

The OBSERVER

IN THIS ISSUE:

TCAA ANNUAL MEETING FEBRUARY 5TH 1
 2011 CLUB PORTRAIT 1
 FEBRUARY OBSERVERS' LOG 4
 UPGRADES AT SGO 4
 MARCH SKY GUIDE 4
 UPDATES AT SGO 5
 TELESCOPE TRAINING FOR CLUB MEMBERS COMING 5
 RECENT AND UPCOMING E/PO EVENTS 5
 2011 POS SCHEDULE SET 6
 CONSTELLATION OF THE MONTH: CANCER—THE CRAB 6
 MESSENGER TO MERCURY 7
 A-TRAIN GLORY 7
 HISTORY OF SPACE SHUTTLE DISCOVERY 8
 TREASURER'S REPORT 11

VOLUME 36, NUMBER 3

MARCH 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. Participating in events were Carl & Carolyn Wenning, Paul and Eve Pouliot, Bob Finnigan, William Carney, Nancy Sultan, Larry Leetzow, Lee Green, Tom Weiland, Erin Estabrook and her two sons, Duane Yockey, John & Joyce Werner, Dave Osenga, Dan & Paulette Miller, Tony Cellini, and new members Don Cooper and Dave Peters.

Following an opening prayer of thanks and a buffet-style banquet, President Dave Osenga called the membership to order for the annual business meeting at 7:23 p.m. He provided a "state of the club" address by reviewing the events of 2010. This including comments regarding 50th anniversary celebration at Ewing Manor, the NCRAL 2010 conference, TCAA education/public outreach sessions, installation of a new pier and telescopes at SGO thanks to generous contributions by club members, recent successes in observing and photography, field trips, improved web presence, a successful Christmas party, stable finances, and publication of a golden anniversary TCAA historical volume.

Duane Yockey then provided a treasurer and ALCor reports. He noted that the club's balance is down about \$600 over the course of the calendar year, which included a loss from NCRAL 2010 due to a smaller than anticipated attendance as well as considerable number of costs associated with improvements at the SGO. The club continues with about 50 members. As ALCor, Duane noted the dates of NCRAL 2011 April 29/May 1 in Greenbay, WI, and ALCON 2011 June 29/July 2 at Bryce Canyon, UT.

Dave then called for nominations for the 2011 TCAA Board of Directors. The names entered into nomination were as follows: Dave Osenga, Dan Miller, Tim Weiland, Tony Cellini, and Paul Pouliot. Hearing no additional nominations, Duane

(Continued on page 2)

2011 CLUB PORTRAIT

At the request of Lee Green, a group photograph was taken at the 2011 Annual Meeting on February 5th.



Kneeling, left to right: John Werner, Dan Miller, Lee Green, Dave Osenga, Duane Yockey. Standing left to right: Bob Finnigan, Dave Peters, Eve Pouliot, Paul Pouliot, Tony Cellini, Tom Weiland, William Carney, Don Cooper, Larry Leetzow, and Carl Wenning.

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.

TCAA OFFICERS

Director Dave Osenga
DaveOsenga@msn.com

Director Dan Miller
309-473-3465
damiller@mail.millikin.edu

Director Tim Weiland
309-473-3045
tomcea@aol.com

Director Tony Cellini

Director Paul Pouliot

Treasurer/RA Duane Yockey
309-452-3936
duane@lybinc.com

Historian Carl Wenning
309-830-4085
cjwennin@ilstu.edu

Web Lee Green
309-454-7349
lee@starlightsoftware.com

Property Manager

William Carney 309-829-7748
willcarney@aol.com

The Observer Editor

Erin Estabrook
314 Covey Court
Normal, IL 61761
309-454-6894
erin@lybinc.com

Submission deadline is the first of each month.

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
Duane Yockey
508 Normal Avenue
Normal, IL 61761

TCAA ANNUAL MEETING FEBRUARY 5TH (CONT.)

(Continued from page 1)

called for a close of nominations. Carl seconded. The membership elected the new Board by unanimous acclamation. He then announced, as required by state law, the official registered agent of the TCAA: Duane Yockey, 508 Normal Ave., Normal, IL.

The TCAA then conferred two recognitions upon the following individuals: Erin Estabrook for serving as editor of *The OBSERVER* since December 2006, and Bob Finnigan, Lifelong Honorary Membership, for outstanding recent contributions to the TCAA by way of restoring life to SGO. TCAA, Astronomical League, and Night Sky Network awards were then conferred.

Tony Cellini received the G. Weldon Schuette Award for Outstanding Amateur Astronomers in recognition of his work as an accomplished astrophotographers and work with the general public in terms of education/public outreach. William Carney received the John & Bertha Kieviet Founders award in recognition of his serve on behalf of the club as property manager. Duane conferred the following Astronomical League awards:

- ☆ Lee Green – Honorary Messier (no certificate or pin)
- ☆ Lee Green & Carl Wenning – Globular Cluster Club
- ☆ David Hahn, Lee Green, & Duane Yockey – Binocular Messier Club
- ☆ William Carney & Carl Wenning – Deep Sky Binocular Club
- ☆ Lee Green – Urban Observing Club
- ☆ Carl Wenning – Master Observer Club
- ☆ Carl Wenning – Outreach Club (all three levels of the award)

Lee noted that pins had not been received from the Night Sky Network for contributions to education/public outreach. He noted that when the 2010 pins arrive, they will be awarded to Carl Wenning, Dan Miller, and Dave Osenga. Carl pointed out the availability of 6 DVDs made possible in part by the efforts of Lee Green who provided labels and jewel cases for the historical DVD. The business meeting then drew to a close at 7:58 p.m.

Carl introduced our invited guest speaker for the evening, Dr. Nancy Sultan. He noted that she hails from Ashville, NC, but has been at IWU since 1991 where she has served as chair of the Modern and Classical Languages and Literature Department, and is now serving as head of Greek and Roman Studies. She earned her Ph.D. from Harvard University completing a study of literary tragedies. Her presentation, *But Zeus made them into Stars: Greek Myths and the Laws of the Cosmos*, ran from 8:10 to 9:10 pm. Nancy spoke about how constellations of heroes (demigods) were created according to Greek myth, and focused attention upon Orion, Perseus, Hercules, and Achilles (no constellation) as types, and less so on heroines such as the Hyades, Pleiades, and Callisto of Big Dipper fame. The talk was very well received by the membership.

Following the close of formal events, the membership continued informal discussions, and then cleaned the Normal Township Hall where the meeting had been held. Lights were turned off and doors were locked by 9:45 p.m. Thanks again to Dave Osenga for arranging this memorable event.



Bob Finnigan receiving the Lifelong Honorary Membership recognition from Dave Osenga.



Dave Osenga presenting William Carney with the John & Bertha Kieviet Founders award.

HIGHLIGHTS OF THE TCAA ANNUAL MEETING



Guest Speaker Dr. Nancy Sultan



Dave Osenga presenting Tony Cellini with the G. Weldon Schuette Award for Outstanding Amateur Astronomers.





Carl Wenning receiving the Astronomical League Master Observer Award from Duane Yockey.





Dave Osenga presenting Erin Estabrook with a Certificate of Merit.


MARCH SKY GUIDE

06 The Moon passes 7° north of Jupiter, 11 p.m. 


12 Asteroid Juno is at opposition, 4 A.M. 


16 Mercury passes 2° north of Jupiter, noon 


20 Equinox (northern spring/southern autumn begins), 6 P.M. 


The Moon passes 8° south of Saturn, 7 P.M. 

21 Uranus is in conjunction with the Sun, 7 A.M.

22 Mercury is at greatest elongation (19°), 8 P.M. 

26 Venus passes 0.2° south of Neptune, 8 P.M. 

30 The Moon passes 5° north of Neptune, 9 P.M. 

31 The Moon passes 6° north of Venus, 8 A.M. 

FEBRUARY OBSERVER'S LOG

Despite a recent blizzard that dumped 13 inches of snow on central Illinois, Bob Finnigan and Lee Green took advantage of two clear nights to view at SGO. Following the February 1/2 blizzard, and despite bitter cold and wind chills far below zero, this dynamic duo spent the evenings of February 3 and 4 viewing remotely from within SGNC. During these operations they imaged a number of astronomical objects.

On Thursday, February 10th, Tony Cellini, William Carney, Bob Finnigan, and Lee Green went to SGO to enjoy the mostly clear skies and the warmer weather despite the presence of a first-quarter moon. The goal was to continue aligning the pier. Lee noted, "Bob took the next step and he hit the polar alignment sweet spot! The GoTo seemed to work well and after a brief visit to the Eskimo Nebula, we went to M81 and the first image looked great. We took a series of three 5-minute unguided exposures of M81 and you can see that the amount of movement is quite small for such a long exposure. From the individual frames, it appears that the elongation is due to periodic error, not from misalignment drift because the movement changed directions. Congratulations Bob! Going forward, we still have much to do, but we've made some definite progress."

Prior to going out on this evening William noted, "Between 5:53 and 6:19 there are no less than four Iridium [satellite] flares. The brightest at -4.3 or about as bright as Venus...." We never did hear over the listserv if William saw all of them.

Bob and Lee went out again on Saturday, February 12th and, according to Lee, "we were able to get a measurement of our polar alignment (to within 13" in azimuth) using MaxPoint." That's pretty good, and within 0.0036 degrees of true north.

The remainder of the month was mostly cloudy but without any reports to the contrary, little else was done by way of observing during February.

UPGRADES AT SGO

By Lee Green

Since my last article in The Observer, we've made some good progress preparing SGO for all our future activities. The weather has not been cooperating and we've had long periods of cloudy weather throughout most of February, but we made several trips to the observatory. "We" includes William Carney, Tony Cellini, Bob Finnigan and Lee Green who have all been actively participating in these endeavors.

In January, we adjusted of the new pier to get it close to vertical. Using successive polar alignments helped us achieve a very good polar alignment of the mount, measured as off by only 13 arcseconds. At that point we deemed to mount to be "well aligned" and turned our attentions to the next steps.

The next steps have been related to further tuning the mount and working with different combinations of optics, cameras and guiders. Each combination of these elements requires that different sets of equipment be mounted and each set must be properly balanced to avoid stress on the mount. We now support piggyback or side-by-side guider configuration; that lets us work with on-axis guiding through our cameras or off-axis guiding through a guide scope. We have installed new locks on the SGO to beef up security and to ensure that access is granted. We are establishing new key holder policies, working to establish a remote video from the dome as well as implementing automated imaging.

We will host a Members-Only Observing Session during the spring so that members who wish to learn astro-imaging techniques can join in an imaging session to see the things we have been doing.

You can follow some of the images we have taken at the SGO on our TCAA website at <http://tcaa.us/Astrophotos.aspx>.



UPDATES AT SGO

Property manager William Carney has been working to maintain Sugar Grove Observatory. He reported on February 18th, "I put some more tree mulch around the base of the building. For newer people this helps in keeping down erosion. I also filled a few potholes in the road going down to the nature center. This is something I usually take care of in the spring. Sometime in the next few weeks I plan on cleaning the concrete area where we set up scopes. This is also an annual spring task because of the loose rock that builds up. I noticed one small siding panel that split and had come loose up on the top section. Not bad considering the winter we had. This piece did not appear to expose the under layer so I will have time to fix it later. It just seemed to expose the board just under it. It looked like a previously cracked piece just coming loose. It may not need fixing at all. I will try and get a better look at it tonight." On February 21st he again reported on progress at SGO, "On Saturday I fixed the small siding panel up high. I also fixed the white lights. I replaced the switch and bulbs so they all work now." Thanks, William, for your unceasing efforts to maintain SGO.

TELESCOPE TRAINING FOR CLUB MEMBERS COMING

Pending approval of the new TCAA Board of directors, AL Master Observer Carl Wenning will offer a no-fee short course for TCAA members this spring dealing with how to use a Dobsonian telescope to make visual observations of objects in the night sky. Carl will be repairing, cleaning, and painting the two Coulter Odyssey 10-inch Dobsonian telescopes on indefinite loan from the ISU Planetarium to teach the series. Two of the club's Telrad finders, taken from dysfunctional club telescopes and provided by property manager William Carney, will be used to replace the wobbly 6x30 finders currently mounted on these telescopes.



This course is intended for those without substantial telescope operating experience. Class size will be limited to four students so that each participant will get lots of hand-on experience with a telescope. Participants will learn about the various powers of the telescope, how to find objects in the night sky using a variety of approaches, and learn about Astronomical League observing programs. Details will also be provided about the club's telescope loaner program of which these telescopes are a part. To sign up for this free course now, please contact Carl immediately via email at carlwenning@gmail.com. In the event of excess demand for this short course, enrollment will be limited to one person per household. A waiting list for future courses over the summer will also be established if necessary. Look for details in the April issue of *The OBSERVER*.

RECENT AND UPCOMING E/PO EVENTS

With the holidays and the cold of winter, there has been a substantial lull in education and public outreach activities during February. One event did take place however. Lee reported that he gave a presentation at Bloomington Public Library during mid February dealing with Stardust and MESSENGER space missions. He reported an audience of 10 people, with about half being kids.

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

- ☆ March 5 (Sat.), 2011 – March MOOS, SGNC, dusk. Open to members and friends of the TCAA.
- ☆ 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.
- ☆ May 7 (Sat.), 2011 – International Astronomy Day. Tom Willmitch of ISU Planetarium requests that the club work with him to sponsor some public events.

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.

CONSTELLATION OF THE MONTH: CANCER—THE CRAB

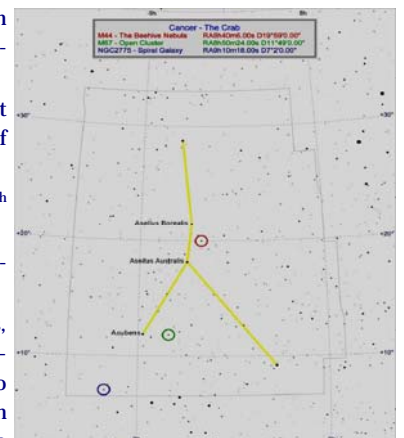
Cancer is a zodiac constellation that is best viewed in the spring. Cancer lies between Gemini and Leo just north of the head of Hydra. Cancer is the most difficult zodiac constellation to view because the stars are very dim.

Cancer is remembered at the crab sent by Juno to harass Hercules during his fight with the Hydra. While the crab was unsuccessful, having been crushed by the heel of Hercules, it was rewarded for its actions with a celestial home.

Cancer is the 31st largest constellation covering 506 square degrees. It is the 56th brightest. Cancer reaches opposition on January 27.

The named stars in Cancer include the brightest star Acubens, and the Ascelli or Donkeys, Asellus Borealis and Asellus Australis.

Cancer is located away from the Milky Way and contains a large number of galaxies, but two prominent open clusters are found there. M44 is also known as the Beehive Cluster is a very large, bright open cluster that can be seen with the unaided eye. It is also called Praesepe or the Manger. Praesepe is associated with the nearby Ascelli. M67 is an open cluster of very old stars that may have drifted away from the plane of the galaxy into their present position. NGC2749 and NGC2775 are two of the brighter galaxies in Cancer.



MESSENGER TO MERCURY

By Lee Green

On March 18, 2011, the MESSENGER spacecraft will arrive at Mercury to start a year-long mission studying the innermost planet of our solar system. MESSENGER stands for **M**ercury, **S**urface, **S**pace **E**nvironment, **G**eochemistry and **R**anging, which describes the key elements of the mission.

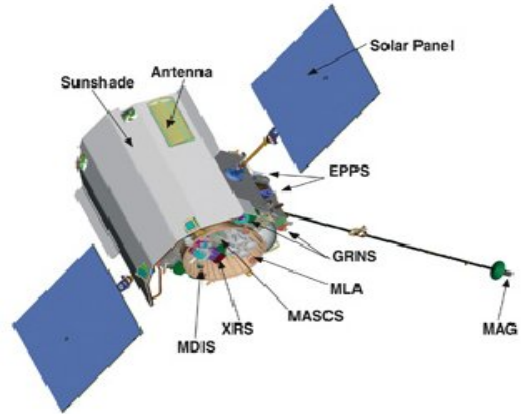
From its launch in August 2004, MESSENGER has been positioning itself to approach Mercury at just the right speed so it can achieve an orbit. It took 6-1/2 years, one flyby of Earth, two passes by Venus and three passes past Mercury to slow the craft enough that it doesn't speed past the planet on its final approach.

During its planned orbiting mission, MESSENGER will study the surface of Mercury to learn about the chemical composition of the planet using gamma-ray, x-ray and neutron spectrometers. It will map the surface using a laser altimeter which will also provide information about the planetary core. It will measure Mercury's magnetosphere, effectively sniffing the ethereal atmosphere looking for charged particles and volatiles evaporated from the surface by the harsh condition near the Sun.

The dual imaging system consists of wide-angle and narrow-angle imagers that will map landforms, track variations in surface spectra and gather topographic information. A pivot platform will help point it in whatever direction the scientists choose. The two instruments will enable MESSENGER to "see" much like our two eyes do.

As it orbits Mercury, the spacecraft will need to maintain its orientation to the Sun to keep the solar panels generating electricity and to keep the white heat shield towards the Sun. Without the heat shield, the instruments would quickly overheat and fail from the intense radiation from the Sun.

MESSENGER to Mercury will be the topic of the TCAA's March Public Observing Session.



A-TRAIN GLORY

By Lee Green

In an article for The Observer last June, I talked about the A-Train, a series of Earth observing satellites which pass across the equator at 1:30pm local time. This "afternoon" track was dubbed the A-Train.

A new satellite named **Glory** was scheduled to launch on Feb 23 to join the A-Train, but the launch was delayed. Glory has two primary scientific missions, monitoring incident solar radiation and measuring aerosols in the atmosphere. During its planned three year mission, Glory will extend our understanding of the atmosphere and help to reduce uncertainties in the way we measure global Earth's "energy budget."

The energy budget refers to the interconnected processes that distribute heat. We receive solar energy at a rate of approximately 360 Watts/square meter. Some of this energy is reflected back into space by clouds, the surface and other particles in the atmosphere. The remainder is absorbed and contributes to the driving forces of weather. The role of aerosols, including greenhouse gases and particulates, is understood as a factor in the energy budget, but the extent of these effects has been poorly quantified. Glory will increase our understanding of the Earth's energy budget in two ways. By monitoring the amount of solar radiation we receive and by measuring the amount, size and composition of aerosols in the atmosphere.

The Total Irradiance Monitor (TIM) will extend a 30 year history of measuring the solar radiation that reaches Earth. The amount of energy we receive from the sun varies throughout the 11 year solar cycle and has been monitored from satellites for the last 30 years by familiar missions such as Nimbus, ACRIM and ERBE. The TIM instrument has been calibrated to meet the standards of the National Institute of Standards and Technology so that the measurements are of the highest quality. The problem with previous measurements is that the various sources were never calibrated and the data, while consistent within their domain, did not calibrate closely with the other instruments.

The Aerosol Polarimetry Sensor (APS) will quantify the role of aerosols with much better accuracy. Aerosols, microscopic particles that are suspended in the atmosphere, come in different sizes and shapes. They include a variety of particles including dust, smoke, ice and other material. The amount of these materials can be inferred by how much light they reflect, however it can be difficult to distinguish these from water vapor. By looking at polarized light, we are better able to quantify the composition, size and density of these materials. The APS will scan along its ground track, measuring the polarization and intensity of scattered light in order to record aerosol observations.

Glory replaces the French PARASOL mission which will soon run out of propellant and be decommissioned. The data returned by Glory will be added to the Eyes on the Earth 3D web site (<http://climate.nasa.gov/Eyes/index.html>) along with the other A-Train missions to give us a way to better understand the many complex processes that affect our weather and our environment.



HISTORY OF SPACE SHUTTLE DISCOVERY

By NASA

(Editor note: During STS-133, Discovery successfully completed its final launch on Feb. 24, 2011 and rendezvoused with the International Space Station.)

Space shuttle Discovery ends its spaceflight career with more missions than any other vehicle in the fleet; serving as a symbol of American pride and leadership in human spaceflight.

Discovery was launched on its maiden voyage (STS-41D) on Aug. 30, 1984 and since has completed 38 missions. It was the third orbital vehicle manufactured following Columbia and Challenger. Construction of Discovery began in August 1979 at the Palmdale, Calif. manufacturing plant. Designated OV-103, it was transported to Kennedy Space Center in November 1983 ahead of its maiden voyage.

The choice of the name "Discovery" carried on a tradition drawn from some historic, Earth-bound exploring ships of the past. One of these sailing forerunners was the vessel used in the early 1600s by Henry Hudson to explore Hudson Bay and search for a northwest passage from the Atlantic to the Pacific.

Another such ship was used by British explorer James Cook in the 1770s during his voyages in the South Pacific, leading to the discovery of the Hawaiian Islands. In addition, two British Royal Geographical Society ships have carried the name "Discovery" as they sailed on expeditions to the North Pole and the Antarctic.

Destined for exploring the heavens instead of the seas, it was only fitting that NASA's Discovery carried the Hubble Space Telescope into space during mission STS-31 in April 1990, and provided both the second and third Hubble servicing missions (STS-82 in February 1997 and STS-103 in December 1999).

During its many successful trips to space, Discovery has carried satellites aloft, ferried modules and crew to the International Space Station, and provided the setting for countless scientific experiments.

Just like all of the orbiters, Discovery has undergone some major modifications over the years. The most recent began in 2002 and was the first carried out at Kennedy. It provided 99 upgrades and 88 special tests, including new changes to make it safer for flight.

Discovery had the distinction of being chosen as the "Return to Flight" orbiter twice. The first was for STS-26 in 1988, and the second when it carried the STS-114 crew on its mission to the International Space Station in July 2005.

Discovery benefited from lessons learned in the construction and testing of Enterprise, Columbia and Challenger. At rollout, its weight was some 6,870 pounds less than Columbia.

Beginning in the fall of 1995, the orbiter underwent a nine-month orbiter maintenance down period in Palmdale, Calif. during which it was outfitted with a fifth set of cryogenic tanks and an external airlock to support missions to the International Space Station. It returned to Kennedy, atop its Boeing 747 shuttle carrier aircraft, in June 1996.

Following STS-105, Discovery became the first of the orbiter fleet to undergo an orbiter major modification period at Kennedy. Work began in September 2002, and along with the scheduled upgrades, additional safety modifications were added as part of the preparations for the 2005 Return to Flight mission.

DISCOVERY BY THE NUMBERS	
Discovery miles	142,917,535 (through traveled STS-131)
Days in orbit	352 (8,441 hours 50 minutes, 41 seconds)
Orbits	5628
Flights	38 (through STS-131)
Individual crew members	180 (through STS-131)
Russian Mir space station dockings	1 (STS-91 June 1998)
International Space Station dockings	12 (through STS-131)

TCAA Treasurer's Report – February 2011

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

Income

Brian Barling (Dues) - \$ 40.00
Paul Pouliot (Dues) - \$ 40.00
Lee Green (Dues) - \$ 40.00
Dan Miller (Dues) - \$ 40.00
Gary & Linda Fillingham (Dues) - \$ 40.00
Annual Dinner (17 adult, 2 children) \$ 198.00

Expenses

LYB Inc. (Observer copies & postage) - \$ 39.41
Erin Estabrook (newsletter editor honorarium) - \$ 100.00
Nancy Sultan (speaker honorarium) - \$ 50.00

OPERATING FUND BALANCE – February 28, 2011 - \$ 2,127.52

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

Income

Interest - \$ 0.53

Expenses

None! - \$ 0.00

OBSERVATORY FUND BALANCE – February 28, 2011 - \$ 2,242.81

TOTAL TCAA FUNDS – February 28, 2011 - \$ 4,370.33

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@yahoogroups.com. Unsubscribing is just as easy. To unsubscribe, just send a blank email to TCAA-unsubscribe@yahoogroups.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**