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JUNE 2010

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TCAA ANNUAL POTLUCK SLATED FOR JUNE 12TH

Each year since the mid 1960s – starting with the grand opening of the club's "Beehive Observatory" at the Fissel farm to the northeast of Normal – the TCAA has usually held a club picnic during the summer – usually June. This has become an annual tradition. This year the tradition will continue on Saturday, June 12th. A potluck picnic for members and their guests only will be linked to the members-only observing session that is scheduled for that evening. Dan and Paulette Miller have most graciously agreed to his this year's event in their rural home several miles east of Heyworth, IL. The picnic will begin with arrival around 6:30 p.m. The club will provide a lighted grill that will be ready by 6:45 p.m. and dinner will be served at 7 p.m. As also has been the tradition, the TCAA will provide the charcoal and lighter fluid for the grill, as well as a variety of refreshments in 2-liter bottles. This year members are also asked to bring small tables and chairs as the traditional picnic tables will NOT be available.

As this is a potluck dinner, please bring a dish to share. Be creative, and avoid the urge to bring that bag of potato chips! © Also bring your own entrée (fish, steaks, burgers, hotdogs) and table service (cups, plates, utensils, napkins, condiments). We have plenty of tablecloths, so no need to bring those. Bring along some games to play as we wait for sunset (8:27 p.m.) and the beginning of dusk.

The picnic and follow-up events will be held cloudy or clear. An entertaining program will be held beginning at 8:30 p.m., and viewing will begin at 9:00 p.m. if the sky is clear. If the sky is overcast, we'll end the picnic with the program, the making of "s'mores" and the telling of star stories around a campfire. This picnic will be a great time for the whole family, and TCAAers will not want to miss it. Should you have any questions, don't hesitate to contact the event's coordinator, Carl Wenning, at (309) 830-4085 (cell).

DIRECTIONS: South from Bloomington on US 51 to Heyworth. Take exit US 136 east through town and continue 2-3 miles to county road 1700N. Turn left. Dan and Paula's house is at the intersection of 1700N and 325E, northwest corner. To enter the driveway, turn left (west) on 325E. The house is a bit secluded and won't be visible until you reach the driveway about 100 feet to the west of the intersection.

JUNE 26 LUNAR ECLIPSE

Central Illinois observers will just miss the start of a predawn partial lunar eclipse on Saturday, June 26th. The umbral shadow of the earth just grazes the moon as it is setting in the west. Unfortunately, only observers west of an SC-NC-TN-KY-IN-IL-WI-MN line will be able to view this lunar phenomenon according to Bob Victor, author of *Sky Calendar*. Due to the moon's low altitude, the penumbral phase of the eclipse will not likely be noticeable.



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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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
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Normal, IL 61761

SDO NOW OPERATIONAL

By Lee Green

On May 14, 2010, the Solar Dynamics Observatory (SDO) was declared to be "operational" in its 5 year mission to monitor the Sun. SDO is NASA's newest space-based telescope that was launched from Cape Canaveral on an Atlas V rocket on Feb. 11, 2010 to study the Sun.

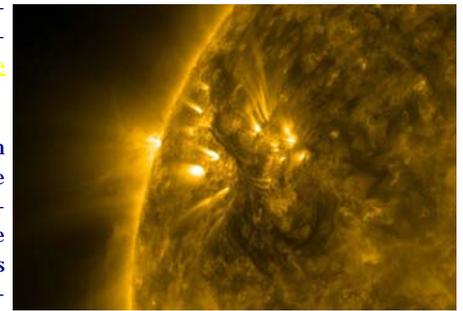
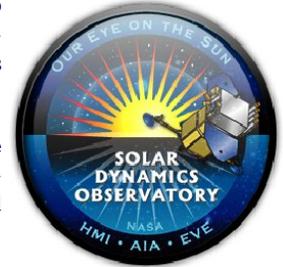
Since its launch, SDO has been going through its provisioning phase where the spacecraft is prepared for its science mission. It was moved into its assigned geostationary orbit and the onboard systems were tested and prepared for its new mission.

SDO has already provided us with some spectacular images, such as the filaments shown here in extreme ultraviolet light. This image was selected as the [Astronomy Picture of the Day](#) for May 22, 2010.

SDO is the first step in the Living With a Star program which will help us understand how the Sun creates "space weather." Just like with weather on Earth, storms sometimes occur. The 'northern lights' are the interplay of the solar wind with Earth's magnetic field. If a solar storm hits Earth, it can cause damage to satellites and electrical systems. We don't know what could happen if a major storm were to strike the Earth. This program will help us prepare for that.

SDO has three instruments that will study the Sun. The Helioseismic and Magnetic Imager (HMI) monitors magnetic activity that is generated deep in the Sun's interior to follow its effects throughout the solar atmosphere. The Extreme Ultraviolet Variability Experiment (EVE) continuously monitors high energy radiation from the Sun. The Atmospheric Imaging Assembly (AIA) provides high resolution, full disk images of the Sun.

Using these state of the art instruments which continuously monitor the Sun across many wavelengths simultaneously, SDO will generate a huge amount in information. Every day, 1.5 terabytes of science data will be returned for analysis.



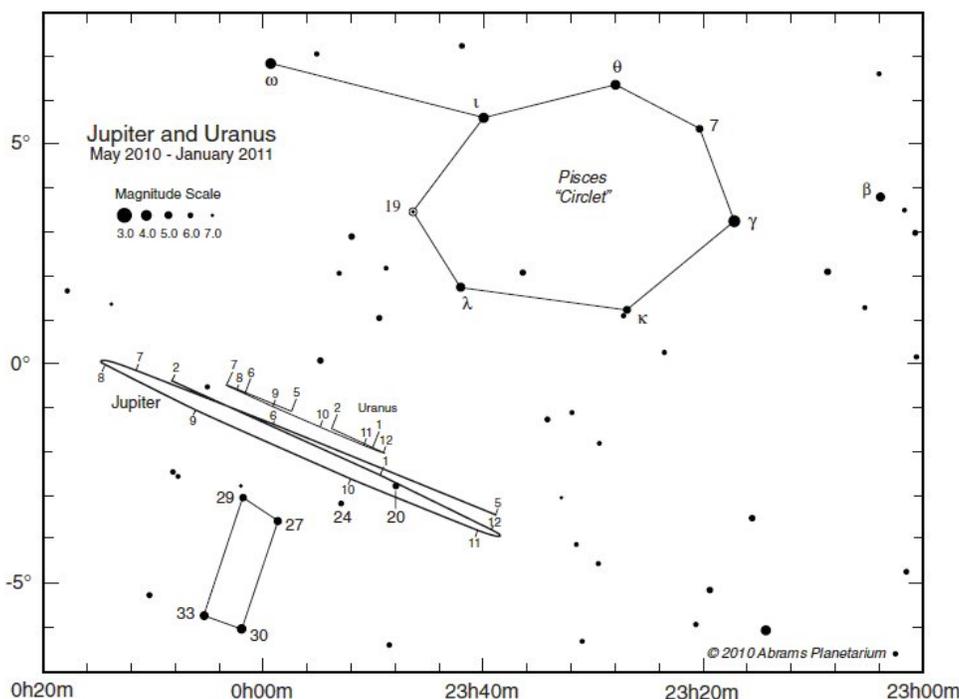
The scientific goals of the SDO Project are to improve our understanding of seven science questions:

1. What mechanisms drive the quasi-periodic 11-year cycle of solar activity?
2. How is active region magnetic flux synthesized, concentrated, and dispersed across the solar surface?
3. How does magnetic reconnection on small scales reorganize the large-scale field topology and current systems and how significant is it in heating the corona and accelerating the solar wind?
4. Where do the observed variations in the Sun's EUV spectral irradiance arise, and how do they relate to the magnetic activity cycles?
5. What magnetic field configurations lead to the CMEs, filament eruptions, and flares that produce energetic particles and radiation?
6. Can the structure and dynamics of the solar wind near Earth be determined from the magnetic field configuration and atmospheric structure near the solar surface?
7. When will activity occur, and is it possible to make accurate and reliable forecasts of space weather and climate?

LEE GREEN GIVES SATURN PRESENTATION

NASA Solar System Ambassador Lee Green gave an excellent PowerPoint presentation about Saturn, its rings and its moons to 11 attendees at SGNC on Tuesday, May 11. After a day of cloudy skies, the heavens cleared by the start of the program at 7:00 p.m. Following an hour-long presentation, attendees were treated to hot chocolate in the Nature Center, courtesy of Angela Smith. Around 8:30 p.m., Carl Wenning opened the SGO for views of Venus through the club's 10-inch Meade while Lee prepared his C14 telescope for observations of Saturn. At around 8:45 p.m. it was dark enough for views of Saturn with its pencil-thin rings. Observing, including the point out of constellations and brighter stars, continued until 9:30 p.m. Also in attendance were club members Dani Steinbeck and Bryan Roach. After everyone departed, Lee continued observing and imaging late into the evening.

Jupiter-Uranus Triple Conjunction ~ by Bob Victor, Abrams Planetarium ~



The Jupiter-Uranus triple conjunction of 2010-11 provides almost 9 months of easy opportunities to locate 6th-magnitude Uranus in the same binocular field as Jupiter. Use the above chart to follow the planets' movements. In predawn on June 8, Jupiter passes just 0.4 degrees S of Uranus, the first conjunction. They spread to 3.1 degrees apart in last week of July, then come together for their second conjunction on the night of Sept. 18 as Jupiter passes 0.8 degrees S of Uranus, just three days before their opposition and all-night visibility on Sept. 21. They spread apart again until 2nd week of November, when they're 3.4 degrees apart in evening sky. Their final conjunction will occur on evening of Jan. 3, 2011, when Jupiter passes 0.5 degrees S of Uranus. They're still just 4 degrees apart, low in west at nightfall, on Feb. 1, 2011. Numbers on the paths in the chart correspond to month numbers for the following dates: 5. May 1, 2010; 6. June 1; 7. July 1; 8. August 1; 9. September 1; 10. October 1; 11. November 1; 12. December 1; 1. January 1, 2011; 2. February 1.

JUNE SKY GUIDE

- 03** The Moon passes 5° north of Neptune, 1 P.M. 
- 06** The Moon passes 7° north of Jupiter, 6 A.M. 
- The Moon passes 6° north of Uranus, 6 A.M. 
- Mars passes 0.9° north of Regulus, 10 A.M. 
- Jupiter passes 0.5° south of Uranus, 2 P.M. 
- 09** Venus passes 5° south of Pollux, 5 A.M. 
- 10** The Moon passes 5° north of Mercury, 10 P.M. 
- 15** The Moon passes 4° south of Venus, 2 A.M. 
- Mercury passes 5° north of Aldebaran, 9 P.M. 
- 17** The Moon passes 6° south of Mars, 2 P.M. 
- 18** Asteroid Ceres is at opposition, 5 P.M. 
- 19** The Moon passes 8° south of Saturn, 6 A.M. 
- 21** Solstice (northern summer/southern winter begins), 6 A.M. 
- 25** Pluto is at opposition, 2 P.M. 
- 26** Partial lunar eclipse, 7 A.M. 
- 30** The Moon passes 5° north of Neptune, 8 P.M. 

COLOR BALANCE

By Lee Green

I recently took a series of images of some globular clusters. I was very careful to use the same settings as I took each of these images so that I could analyze and compare the results. My goal was to process the images to have a common size and “true” color.

Pulling out my **Handbook of Astronomical Image Processing** tells me that in capturing the images, my signal is the integral across the spectrum of the flux from the celestial source, the transmittance of the atmosphere, the transmittance of my color filters, the quantum efficiency of my detector, the amplifier gain and the integration time. Makes sense, right? And to get to true color, all we need to do is to mitigate these factors. Simple, right?

There’s nothing we can adjust for the celestial source flux. It is what it is and that’s really what we’re trying to measure. However, the electrical signal we receive is “dirty” – contaminated by skyglow, dark current and other factors.

I was less clear about the atmospheric transmittance. While I knew that this value can change based on the elevation and humidity, I had forgotten how much the values change by altitude, an effect called atmospheric extinction. At the zenith, the values are 100%, but at 30° the values drop to 90% for red, 85% for green and 78% for blue and at the horizon the values are 31%, 18% and 7% which explains the red color of the Sun when it is setting.

The quality of color filters is never perfect. Each filter absorbs light that is outside its band. Each filter also absorbs some portion of the light in-band. Good filters pass at least 90% of in-band light and reject most of the light out of band. Each filter may have different efficiencies, so the resulting signal may vary from the true

The relative response of the cameras to each color, its quantum efficiency, is usually well characterized by the chip’s manufacturer. But obtaining a flat response across the spectrum is impossible using today’s solid-state electronics. Most CCDs today tend to roll off at the blue end of the spectrum.

The book goes on to describe how one way to arrive close to color balance is to image stars with spectral type G2V, like our Sun. This gives us a standard reference point for white light, although G2V stars are not so common as to be found in any given image. An easier alternative they discuss is to use field stars (other stars that show up in your image) to help approximate white.

I offer no solutions here since I am still learning about the relative difficulties of achieving good color balance. Although several years ago I purchased a set of Astrodon Tru-Balance color filters which have an approximately even (1.0:1.0:1.0) color response with Kodak E series detectors. An added benefit of these filters is that they are nearly “parfocal” so I don’t have to refocus every time I switch the channel. So for the purpose of this discussion, while there is nothing I theoretically need to do to correct the color balance of my filters or the camera’s quantum efficiency, I can see the need to do so to achieve the best possible images.

2010 PUBLIC OBSERVING SESSIONS

From March through October each year, the TCAA holds monthly public observing sessions on the Saturday typically nearest the first quarter moon. All programs are free of charge and open to the public. The sessions are held at Sugar Grove Nature Center. In 2010, we will hold the observing sessions on the dates and time listed below. Each session will focus on a particular celestial phenomenon, though additional prominent sky objects such as planets, nebulae, star clusters, and galaxies are viewed when visible. A typical public observing session includes the following components:

- ☆ *Lecture about the featured object.* This 20-30 min. 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.
- ☆ *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.
- ☆ *Telescope observing session.* We use telescopes at ground level to observe the featured objects and other wonders of the heavens.

Date	Featured Ob-	Time	Coordinator(s)
June 19	Virgo Cluster of	9:00pm -	Duane Yockey &
July 17	Globular Star	9:00pm -	Duane Yockey &
August 14	Planets and the	8:30pm -	Carl Wenning
September 11	Stars of Red,	7:30pm - 9:30pm	Dan Miller
October 16	Perseus double star Cluster	7:00pm - 9:00pm	John Werner

A detailed brochure dealing with the 2010 public observing sessions can be downloaded from the TCAA website at www.tcaa.us.

Members-only observing sessions usually are held on the Saturday nearest the full moon and are typically held one week prior to public sky viewings. MOOS programs are held throughout the year, but only if the temperature isn't too low and the wind too high during the winter. Because the TCAA Board has agreed to dispense with coordinators for the members-only events, TCAAers should pay attention to monthly reminders that will be distributed electronically through the club's listserv.

CONSTELLATION OF THE MONTH: BOÖTES—THE HERDSMAN

Boötes is a constellation that is visible high in the sky during the summer months and is positioned east of Ursa Major.

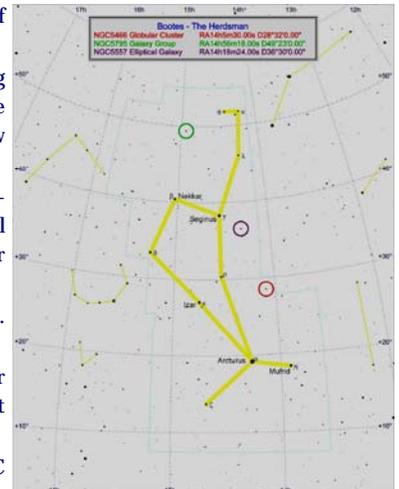
In Mythology, Boötes is known as the Ploughman, the ox driver or the bear driver. In some cultures, the Big Dipper was seen as a wagon or a plough that is pulled by a team of oxen. In these contexts, Boötes is seen as the driver. Another story sees the constellation as Icarus, a famous grape grower from Attica, who was shown how to turn grapes into wine by Bacchus, the god of wine.

In stories where the Big Dipper is seen as the rear of the bear, Boötes is seen as the bear-driver, who in conjunction with his hunting dogs, Chara and Asterion, Canis Venatici, pursue the great bear around the celestial pole. This has become the traditional story and is consistent with the name of the constellation's brightest star Arcturus which means "Bear-Guard."

Astronomically, Boötes is the 13th largest constellation covering 907 square degrees and is the 7th brightest. Boötes reaches opposition on April 28th.

The named stars in Boötes include its brightest star Arcturus, the bear guard. Other stars include Nekkar (beta), Seginus (gamma), Mufrid (eta), Izar (epsilon). Izar is a striking double star with distinct color contrast of yellow and green.

Among the deep space objects in Boötes are a large number of small, faint galaxies and galaxy clusters. NGC 5466 is a globular cluster.



EYES ON THE EARTH

By Lee Green

I heard about a NASA website that provides a wonderful 3D visualization of satellite data. The Eyes on the Earth 3D site at <http://climate.nasa.gov/Eyes/index.html> provides a common platform for delivering current scientific data from 15 Earth-orbiting satellites.

The site uses a proprietary browser plug-in to show an interactive 3D visualization of the Earth. The user can use the mouse to adjust the position and orientation of the Earth to view anywhere on the globe. User controls let you select a variety of display options.

When you first bring up the site, you will see all 15 satellites showing their current position and their orbit. By selecting a particular satellite, you can get an overview of the mission being performed and you can zoom into look at the satellite to see how big it is and what instruments it carries.

Several satellites (four of the current 15) already have available datasets that are rendered as global overlays. When you first select a dataset for loading, it takes a few minutes to download the data. Once ready, the data is rendered as an overlaid image on the 3D global graph. The image can be color coded and shown as a topograph. By moving your mouse over a location, individual data points are shown in a legend.

Among the satellites included are the so-called "A-train" constellation satellites which follow the same orbit. This provides a way to collect consistent, comprehensive sets of data on atmospheric conditions. By analyzing multiple channels, it provides researchers a way to correlate possibly interrelated processes.

The A-train includes Aqua, which was launched in 2002 and studies water in the Earth's surface and in the atmosphere, mapping greenhouse gases and cloud properties. Aura, launched in June 2004, studies the chemical content of the atmosphere to track the state of the ozone layer and atmospheric pollution. CloudSAT uses radar to monitor the internal structure of clouds while CALIPSO and the French satellite PARASOL measure the clouds and aerosols. The Orbiting Carbon Observatory, OCO, failed during its launch in Feb, 2009. Several other satellites are scheduled to join the A-train in future missions.

The 3D global model provided by the Eyes on the Earth is an excellent way to present a variety of information to help us visualize Earth's processes by providing current quantitative data that is ready for detailed, interactive viewing throughout the world. Over time, additional satellites can be added and more datasets can be formatted for this virtual online environment, providing scientists and enthusiasts with additional visualizations that will help us better understand our world.

LONGITUDE

By Lee Green

I enjoy reading about history and am often shocked about how far we have come in the last few hundred years. I was reading about Christian Huygens and his 1655 theory that Saturn had "a thin, flat ring, nowhere touching, and inclined to the ecliptic" and his discovery the same year of the largest moon Titan.

What I did not recall was that he also proposed the wave theory of light, developed the mathematical principles of probability theory and centripetal force. His work on pendulum clocks resulted in a dramatic increase in the accuracy of timekeeping. He also built and patented the first pocket watch which used a balance spring which vastly improved the accuracy of mobile chronometers.

What was widely known in that era was that if you knew the exact time, you could determine your position in longitude exactly by several means. But chronometers of the day were inaccurate, sometimes by hours every day, so knowing the exact time was a difficult task. You can get an approximate estimate of noon by watching the shadow cast by a vertical rod and noting when the shadow is shortest. But by the time you recognize that the shadow's length starts growing again, the time has passed. Keeping time on a ship was a more difficult proposition because the waves prevented having a reliable vertical reference and wreaked havoc on mechanical clocks based on springs and pendulums.

In 1707, a British naval fleet under Sir Cloudesley Shovell ran aground on the Isles of Scilly and several ships were lost along with 2000 sailors. This disaster led to the Longitude Act of 1714 which offered a monetary reward for anyone who could find a simple and practical method for the precise determination of a ship's longitude.

There were many ways proposed to measure time before the Longitude Act and many of the famous scientists of the day were involved in the problem. Galileo believed that Jupiter's moons could be used. Robert Hooke and John Flamsteed, investigating using the Moon's position but lacking detailed knowledge of the Moon's movement and stellar positions, convinced King Charles II of England to establish the Greenwich Royal Observatory in 1675. Edmund Halley suggested watching the Moon occult stars to determine time. Tobias Mayer, working with Leonard Euler, proposed using the size of the Moon to determine longitude, and Nevil Maskelyne proposed the publication of a nautical almanac along with detailed tables of the Moon's size. In fact the lunar size method was widely used into the 20th century. But it was carpenter John Harrison who in 1761 first produced a mechanical time-piece that worked reliably at sea.

It was about time that mankind finally established a point of reference and Greenwich was selected, in 1847 for its Greenwich Mean Time and in 1851 as the Prime Meridian. But it was not until 1925 that time became Universal Time that unified longitude and Right Ascension.

TCAA Treasurer's Report – May 2010

OPERATING FUND BALANCE – April 30, 2010 - \$ 2,891.20 *

Income

Roy Lawry (senior dues) - \$ 26.00
James Wharton (senior dues) - \$ 25.00
Gary Fillingham (dues) - \$ 40.00
NCRAL Registrations - \$ 81.92
Presley family (dues) - \$ 40.00

Expenses

LYB Inc. (May Observer) - \$ 29.64
Challenger Learning Center (NCRAL) - \$ 450.00
John Werner (Wenning Plaque) - \$ 51.16
PayPal fees - \$ 2.97
Grinnell Mutual (liab. insurance) - \$ 144.00
D K Designs (shirt orders) - \$ 206.89

OPERATING FUND BALANCE – May 31, 2010 - \$ 2,219.46

OBSERVATORY FUND BALANCE – April 30, 2010 - \$ 2,560.61

Income

Donation (anonomous) - \$ 500.00

Expenses

None - \$ 0.00

OBSERVATORY FUND BALANCE – May 31, 2010 - \$ 3,060.61

TOTAL TCAA FUNDS – May 31, 2010 - \$ 5,280.07

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 2009)
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**