

The OBSERVER

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FEBRUARY 2011

TCAA ANNUAL MEETING FEBRUARY 5TH

The 51st annual business meeting and banquet of the Twin City Amateur Astronomers will take place on Saturday, February 5th, at the Normal Township Hall, 304 E. Mulberry Street in Normal. Participants should arrive at 6:00 p.m., and the banquet begins at 6:15 p.m. Free parking is available in back of the building and on the adjacent street. There is also a small parking lot across the street. You need to be traveling westward on Mulberry St. (a one-way street) in order to gain access to the location. The purpose of the Annual Meeting is to elect this year's Board of Directors, listen to officer reports, watch award presentations, and hear a guest speaker.

Our guest speaker this year will be Dr. Nancy Sultan, Professor and Director of Greek and Roman Studies at Illinois Wesleyan University. Her talk title is *'But Zeus made them into Stars': Greek Myths and the Laws of the Cosmos*. Her talk will commence after the business meeting that follows the banquet meal.

This year we will have a buffet-style banquet meal provided by Rick McCormick of Redbird Catering. The menu consists of the following: Fried Chicken, Baked potato with butter and sour cream, Rolls and butter, Sliced Carrots, Fruit salad, and Ice Tea and Coffee. Cake will be served for dessert. Plates, plastic utensils, cups, and napkins will be provided.

Reservations for the banquet are due to Carl Wenning carlwenning@gmail.com by Tuesday evening, February 1st. The cost of the banquet is \$11 per person; payment must be made at the door to Treasurer Duane Yockey. If for any reason you make reservations and are not able to attend, please cancel your reservations with Carl not less than three days in advance of the event. Failure to cancel reservations in a timely fashion might result in billing for the cost of the banquet.

TCAA members are invited to attend both the business meeting and the follow-up talk starting around 7 p.m. at no charge. No reservations are required for either, only the banquet meal.

Many thanks to President Dave Osenga for making all the arrangements for the Hall and the catering.

HISTORY DVD TO BE DISTRIBUTED AT ANNUAL MEETING

Pursuant to his work of writing and publishing *History of the Twin City Amateur Astronomers 1960-2010*, TCAA Historian Carl Wenning will distribute at cost DVDs containing nearly 3 gigabytes of photographs and printed information dealing with the club's history starting with the club's February 5th Annual Meeting. Dissemination of the DVD will help protect the club's historical record for posterity's sake, and will continue via US mail after the meeting. DVDs are being prepared by request only.

The DVD will include scanned images from the club's two scrapbooks thought lost until early 2010, an archive of all club newsletters extant since August 1961 (thanks primarily to the scanning work of Lee Green), scanned minutes of meeting minutes from 1960-1963, scans of early newspaper clippings, *Central Illinois Sky* columns (published by the *Pantagraph*) from 1966-1967, *A Bolivian Adventure* chronicling the club's 1994 solar eclipse expedition, histories of the ISU Physics Department Planetarium and IWU Mark Evans Observatory, and more. It will also include version 5.0.1 of the club's history that is a very slight update of the printed version made available this past September. Lee Green has prepared nice labels for both the DVDs and the jewel cases that will contain them.

In order to obtain a copy of the DVD, you will need to request a copy at least three days in advance of the Annual Meeting by contacting Carl (carlwenning@gmail.com or 309-830-4085). The cost of copies distributed at the Annual Meeting (or face-to-face anytime) will be \$1 each. DVDs will be mailed upon request; the cost of mail distribution will be \$3 total. Send your \$3 pre-payment directly to Carl Wenning, 21 Grandview Drive, Normal, IL 61761-4071. Be certain to include your mailing address. Checks should be made payable to Carl.

Printed copies of the club historical volume are now in the hands of about a dozen club members, and additional copies are maintained in the TCAA library as well as the McLean County Historical Society. An electronic copy of the history book is also available on the TCAA website at <http://tcaa.us>. One (1) hard copy of the club's history book is still available from the Historian for \$49.50 plus \$5 shipping if any – John Werner having purchased the next-to-last copy recently.

The *OBSERVER* is a monthly publication of the Twin City Amateur Astronomers, Inc., a registered 501 (c)(3) non-profit educational organization of amateur astronomers interested in studying astronomy and sharing their hobby with the public.

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Membership Dues

Individual Adult/Family \$40
Full-time Student/Senior \$25
Electronic Newsletter \$25

To join the TCAA, send your name, contact info and dues payment to

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JANUARY 4TH BOARD MEETING MINUTES

President Dave Osenga called the meeting of the TCAA Board at the office of Treasurer Duane Yockey to order at 6:42pm. Present along with Duane were William Carney, Tony Cellini, Bob Finnigan, Lee Green, Dan Miller, Dave Osenga, Tom Weiland, Carl Wenning and John Werner. The minutes of the previous meeting were quickly approved.

Lee noted that 2010 was another good year for the club as we posted 37 events with an average of over 5 members at each of those events. Members brought telescopes 87 times and we interacted with 1177 people. He noted the recent improvements on the TCAA web site and referred to an article on the subject in the January 2011 Observer. He also reported that Michael Rogers had contacted him about the cost of renewing the teaa.us domain name. The \$112 fee for a 7 year renewal was unanimously approved and Duane provided a check for Michael that Lee will deliver.

Duane submitted the latest Treasurers report which was approved. He raised the issue of the key-holders' fees in light of the recent improvements at SGO, suggesting that we revisit the fees charged to fairly reflect new expenses associated with the observatory. For example, he suggested that the cost of possible insurance should be borne by the members who most use the facility and that any insurance could be limited to fire and theft. He indicated the need for new and improved procedures and training be made available before key-holder status be conferred.

Duane then raised the possibility of terminating the distribution of the monthly Abrams Sky Calendar given the free availability of such sky maps online. The motion to suspend our subscription was unanimously approved. Lee agreed to review the web site for references to this item and Dan suggested that we include the web addresses of free alternatives in the Observer.

William indicated that the Meade LX-200 fork had been sold and promised to remit the funds back to the club. He, Carl and Dave noted the many improvements made by SGNC to the barn next to SGO and that we are looking forward to having some space there. While progress has been rapid, the space is not yet available and Carl will discuss some of our needs with Angela. William also noted that he has disassembled the 16" roll-out Dobsonian telescope and that the mirror was stored at SGO.

Carl noted that the new SGO pier had been installed on December 22, 2010. All agreed that the work performed by Jim Dunham was of excellent quality. Carl suggested that the club reimburse Jim for his time and materials and stated that Jim had estimated the value of his work at \$350. Carl thought this was low and that an appropriate amount was \$500 and that he had made a \$150 donation to the club to make up the difference. Payment to Jim was approved unanimously and a \$500 check was given to Carl.

Duane noted that the 2011 NCRAL conference was planned for Green Bay, Wisconsin. The 2011 ALCON is slated to be held 6/29-7/2/2011 at Bryce Canyon National Park. Duane and Carl expressed interest in attending and William noted that he had already reserved a hotel there.

Everyone thanked Dave and Donna Osenga for hosting this year's Saturnalia party. Recent observing opportunities have been limited by winter weather, and the solstice total lunar eclipse was obscured by clouds.

Carl distributed draft copies of the program for the 2011 Annual Meeting to be held February 5. He reported that the Catering Club had agreed to provide food service for our meeting and that approximate cost would be \$12-15. He also spoke with Professor Nancy Sultan about the possibility of having her as keynote speaker. Annual award nominations discussed and three awards to be disclosed at the annual meeting were approved unanimously as was an honorarium for our newsletter editor Erin Estabrook.

The Board then chose a slate of candidates for the next Board of Directors including Paul Pouliot, Tony Cellini, Tom Weiland, Dan Miller and Dave Osenga. Other candidates may be nominated at the meeting. We then tabled a discussion of a substitute plaque for the soon to be filled Weldon Schuette Society of Outstanding Amateur Astronomers. Lee then reported that our 2011 Public Observing Session calendar had been completed and, with Carl's suggestion of a topic change, the events have been published on the club web site.

Dave then turned discussions to the recent improvements at SGO and led us all in thanking Bob Finnigan for his recent generous contributions to the club. Among the needs for better security were a safe and a deadbolt to better protect equipment. Following on Duane's comments, several people suggested the need for guidelines, training materials and operating procedures to establish usage requirements for safely operating the observatory. We had a variety of ideas discussed including having a tiered certification process where members can be trained to perform tasks of increasing sensitivity, and establishing a calendar in which equipment configurations can be planned. John suggested that we designate certified trainers who are qualified to help members become qualified for using the equipment. Dan suggested having different levels of training depending on the intended activities of each member. Bob suggested that setting up a telescope at ground level for imaging would be a productive way to help people gain the experience for using the observatory and implied that his CGEM mount could be made available for this. Lee noted that many concerns centered on the need to properly configure equipment and that activity should be per-

(Continued on page 8)

NASA SPEAKER AT CLC ON JANUARY 28TH

Six TCAAers and family members attended a talk by NASA astronaut trainer Jeff Fitch as part of the 25th anniversary commemoration of the Challenge shuttle disaster that occurred 25 years earlier to the day. In attendance were Paul Pouliot along with Eve and Amber, Dave and Donna Osenga, and Carl Wenning.

Following a tour of the Challenger Learning Center that began at 7:00 p.m., everyone moved to the Asteroth Auditorium of Heartland Community College for a 7:30 p.m. commemoration conducted by Lead Flight Director Stacey Shrewsbury. The 20-minute commemoration talked about the mission, lives, and deaths of the seven who gave their lives. Stacey pointed out that their lives were not wasted as can be seen by the 48 CLCs across the US, Canada, and Great Britain that serve to inspire the next generation of space voyagers and scientists. Seven white roses touchingly were placed near the lectern.

Mr. Fitch's 30-minute presentation dealt with his time growing up in Normal from a geeky youth, to his preparation in the ISU Physics Department, to his life and times with NASA serving as an astronaut trainer working primarily with payload specialists. Following this presentation, he answered questions from the audience for another 20 minutes or so.

Just prior to this event, Paul, Eve, Amber, and Carl shared supper at Steak and Shake on Raab Road. A fun time was had by all.

2011 POS SCHEDULE SET

Each year during the warmer months the TCAA conducts a series of sky viewing sessions for the general public. These sessions are held at Sugar Grove Nature Center on Saturday evenings and begin at dusk. Each POS typically includes the following components: (1) *Lecture about the featured object*. This 20-30 minute presentation, held in the SGNC picnic shelter, includes images of and details about the featured sky object as well as information on other interesting celestial objects that might be viewed that evening. (2) *Sky tour using a laser pointer*. We step out under the stars to point out the major constellations and planets, and to designate the location of the featured celestial object for the evening. (3) *Telescopic viewing*. We use members' telescopes at ground level to observe the featured object and other wonders of the heavens.






The 2011 POS schedule was designed to give a bit more lunar exposure this year while avoiding infringing significantly on the topic for each program. Lee Green has arranged the programs as follows:

- ☆ **March 12: MESSENGER to Mercury** (8 day old moon) – MESSENGER's arrival at Mercury starts a new phase of planetary exploration. We'll preview the mission, the spacecraft and its journey and we'll review other planetary orbiters.
- ☆ **April 9: Birth of Stars: Orion's Nebula** (5 day old moon) – We look at how stars, star clusters and planets are born from large clouds of interstellar gas.
- ☆ **May 7: Saturn's Rings** (9 day old moon) – The ringed planet provides one of the most compelling sights you can view through a telescope. We highlight Saturn near its annual opposition and review the latest findings from Cassini.
- ☆ **June 4: Death of Stars: Planetary Nebulae** (4 day old moon) – As a star burns up its hydrogen fuel, amazing things happen to the star. We review the relation between variable stars, planetary nebulae and supernovae.
- ☆ **July 9: Galactic Travelers: Globular Clusters** (7 day old moon) – These ancient companions to our Milky Way galaxy provide clues about stellar lifecycles and galactic distances.
- ☆ **August 6: Small Bodies – Large Impacts** (9 day old moon) – Some of the smallest bodies in our solar system have had the biggest impact on our understanding of how the solar system formed. Small bodies like comets, asteroids and the small objects in the distant Kuiper Belt have been very difficult to see, much less study. Join our exploration of these curious members of our solar system and experience their impact -- on our understanding and on the planets.
- ☆ **September 3: Phases of the Moon** (7 day old moon) – Earth's monthly companion is involved with many processes on Earth. We look at the phases of the Moon, eclipses and tides to explore how the Moon influences the Earth.
- ☆ **October 1: Jupiter's Moons** (4 day old moon) – The King of Planets dominates our solar system through its gravitational pull. It also contains some of the largest moons in the solar system.

Things to Remember: Telescope observing can take place only if the sky is reasonably free of clouds and transparent. In the event of an entirely overcast sky, the observing session and associated talks will be cancelled. When uncertain if a session has been cancelled, call Carl at (309) 830-4085 or Lee at (309) 824-2804 after 6 PM. Please dress very warmly during cooler months. These are outdoor events; none of the buildings we will use are heated. Please be very careful when driving into and out of the Sugar Grove Nature Center parking lot. Many times there are people, including small children, walking from place to place in the dark. Parking lights only are requested near the observing area.

JANUARY OBSERVER'S LOG

FEBRUARY SKY GUIDE

- 01** The Moon passes 4° north of Mercury, noon 
- 04** Mars is in conjunction with the Sun, 11 A.M.
- 06** The Moon passes 6° north of Uranus, 6 P.M. 
- 07** The Moon passes 7° north of Jupiter, 4 A.M. 
- 17** Neptune is in conjunction with the Sun, 4 A.M.
- 21** The Moon passes 8° south of Saturn, 11 A.M. 
- 25** Mars is in superior conjunction, 3 A.M.
- 28** The Moon passes 1.6° north of Venus, 10 P.M. 

William Carney started out 2011 right by observing for about an hour at SGNC on the evening of New Year's Day. Due to back pain, he was unable to continue observing for long and evidently departed just before Bob Finnigan and Lee Green arrived. Bob and Lee spent time imaging using the 5-inch telescope housed in SGO. They started off their evening by aligning the CGE Pro mount recently installed on the mono pier. Afterwards, they conducted computer-based observations from the warmth and comfort of the nature center building.

The next night, seven observers traveled to SGNC to view the winter skies. In attendance were Bob and Lee, Tom Weiland, Tony Cellini, Dan Miller, John Werner, and Carl Wenning. Despite a temperature in the teens and a slight breeze, a number of observations were completed. John, Tony, Carl and perhaps others observed a bright meteor (about magnitude -3 and possibly a Quadrantid meteor) moving downward toward the southeastern horizon, passing just to the east of Sirius. The meteor was "slow" and had a slight green tint. Carl completed five observations of planetary nebulae. He is now only 10 objects away from completing all observations required to earn his 11th AL observing club award. He has been working on this program for three years now, and considers it his most challenging.

Immediately after the Board of Directors meeting on January 4th, Lee Green and Bob Finnigan headed out to SGNC to conduct some more astronomical imaging. They remained out until about 1:15 a.m. taking images of the Christmas Tree cluster in H-alpha.

The January MOOS was held on the evening of the 8th despite the presence of a 4-day-old waxing crescent moon. In attendance were Lee Green, William Carney, Bob Finnigan, Tony Cellini, and Carl Wenning. Lee, William, Bob and Tony observed remotely from the relative comfort of SGNC using remote imaging techniques. They spent the evening photographing the heart nebula with the 5-inch and M1 with the 11-inch telescope. Carl spent three hours flitting back and forth between his truck and remotely controlled CPC 11-inch telescope observing objects of the Herschel II program. He was able to observe a total of 30 open clusters, planetary nebulae, emission and reflection nebulae, and galaxies despite the presence of the moon low in the western sky. In total, Carl now has 96 of the 400 observations required for the Herschel II observing club award. While the sky was transparent, the seeing was relatively poor.

The next day, Sunday, Carl spent part of early morning viewing the sun with his PST H-alpha solar telescope before a thin layer of clouds rolled in. He was able to glimpse a large sunspot but nothing else. With the use of new adapters, Carl is now able to piggyback his PST atop his CPC 1100 that is outfitted with a white light filter. Now, an observer can capture both views of the sun at one time. The piggyback mount is outfitted with precision slow motion control knobs in both elevation and azimuth. These make it possible to perfectly align the two telescopes with one another.

Bob Finnigan and Lee Green traveled to SGO on two occasions during January to more precisely align the newly installed CGE Pro mount. On the evening of January 28th, they spent two hours making refinements and then spent time imaging the Rosette Nebula and the Leo trio of galaxies. They remained at SGNC until just after 2 a.m. doing their photographic work mostly from within the warm confines of the nature center building.



UPDATES AT SGNC

Following approval at the January 4th Board meeting, Bob Finnigan purchased a 400-lb gun vault for SGO and had it delivered there the next day by Kenney's Delivery, Moving & Storage. Lee Green joined Bob during the delivery and they spent time reconfiguring the inside of the storage locker to hold the new 11-inch Celestron HD telescope. On this same day, machinist Jim Dunham received remuneration for his part in the fitting of the mono pier and CGE Pro mount under the dome of SGO several weeks earlier.

On Wednesday, January 26th, Duane Yockey, Lee Green, and Carl Wenning met over lunch at Michael's in downtown Bloomington with businessman George Farnsworth, retired head of the Farnsworth Group of Bloomington – a large surveying and architectural firm associated with much of the construction that historically has taken place in the Twin Cities. George had asked through Duane to meet with TCAA representatives to hear our take on needs for storage inside the newly refurbished storage barn adjacent to the SGO. Following a lively round of discussion, it was agreed that Lee would get back to George with a statement of need of storage space and security. He will do so as soon as reasonably possible.

UPCOMING E/PO EVENTS

Looking further ahead (so we don't forget about them), the TCAA has been asked to participate in or present the following events:

- ☆ March 12 (Sat.), 2011 – Our first POS for the year will be MESSENGER to Mercury. NASA Solar System Ambassador Lee Green will be previewing the arrival of the MESSENGER at Mercury. This will be the first spacecraft to orbit the innermost planet in our Solar System and will give us a better understanding of this small, strange world. We will also tour the night skies and point out the constellation and give you a look through our telescopes at beautiful celestial objects.
- ☆ April 17 (Sun.), 2011 – Family Science Day, Sponsored by CeMaST, Coordinator Lee Green; three interactive displays (how telescopes work, laptop planetarium, and solar observing.)
- ☆ May 7 (Sat.), 2011—Space Day, sponsored by the Challenger Learning Center. The coordinator is Carl Wenning. He will present a 15-20 minute talk about telescopes, astronomy, space exploration, etc. for a class of up to 24 enrollees.

ASTRONOMY TEACHING RESOURCES

Starting in mid January, TCAAer Carl Wenning began teaching a graduate-level "Space Science for Middle School Teachers" course for Illinois State University's Department of Curriculum & Instruction. Enrolled in the course are members of a master's degree cohort who have been taking courses in physical science, earth science, and now space science. Carl, along with his daughter Rebecca, taught the physical science course for this same cohort during the summer of 2009.

Dozens of classroom-ready astronomy teaching resources have been prepared by Carl for this spring semester course. If you would like to take advantage of the educational materials, feel free to visit the PHY 489.02 course website at <http://www.phy.ilstu.edu/pte/489.02.html>

CELESTRON PRODUCES NEW WEDGE

Duane Yockey and Carl Wenning have been debating purchasing equatorial wedges to work with their CPC 1100 telescopes. A wedge, fitting between the telescope mount and the telescope proper, would allow for the alt-azimuth mounts to work in equatorial fashion. In so doing a telescope can track the stars with one-axis motion. This, in turn, would allow these amateur astronomers to conduct astrophotography without having to worry (as much) about field rotation.

Until now neither has purchased an equatorial wedge for two reasons: (1) Celestron's only available wedge was considered inadequate to the job of firmly holding the telescope in place, and (2) a good substitute from England was available but cost some \$600. During the past several months, Celestron began shipping a new, much more substantial wedge available for under \$400. Carl took the leap and last month acquired the new Celestron wedge (that he is glad to loan to Duane if he's interested). The wedge arrived during January, and Carl is anxiously awaiting warmer weather when he might start using it to do astrophotography.

SkyMaps.com REPLACES ABRAMS SKY CALENDAR

Because a free online replacement is available for the Abrams Sky Calendar (which costs the club \$2.64 per member per year in addition to increased postage for sending *The OBSERVER*), the TCAA Board agreed to stop acquisition of this publication and direct the membership to SkyMaps.com from which they can freely access a very similar publication free of charge. This cost-saving measure was made as a result of a dramatic increase in the amount of money being spent recently to update SGO.

Club members are hereby encouraged to download and print monthly sky maps from the following web address: <http://www.skymaps.com>. The Evening Sky Map (PDF) is a two-color, two-page monthly guide to the night sky suitable for all sky watchers including newcomers to Astronomy. Designed to print clearly on all printers, The Evening Sky Map is ready-to-use and will help observers:

- identify planets, stars and major constellations;
- find sparkling star clusters, wispy nebulae & distant galaxies;
- locate and follow bright comets across the sky; and
- learn about the night sky and astronomy.

STARDUST—NEXT

By Lee Green

On February 14, 2011 the Stardust mission returns to comet Temple-1.

Stardust was launched in 1999 to travel through the tail of comet Wild-2. It was equipped with “aero-gel” cells that collected small particles from the coma and, in 2006, those samples were returned to Earth in our successful mission of interplanetary prospecting. After the delivering the samples, Stardust was healthy but orbiting the Sun and low on fuel.

Comet Temple-1 was the destination for the Deep Impact mission that launched in 2005 and shot an “impactor” rocket into the comet to see what we could knock off the surface. The resulting plume from the impact, shown here, was much larger than anticipated and showed that water, carbon dioxide and minerals were abundant and that comets can be described as “dirty snowballs.” After the event, the Deep Impact spacecraft was healthy but left orbiting the Sun far, far away.



With two healthy spacecrafts already in orbit, NASA found more for them to do. Deep Impact was repurposed as the EPOXI mission and was guided to a successful fly-by of comet 103P/Hartley in November last year. Stardust's extended mission is Stardust-Next. It sounds easy to repurpose the mission for a new target, but the considerations that go into such a decision are far from trivial.

Does the spacecraft have enough fuel to make the needed trajectory changes to bring it to the target? Will the solar arrays still generate sufficient power in its new orbit? How long will it take to arrive at the target and can you expect the onboard equipment (gyros, batteries, etc.) will continue to work? Can the science package equipment perform the job you will need and can antennae and radio support the required data rates? Can you justify the additional cost for the likely science gains? These are just a few of the considerations that must be taken into account.

Comet Temple-1 orbits the Sun every six year in an elliptical orbit. At perihelion, it is outside the orbit of Mars and at aphelion, it is near the orbit of Jupiter. Redirecting Stardust to Temple-1 took almost all the remaining propellant, but it is on course for a sweet rendezvous with the comet on Valentine's Day.

This is the first time we have returned to the same comet on successive orbits. We will be looking for changes on the comet's surface after its trip around the Sun, revisiting and extending our mapping of the interesting regions on the surface. We will also look for the impact site created by Deep Impact to see if it is visible and what “weathering” might have occurred.

Stardust will run out of fuel and be decommissioned. After all its spectacular successes, all the men and women who have guided the spacecraft through its 12 year mission should be congratulated.

Be sure to visit <http://www.stardustnext.jpl.nasa.gov> for more information about this mission which is also featured on the NASA **Eyes on the Solar System** web site at <http://solarsystem.nasa.gov/eyes>.

EYES ON THE SOLAR SYSTEM

By Lee Green

Explore the Solar System in interactive 3D at NASA's new Eyes on the Solar System web site at <http://solarsystem.nasa.gov/eyes>.

You immediately see the current solar system with the Sun and the planets. The site uses an intuitive navigation technique that lets you change your view by dragging the mouse and zooming in or out with the mouse wheel.

Click on a target to select it as your destination and click again to go there. The planets, their moons and NASA spacecraft are all available as destinations. Once at a destination, you can view a variety of information in pop-up windows and with direct links to news and other information on NASA sites.

You can speed up and reverse time to watch the planets and moons revolve and orbit. Follow along to watch events as they occur. All NASA missions since Pioneer 10 was launched in 1970 are included in the simulation, so you can easily zoom into current missions to see where they are or follow along as the Voyager probes complete their Grand Tour of the outer planets.

This page is a great way to learn about and visualize the Solar System and NASA's missions of exploration.

THOUGHTS ON EYEPIECES

By Carl Wenning

In the February 2009 issue of *The OBSERVER*, I wrote about the exit pupil of various eyepiece-telescope combinations. I noted there that the eye's pupil (the diameter of the small disk of light emanating from an eyepiece) must exceed the exit pupil of the telescope system if vignetting is not to occur, wasting much of the light-gathering power of the telescope. (This effectively reduces the aperture of a telescope.) Now, the brightest views of diffuse objects visible in a telescope occur when the two pupils are matched.

The diameter of the exit pupil of the telescope is dependent on the objective aperture and the magnification. They are related in the following manner:

$$\text{Eyepiece exit pupil diameter} = \text{Telescope aperture} \div \text{Magnification}$$

where exit pupil diameter and aperture are stated in the same units. Stated in another way:

$$\text{Eyepiece exit pupil diameter} = \text{Eyepiece focal length} \div \text{Objective f-ratio}$$

As the first equation shows, lower magnifications produce larger exit pupils, and higher magnifications produce smaller exit pupils. The second formula shows that exit pupil diameter is proportional to eyepiece focal length – the objective's focal ratio being fixed for a particular telescope.

Consider the use of f=12mm and f=17mm Nagler eyepieces with an 82-degree apparent field of view with my CPC 1100 telescope (f/10, F = 2794mm. aperture 279.4mm).

$$\text{Magnification produced by 17mm eyepiece} = F/f = 2794\text{mm}/17\text{mm} = 164X$$

$$\text{Magnification produced by 12mm eyepiece} = F/f = 2794\text{mm}/12\text{mm} = 233X$$

These magnifications relate apparent field of the eyepiece (how wide the field appears to the eye) and true field (how much of the sky one sees with a particular eyepiece-telescope combination) in the following fashion:

$$\text{True field} = \text{Apparent field} \div \text{Magnification}$$

$$\text{True field for 17mm Nagler with CPC} = 82^\circ/164X = 0.5^\circ \text{ (the diameter of the full moon)}$$

$$\text{True field for 12mm Nagler with CPC} = 82^\circ/233X = 0.35^\circ \text{ (about 2/3 the diameter of the full moon)}$$

Now, the pupil diameter of the typical adult human eye is mostly a function of age. Young adults on the order of 20 years of age will have a fully-dilated pupil diameter of as much as 7.5mm, whereas someone who is 70 years of age will have a dark-adapted pupil diameter on the order of 3mm. A simple formula relating average pupil diameter of the eye to the adult observers age (≥ 20) is given as follows:

$$\text{Average pupil diameter} = (-0.09\text{mm}/\text{yr}) \times \text{Age} + 9.3\text{mm} \text{ (Age} \geq 20\text{yr)}$$

Hence, in my case (58 years old) selecting a low power eyepiece-telescope combination that produces an exit pupil of greater than 4.1mm probably would not be advisable. Therefore, the lowest magnification I should be using with a Nagler-type eyepiece would be (using the first equation):

$$\text{Telescope aperture} \div \text{Eyepiece exit pupil diameter} = \text{Magnification}$$

$$279.4\text{mm}/4.1\text{mm} = 68.1X$$

and from the second equation, the maximum focal length of an eyepiece that I should use would be:

$$\text{Eyepiece exit pupil diameter} \times \text{Objective f-ratio} = \text{Eyepiece focal length}$$

$$4.1\text{mm} \times 10 = 41\text{mm}$$

You might want to make these calculations for yourself given your telescope and eyepiece collection. What you will focus your attention on is the long focal length, lower power producing eyepieces. It is these eyepieces that are most likely to cause problems with vignetting.

Keep in mind that eye relief (how far from the surface of the eyepiece one should place his or her eye to get the optimal view) is set by optical designers and is independent of the parameters of the telescope with which the eyepiece is used. Nagler 12mm and 17mm Type 4 eyepieces have 17mm eye relief. Typically, if one is wearing glasses, one will want to have an eyepiece with an eye relief of about 20mm, but this varies by individual. Positioning one's eye to close to or too far from the eyepiece will cause edge darkening and loss of field of view.

JANUARY 4TH BOARD MEETING MINUTES (CONT.)

(Continued from page 2)

formed only by qualified members. Dan looked ahead to maximizing observatory performance using T-Point to accurately model the mount and John suggested MaxPoint as a similar alternative.

At this point, Carl and Dave noted that these discussion could extend indefinitely and suggested that an ad hoc committee be established to develop a more comprehensive and detailed approach to managing the observatory. The goals stated included Equipment, what configurations were appropriate and what schedule could be planned for their use; and Training, to develop a training regimen for members, perhaps through a tiered program or internship. Lee agreed to chair this committee which included John, Dan, Bob, Tony and William.

Duane agreed to look into the cost of obtaining Fire and Theft insurance for the observatory. Bob indicated his willingness to purchase a safe for the observatory but was concerned about the logistics of installing it. The Board unanimously approved his offer and agreed to reimburse Bob for the cost of using a moving service. John voiced concern about the strength of the door even with a deadbolt, and the Board agreed that the observatory should be re-keyed. William agreed to investigate the cost of rekeying and installing a deadbolt and will forward the estimates to Dave for approval.

Carl reported that he had a successful trip to UMCE in Chile and that he was pursuing a request by the people there for collaboration with our club and several members expressed their willingness to help. Carl offered to step down from his position as Club Historian at the end of his term but would be willing to serve if called on. Many members noted Carl's excellent work and called on Carl to remain in his post. He noted that he has two boxes of memorabilia in his home and suggested that the material be donated to the McLean County Historical Museum and the Board readily concurred. Duane offered his assistance in this effort. Finally, Carl noted that several EPO events have already been scheduled and will be publicized soon in the Observer.

The meeting was adjourned at 7:49pm.

Respectfully submitted,

Lee Green

Secretary

KITTY KISSES TO FEATURE ASTRONOMERS

Friends of the SGNC receive a quarterly newsletter, *The Nature of the Grove*. Each newsletter features a variety of articles about happenings at the Grove. A regular column, one called Musings & Meowings, is ostensibly written by Daisy Kitty, the white cat that resides in the nature center building. Well, Daisy Kitty has decided to write about nighttime happenings at the SGNC for the April/May/June issue of the newsletter, and featured prominently will be the observing activities of the TCAA. The column is very cute, and draws readers' attention to the fact that our membership is active there at night. When the spring issue of the newsletter is released, we'll be certain to forward Daisy Kitty's comments to the membership. (Better yet, become a friend of the nature center and it will be sent to you directly.)

The January/February/March 2011 edition of *The Nature of the Grove* is now available online. Highlights include: Maple Sirup Programs for Schools, Families, and Scouts; Musings & Meowings by Daisy Kitty; The Great Backyard Bird Count; 2010 Photography Contest Winners; Upcoming Programs and Events for all Ages, and much more. Visit the following URL to download the latest issue of the newsletter: <http://www.sugargrovenaturecenter.org/nl/SGNC%20JanFebMar%202011.pdf>

If you are not personally a member of the Friends of SGNC (and at least two of our members are at the \$500 level), you might want to join to help support the efforts and activities of the nature center.

THE DARK-SKY MOVEMENT

By Mike Krumboltz
From Yahoo! Buzz®

Stargazers now have their Graceland. The [Channel Island of Sark](#), located 80 miles south of England, has been designated as the world's first dark-sky island.

[Dark-sky communities](#) are places with very little to no light pollution. As a result, the stars are far easier to see and more fun to look at. According to a [buzzy article from SPACE.com](#), Sark is just 4.5 square miles and has "no public street lighting, no paved roads, and no cars." In other words, save for the occasional flashlight or matchstick, there aren't a lot of things to interfere with the nighttime display, which includes "meteors streaking overhead and countless stars on display."

[The International Dark-Sky Association](#) (IDA) makes the call on whether or not a community deserves to join their movement. And plenty would like to. [The Burlington Free Press](#) explains that dark-sky legislation "has been embraced by about 300 countries, cities, and towns." At first this might sound like something only nature enthusiasts would really care about, that's not so. The United States military is also getting behind the legislation. Too much light can interfere with drills at military bases.

And while they don't exactly get a say in the matter, it's worth noting that creatures big and small would likely also be in favor of more dark-sky rules. Again, according to the Burlington Free Press, there is evidence that "nighttime lights disturb animals and ecosystems."

You can learn more about the dark-sky movement at [the IDA's official site](#). The organization is about a lot more than looking at stars. Members are also active in educating the public about the hazards of unnecessary artificial light. The site includes information on how to become a member and steps that can be taken to reduce light pollution, lower your CO2 emissions, and save a fair bit of money on your electric bill in the process.

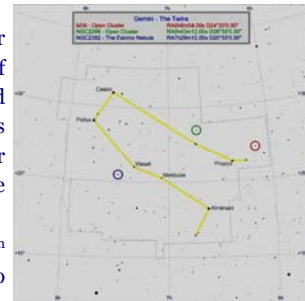
CONSTELLATION OF THE MONTH: GEMINI—THE TWINS

Gemini is a bright zodiac constellation that is best seen during the late winter and early spring. Gemini lies northeast of Orion between Taurus and Cancer.

The two brightest stars in Gemini are Castor and Pollux. In mythology, Castor and Pollux were born to Leda, the Spartan queen, and Jupiter under the guise of the swan, Cygnus. Leda gave birth to an egg which hatched the twins Castor and Pollux. Castor was said to be the master of horses while Pollux was known for his skill in boxing. The twins were inseparable and accompanied Jason on his quest for the Golden Fleece. The twins' sister was Helen, known as Helen of Troy, whose abduction triggered the Trojan War and whose face launched a thousand ships.

Gemini is the 30th largest constellation covering 514 square degrees. It is the 13th brightest constellation and reaches opposition on January 7. In addition to the two bright stars Castor and Pollux, several other stars in Gemini are named including Almeisan, Wasat, Mekbuda and Propus. Mekbuda is a variable star and Wasat and Propus are binary stars.

Among the deep space objects found in Gemini is M35, a naked-eye open cluster. NGC2392, the Eskimo Nebula is a bright and complex planetary nebula which resembles an Eskimo's hooded face.



THE EVOLUTION OF AMATEUR ASTRONOMY: THE TCAA THEN AND NOW—REPRISE

By Carl Wenning

Last month I thought that was finished with this series of articles when a day after the January issue of *The OBSERVER* came out I had an email conversation with one of our founding members, Bill Blunk. Bill lamented the fact that the club was no longer involved with amateur telescope making (ATM), but now is geared primarily toward astrophotography using very sophisticated, commercially prepared instruments. Reflecting on his comments, I now see that TCAA activities have evolved through three stages during the 50-year history of the club. Reflecting on these stages will help better to gain an appreciation our history.

Stage I – Amateur Telescope Making: The first stage started with the club and ended by the mid 1980s for most club members. From the earliest times, club members were involved in making reflecting telescopes in the range of 4.25 to 8 inches. Several of the early members were technically inclined, and at least one (Bob Mayo) was a professional machinist. When the club started, the membership had a small collection of 2.4 to 3-inch refractors and a couple of 4.25-inch reflectors. Our founder, John Kieviet, built his first 6-inch reflector through the club by its second year. Following these earliest starts, formal mirror and telescope making did continue among but primarily among those less attached to the club – Bill Blunk, Joe DeHoff, and Bob Ryburn – all of whom are still building according to the latest reports.

Stage II – Visual Observing: With the growing availability of commercially built telescopes, club members eventually moved away from telescope making and started purchasing their instruments. The 1970s saw the development of the readily accessible Celestron 8 series. Shortly thereafter, a slew of Dobsonian telescopes were offered by Odyssey and other makers, with 10, 13.1 and 17.5-inch telescopes being the most common. With low-cost telescopes now readily available, club members took this route to furthering their studies of the sky. This is really what led to the demise of ATM within the TCAA's active membership. Also instigating the departure from ATM were the observing clubs of the Astronomical League that started with the Messier Club around 1967.

Stage III – Astrophotography: In the early 1990s, well healed amateur astronomers were able to purchase the first commercial grade digital cameras. By the mid 1990s, GoTo telescopes with precision mounts began to make their appearance as well. Mike Rogers purchased an 8-inch Meade GoTo telescope that soon became the rage. The marriage between these two technologies led to a rapid explosion in digital imaging of the night sky. Today the TCAA is filled with individuals who spend most of their time doing astrophotography. Still, there are a few who are strongly dedicated to visual observing and work diligently on earning Astronomical League observing club awards. There are also a very few who might be considered hybrids, spending time with feet in both camps.

TCAA Treasurer's Report – January 2011

OPERATING FUND BALANCE – December 31, 2010 - \$ 1,985.41

Income

Dave Osenga (Dues) -	\$	40.00
John Werner (Dues) -	\$	40.00
William Carney (Dues) -	\$	40.00

Expenses

LYB Inc. (Observer copies & postage) -	\$	44.48
Michael Rogers (Web domain) -	\$	112.00
Carl Wenning (Awards Engraving) -	\$	30.00

OPERATING FUND BALANCE – January 31, 2011 - \$ 1,918.93

OBSERVATORY FUND BALANCE – December 31, 2010 - \$ 2,679.34

Income

Sale of fork -	\$	200.00
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Expenses

Jim Dunham (SGO Pier machining) -	\$	500.00
William Carney (Rekeying locks & keys) -	\$	137.06

OBSERVATORY FUND BALANCE – January 31, 2011 - \$ 2,242.28

TOTAL TCAA FUNDS – January 31, 2011 - \$ 4,161.21

Respectfully submitted, L. Duane Yockey, Treasurer

Sugar Grove Observatory

Listing of Official Keyholders (Paid \$10 deposit/\$5 renewal)

Duane Yockey (renewed through 2009)
William Carney (renewed through 2010)
Carl Wenning (renewed through 2009)
Brian Barling (renewed through 2010)
David Osenga (renewed through 2010)
Josh Lindsey (renewed through 2010)
Dan Miller (renewed through 2009)
Lee Green (renewed through 2009)

MISSING OUT ON TCAA ACTIVITIES & EVENTS?

If you are missing out on club activities or celestial events, be certain to join the TCAA listserv. Many activities are planned at the last minute, and announced only hours in advance through the club's listserv. Reminders about celestial events are also broadcast to the membership through the club's listserv. To join this free service by Yahoo, send a blank email to TCAA-subscribe@yahogroups.com. Unsubscribing is just as easy. To unsubscribe, just send a blank email to TCAA-unsubscribe@yahogroups.com.

To keep up to date on celestial events not described in *The OBSERVER* or addressed in the listserv, visit Carl Wenning's observing page at www.phy.ilstu.edu/~wenning/observing_page.htm. It has been recently updated to include an extended sky calendar of events as well as additional space weather and satellite viewing links.

The OBSERVER

Newsletter of the TCAA, Inc.

Erin Estabrook, Editor
314 Covey Court
Normal, IL 61761

Are your dues due?



The Dues Blues?

If you see a check in the box above, it means your dues are due. To retain membership, please send your dues renewal to our esteemed Treasurer:

**Duane Yockey
508 Normal Avenue
Normal, IL 61761**