THE OBSERVER

OF THE TWIN CITY AMATEUR ASTRONOMERS

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The TCAA is an affiliate of the Astronomical League as well as its North Central Region. For more information about the TCAA, be certain to visit the TCAA website at tcaa.us/

Visit Astroleague.org for additional information about the League and its numerous membership benefits including observing programs.

Also visit the NCRAL website at ncral.wordpress.com for information about our North Central Region. Find out about our next Regional convention during May 2020.

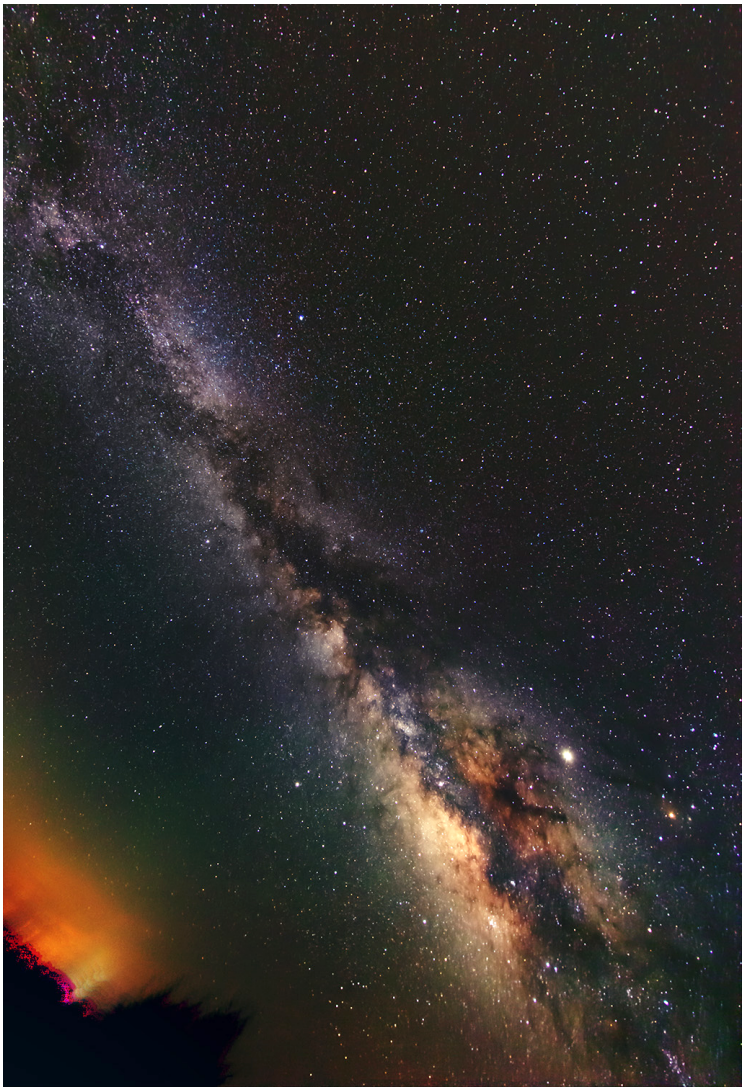


IMAGE OF THE MONTH: EDITOR'S CHOICE – MILKY WAY

This month's image is by Tim Stone who writes: Taken from Copper Breaks State Park near Quanah, Texas, this image of the Summer Milky Way looks along the spine of our galaxy, ranging a full 120 degrees from the southern reaches of Scorpius to as far north as Cepheus. This huge field of view is a stack of 14 thirty-second exposures taken with a Canon 11-24mm f/4 lens on a Canon EOS 5D Mark IV camera body at ISO 3200. This isn't a mosaic. This is the field of view of the lens!

The OBSERVER

is the monthly *electronic* newsletter of 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.

The OBSERVER
Carl J. Wenning, Editor

Submission deadline two days before the end of each month.

MEMBERSHIP DUES

Individual Adult/Family $40
Full-time Student/Senior $25
(Senior status equals ages 60+)

To join, send your name, contact info and dues payment to Dave Osenga, TCAA Treasurer, 1109 N. Linden St., Normal, IL 61761-1471.

Brilliant Jupiter shines to the lower right of the image, and just to the left of Sagittarius, Saturn shines a little more faintly. Many Messier objects are visible, including M6 and M7, which can be challenging at our latitude. (Copper Breaks State Park is at 35°N latitude, so everything in the south is five degrees higher in the sky.) The entire tail of Scorpius was visible, as well as Corona Australis. The star clouds of Sagittarius and Scutum are brilliant. Though the camera has not had its infrared cut filter removed to increase the camera's red sensitivity, M8, M16, M17, and M20 are still all quite visible. The Summer Triangle seems small in the image, and the North America Nebula is clearly visible. Can you find all these features?

I didn't do everything right with this image. The biggest mistake I made was in my polar alignment. There were so many stars visible that I actually mistook another star for Polaris. My alignment was several degrees off. This caused drift, which placed the stars at the edges in increasingly distorted positions on the image. I used Lightroom to correct for the lens distortion, which helped in stacking, but didn't completely correct the problem. You can see that Jupiter isn't particularly round, for example. I'll do better next time! I hope to make another attempt at this at the end of September.

PRESIDENT'S NOTE

It seems the clouds have finally parted, and we can again see beyond a few miles above our heads. We had our first Public Viewing Session of the year where we had clear skies. The public and members turned out in force. It was so gratifying to see people enjoying the views through our members telescopes. I had a look at Jupiter through Lee Green's C14 and I have to say, it was one of the best views of that planet I've ever had! Thanks to Lisa Wentzel for her excellent presentation, and everyone who helped. Let's hope we have similar skies through the rest of the year.

As I said last month, I got the chance to spend a night under truly dark skies at Copper Breaks State Park near Quanah, Texas, on June 30th. Of course, I was at the mercy of the weather, but that night the weather was perfect, and the moon was absent. The Milky Way rising over the Texas Plains was a sight I will not soon forget. I was able to take the best image of our galaxy I've ever gotten, which is the Editor's Choice for this month. That was just icing on the cake. The sense of the vastness of the universe, the incredible beauty of the stars, and even the quiet of the place, filled me with tremendous wonder and awe. Sometimes I get so wrapped up in the technical side of our hobby – the equipment, software, techniques – that I lose sight of the magnitude of what I'm looking at and photographing. It becomes something I do instead of someplace I love. A night under a dark sky is just what the doctor ordered for this malady of familiarity. In the words of Carl Sagan:

> "A still more glorious dawn awaits.
> Not a sunrise, but a galaxyrise.
> A morning filled with 400 billion suns.
> The rising of the Milky Way."

If it's been a while since you've watched galaxyrise, maybe it's about time to remedy that situation. This time of year is perfect for that. You don't have to go to the Southwest for this. Come to one of our observatories. The view is tremendous. I hope to see you soon!

Tim Stone
TCAA President

Calendar of Celestial Events – August 2019

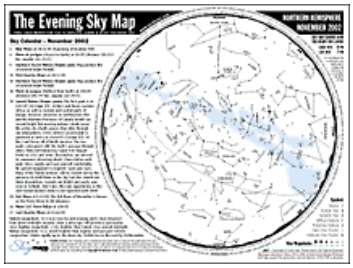
MORNING PLANETS (8/15)**:** Mercury, Uranus, & Neptune

EVENING PLANETS (8/15)**:** Venus, Mars, Jupiter, & Saturn

The following table gives the date and time (24-hour clock) of important astronomical events for this month. All events are given in Central Daylight Time.

Day	Time	Event
02	01:08	Moon at Perigee: 359398 km
07	11:31	**FIRST QUARTER MOON**
08	05	Venus at Perihelion
09	16:53	Jupiter 2.5°S of Moon
09	17	Mercury-Greatest Elong: 19.0°W
12	04:05	Saturn 0.0°N of Moon: Occn.
12	08:45	Moon at Descending Node
12	08:59	Jupiter 4.3°N of Antares
13	01	Perseid Meteor Shower
14	00	Venus at Superior Conjunction
15	06:29	**FULL MOON**
16	22:24	Mercury 1.2°S of Beehive
17	04:50	Moon at Apogee: 406244 km
20	01	Mercury at Perihelion
23	08:56	**LAST QUARTER MOON**
24	03:24	Aldebaran 2.4°S of Moon
25	18	Mars at Aphelion
26	19:50	Moon at Ascending Node
27	08:30	Pollux 6.1°N of Moon
28	05:31	Beehive 0.2°S of Moon
30	04:37	**NEW MOON**
30	09:57	Moon at Perigee: 357177 km

http://www.astropixels.com/ephemeris/astrocal/astrocal2019cst.html



Evening Sky Map

Click on the icon found here to access a current evening sky map along with a more detailed celestial events calendar.

New & Renewing Members

The following individuals have paid dues for new or renewed memberships as of July 29, 2019. (Others who paid after that date will appear in the September 2019 issue of ***The OBSERVER***.*)*

none

Dues Blues

If you have received a "your dues are due" statement along with the email that brought you this issue of ***The OBSERVER***, please remit your dues to Mr. Dave Osenga, TCAA Treasurer, 1109 N. Linden St., Normal, IL 61761-1471. Dues are currently $25 for seniors (60 years of age and over) and $40 regular.

Subscribing to the TCAA Email List

By subscribing to a group's mailing list, you will receive email messages from the group though you won't have access to the group's web features (like photos, files, links, polls, calendar, etc.) unless members activate it later. The club has an open email listserv. It is known as the ***TCAA YahooGroups*** listserv. It will be used to share announcements and reminders about astronomical and club events. To join this main listserv, you must do the following:

1. To subscribe: Send a blank email to TCAA-subscribe@yahoogroups.com Note: You'll be sent a confirmation email from the group. Reply to the confirmation email to activate your subscription.
2. To post a message: tcaa@yahoogroups.com
3. To unsubscribe: tcaa-unsubscribe@yahoogroups.com

Interested in an official 11- or 15-oz. TCAA coffee mug? If you are, contact Carl Wenning via email with the number you might like. The more we purchase, the cheaper they will be. A price will be worked up if we can get an order of 24 or more. Cost will be around $4 to $7 each.

This Month's Phases of the Moon

First Quarter
Wednesday, August 7

Full Moon
Thursday, **August 15**

Last Quarter
Friday, August 23

New Moon
Friday, August 30

All moon phase dates are Central Daylight Time. Additional moon phases for the 2019 calendar year can be found by clicking here. Images provided by J. K. Howell of the Champaign-Urbana Astronomical Society & used with permission.

This Month's Solar Phenomena

In the table below, you will find times of sunrise and sunset along with rising and setting azimuths (Az), length of day including change from previous day, start and end times of astronomical twilight, and the time of solar noon along with the elevation (El) of the midday sun. These data come from https://www.timeanddate.com/sun/usa/bloomington

2019	Sunrise/Sunset		Day Length		Astronomical Twilight		Solar Noon	Solar Dist.
Aug.	Sunrise (Az)	Sunset (Az)	Length	Diff.	Start	End	Time (El)	Mil. Miles
1	5:53 AM (65°)	8:10 PM (295°)	14:17:54	-2:00	4:02 AM	10:00 PM	1:02 PM (67.5°)	94.353
11	6:02 AM (69°)	7:59 PM (291°)	13:56:23	-2:15	4:17 AM	9:53 PM	1:01 PM (64.7°)	94.212
21	6:12 AM (73°)	7:45 PM (287°)	13:32:45	-2:26	4:31 AM	9:25 PM	12:59 PM (61.6 °)	94.040

Minutes of the July 16th BOD Meeting

The TCAA Board of Directors met at the home of Carolyn and Carl Wenning in Normal. In attendance were President and Property Manager Tim Stone, Treasurer Dave Osenga, Secretary/Historian/Newsletter Editor Carl Wenning, ALCor Bob Finnigan, and Chair Lisa Wentzel. Vice President and Member Coordinator Tom Willmitch and 5th Director Scott Wade were unable to attend. Nonetheless, a quorum was present.

The meeting was called to order at 6:46 PM after some "preliminary discussions." The first order of business was officer and chair reports.

Tim noted that the 10" at WO continues to have what appears to be condensation problems in the camera. The 16" is operating flawlessly. The 20" is "getting a strange noise pattern" in the imagery. The 24" is approaching operational condition as the imaging stack has been bench tested and will be installed pending improving weather. The summer has been so wet and cloudy for so long that this is causing an impediment. Tim further noted that the Board should declare the 10" Odyssey telescope in storage at WO "unwanted property" and that it should be given away to any member who wants it. There was unanimous agreement; Carl will make note of this in ***The OBSERVER***. Tim then thanked Bob and Scott for their extensive work at PSO bringing the situation there up to a fully operational status. Bob reported that his brother Ernie has been mowing the grass at the WO and has put crushed rock around all the buildings as a way of reducing rain water run off through the buildings. He has not asked for any form of reimbursement. Everyone expressed appreciation for these generous efforts.

There was no report from Tom Willmitch in relation to his position, but it was noted that we recently had a successful club social and picnic the prior Saturday. Carl had nothing to report in relation to his role as Secretary, Historian, and Newsletter Editor. Treasurer Dave Osenga reported that we have $1,005.38 in savings which includes a recent donation from State Farm in the amount of $500 in recognition of Lee Green's tremendous volunteer efforts. We also have $2,517.74 in checking for a balance of $3,523.12.

There was nothing official to report in relation to Bob's position as ALCor, in relation to Lisa's role as AL Observing Clubs Coordinator, Justin Meyer's role as Technology Coordinator, and Lee Green's role as Webmaster. Bob urged Dave to follow through with his promise to acquire newsletter and other files and information from Webmaster Lee Green for backup purposes. Dave said that he would get to this as soon as he has time.

In matters of Old Business, the following points were made:

- Bob, Carl, and Dave will work together to get the SGO dome lubricated as soon as it cools off a bit. (Scott later indicated an interest to help as well.)

- Carl will manage arrangements for the 2019 TCAA Mini Conference slated for Saturday, September 21st. He will give an early talk at the ISU Planetarium so he can leave in time to set up for the picnic at SGNC later that day. Dave agreed to help with set up. Carl noted that he already has the online registration process set up for the event. (See later in this issue of the newsletter for details.) It is also expected that Tim will speak about spectrography, and that Bob and Scott will speak about the school of astrophotography at PSO. The events at the ISU Planetarium will conclude with a program presented by Tom. After a picnic and an open house at SGNC, we will "stage" people in Waynesville for 15-minute tours of WO so that we do not exceed the contracted limit on visitors at the site at any one time.

- Carl noted that he currently has a limited number of "takers" for the deal for his autumn *Introduction to Amateur Astronomy* course, but that it is still quite early in the registration process.

Under the topic of New Business, the following points were made:

- Tim noted that more than help, he needs time and the cooperation of the weather to get the 24" operational in time for the open house at WO on September 21st.

- Carl pointed out that we need to consider remote planning for NCRAL 2023 which the TCAA will be hosting. It was agreed that we will focus on "observing the sun as a star" as our working theme as the eclipses of 2023 and 2024 would be a bit narrow and repetitive given our focus during NCRAL 2016. We could also include such things as spectroscopy, perhaps the sunspot cycle (or lack thereof) and so forth. Early thinking is that we have plenty of expertise within the club in the persons of Jamey Jenkins (spectroscopy), Tim Stone (color-magnitude diagrams using photographic photometry), Carl Wenning (sunspot cycle), and Scott Wade and perhaps others to provide a solid core of talks. Perhaps someone from the AAVSO might be chosen as a keynote speaker. Due to our distance from the center of the NCRAL area, Carl suggested we should assume a convention with about 60 attendees and noted that we need to make a stronger push than in 2010 and 2016 to get Illinois NCRAL affiliates to attend.

- It was agreed that we would set up a separate escrow account to set aside perhaps $30,000 to provide for future financial needs of WO. These would be funds restricted to use for property tax payments and possibly equipment repairs (not acquisitions). It is hoped that a $5,000 contribution near the end of the year could be used to set up the fund. Carl suggested aggressive growth stocks and not some sort of "secure" instrument like a savings account that would pay only a pittance of what the stock market is returning. A conservative "widows and orphans" fund would return about 7% per annum long term and might be best if the club doesn't want to be too aggressive.

- Dave noted in closing that he needs to get a draft letter to Carl reminding those whose dues are in arrears to pay them. As corresponding and recording Secretary, Carl will send these out to those who are delinquent in dues payment. Dave also will check with Lee to see if dues payment reminders are any longer being sent out to members along with newsletters. It was suggested that we remove those from the membership rosters (including distribution of ***The OBSERVER***) all whose dues are seriously in arrears.

- It was agreed that the next meeting of the Board would be on Tuesday, September 10th, at the Wenning residence beginning at 6:30 PM.

The meeting was adjourned at 7:32 PM.

Respectfully submitted,
Carl Wenning, Secretary

ASTROBITS – NEWS FROM AROUND THE TCAA

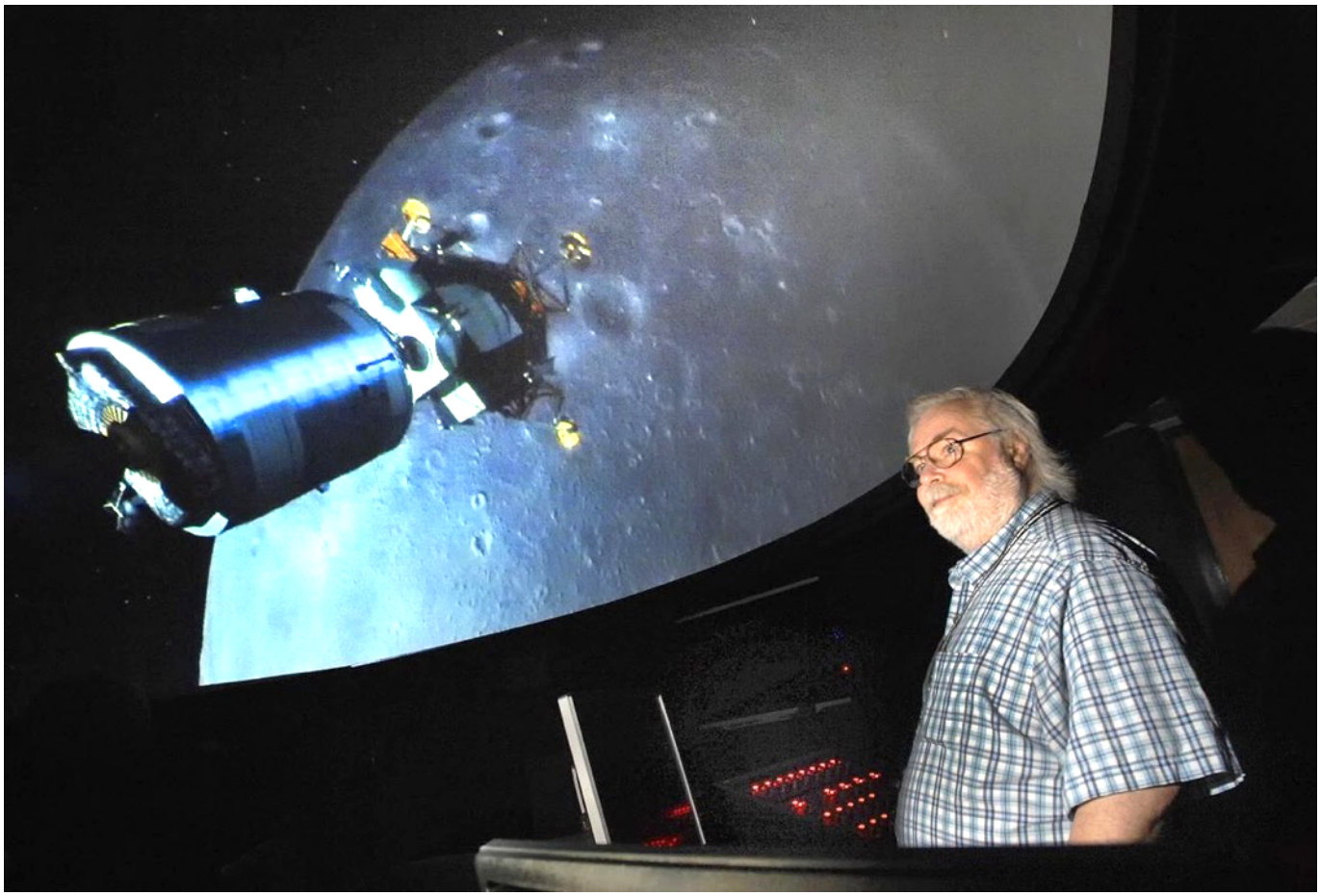
- TCAA Guide #8 – *Optimizing Observations of DSO* – has been updated. It was previously printed in reverse page order. This mistake has been corrected. You may find this Guide along with many others at http://tcaa.us/TCAAGuides.aspx
- To show the power of social media, your editor points out the fact that a recent TCAA Facebook post received nearly 1,500 "hits" within one hour of posting on the evening of July 7th: "50 years ago this month two Apollo 11 astronauts set foot upon the moon. It was July 20th. That evening the moon was 5.9 days past new. Right now (Sunday, July 7, evening) the moon phase is nearly identical. With the clear sky, you can go out right now a see what many Earthlings saw when they looked up the night that humans went to the moon 'in peace for all mankind.'" Within two days of posting, the notice was read nearly 4,000 times.

- On the evening of July 9th, 77-year-old Bob Finnigan, 74-year-old Sharon MacDonald, and 66-year-old Carl Wenning spent an hour at SGNC being interviewed by the *Pantagraph's* Paul Swiech about their memories of the Apollo 11 mission to the moon. This resulted in a feature story on July 16th titled 'KEEP LOOKING UP' and located "above the fold" on page 1 on the 50th anniversary of the lunar launch. The story rolled over onto page 2. It contained three pictures by Lewis Marien. Paul wanted to have perspectives from members old enough to have strong impressions of the events on that day a half century ago and so our three club representatives were chosen. The article, along with its remaining two images, may be found at the following URL: http://bit.ly/2Y6a0Oe.

'KEEP LOOKING UP' front-page "above the fold" image showing Bob Finnigan at PSO in July 16th feature story focusing on Apollo 11 memories of TCAA members. Image by Lewis Marien.

- Sharon MacDonald and Carl Wenning continue to alert TCAA members via our email list of the passages of the International Space Station through our skies. If you are missing these alerts, be certain to subscribe to our email list or follow the TCAA on Facebook. See page 3 for information about subscribing to the email list; see the end of this newsletter for information about Facebook.
- On the Tuesday evening following the July public viewing session, we received the following message and images from Brian Harland via the TCAA's Facebook account: My 3-year-old granddaughter said to me, of her new friend "Mr. Lee", "PaPa, He is so cool!!". Sincere thanks to you Lee!! Gigi loved seeing the moon, Jupiter, and Jupiter's four moons, through your telescopes!! 👏👏👏👏

It should be noted that Lee is the TCAA's premiere public outreach provider. As one of the club's three NASA Solar System Ambassadors, Lee gives dozens of talks and viewing sessions on behalf of the TCAA each year. These rarely go noticed but for a E/PO comment or two in the pages of this newsletter. The TCAA should consider nominating Lee for the 2020 NCRAL Region Award!



- ISU Planetarium Director and TCAA Vice President Tom Willmitch made a big "splash down" in the online edition of *The Pantagraph* (see above) on Friday, July 19th. He was interviewed in relation to the 50th anniversary of the Apollo XI moon landing as were Dr. Dan Holland, Chairman of the ISU Physics Department, and Stacey Shrewsbury, former "assistant" director of the Challenger Learning Center at HCC. This is the third time in about two weeks that the TCAA and/or its members have figured prominently in the *Pantagraph.* To see this story, visit http://bit.ly/2XQgZvv. Congratulations Tom! Story by Lenore Sobota; image credit David Proeber, *The Pantagraph.*
- The next day (Saturday, July 20th) there was nearly a full house at the ISU Planetarium to see the 50th anniversary video of the Ron Howard movie *In the Shadow of the Moon*. This 94-minute program showcased the memories of the Apollo astronauts on their various journeys to the moon. Tom Willmitch followed up with a short sky lecture capping off a pleasant two-hour experience that was excellent! In attendance were Mark and Bryce Heiniger, Brian Barling, Sharon MacDonald, Carl Wenning and, of course, Tom.

Are you familiar with Dark Sky Travels? It's a free, digital magazine published monthly. It is aimed at disseminating results of nightscape photography – the art of combining landscape and night sky in a single image. The editors feature the works of amazing nightscape photographers, whether it be tutorials, news, events, blogs, hints and tips, videos and of course those all-important images! Astrotourism appears to be increasing in popularity, so each month the editors include a special feature on a different nightscape location. They hope that by bringing this information all together in one place, it will offer readers more time to explore the dark & capture its beauty! Visit https://www.darkskytravels.com/

- The 18th annual **Illinois Dark Skies Star Party** will be held again this year from September 26-28 at the Jim Edgar Panther Creek State Fish & Wildlife Area 25 miles northwest of Springfield. Jim Edgar Panther Creek State Fish & Wildlife Area is Illinois' largest park. According to the event's promotional information, "It's a recreational dream and it makes a great home for three nights of observing." It is in an area of Illinois often referred to as "Forgottonia," a 16-county region between the Illinois and Mississippi Rivers in western Illinois that has seen very little development over the years. This has made the region a sanctuary for those seeking dark skies in Illinois. The event is sponsored by the Sangamon Astronomical Society. Registration fees are due by the Sept. 12, 2018 deadline to ensure availability of meals and t-shirt/sweatshirt orders. There is a $20 late fee for registrations after Sept. 12, 2017. For details and to register, visit www.sas-sky.org.
- On July 22nd, Bob Finnigan and Scott Wade began to teach a new astronomical imaging course at Prairie Sky Observatory. Included in this course on this evening as students were Sunil Chebolu and Bryce and Mark Heiniger. (Sandullah Epsicokhan joined the group later.) The group worked under a transparent sky to capture initial images of Messier 17, known as both the Omega Nebula and the Swan Nebula. Look for the image in the TCAA Image Gallery later in this issue of the newsletter.

DID YOU KNOW?

Are you looking for back issues of ***The OBSERVER***? Look no further than here: http://tcaa.us/Observer.aspx

Are you looking for information about the **history of the TCAA**? Find out more here: http://tcaa.us/History.aspx

Are you looking for the **TCAA Guides** to amateur astronomy? Visit this page: http://tcaa.us/TCAAGuides.aspx

E/PO UPDATES FOR JULY 2019

Lee Green and Carl Wenning represented the TCAA at a "How-To Event" at Bloomington Public Library on Saturday, July 6th, from 10:00 to about 11:30 AM. Our focus was on "How to Observe the Universe." We used this event to heighten interest in sky watching, increase attendance at public viewing sessions, and grow enrollment in the upcoming *Introduction to Amateur Astronomy* course. Lee and Carl had a display consisting of a 5" Celestron telescope on an equatorial mount, sky maps for July, and brochures dealing with public viewing sessions for 2019, and a handbill promoting the club's amateur astronomy course beginning next October.

Lee brought along two tactile maps, one consisting of the lunar surface and another of a crater with a central peak. He most compassionately called over the father of two children attending the event. The father was blind, so he enjoyed experiencing the tactile maps that have exaggerated vertical relief. Lee also aimed Carl's telescope on a flag outside the library allowing people to "see stars" during the daylight to the amusement of many. Lee clearly showed his prowess as a real showman.

The event was attended by hundreds as they visited displays set up by dozens of local community groups. About 50 attended our display over about 100 minutes. The goal of the event was to get local citizens more involved in their community and provide them avenues to do so. We hope to see many of these visitors in attendance at future public viewing sessions and the autumn course at the ISU Planetarium.

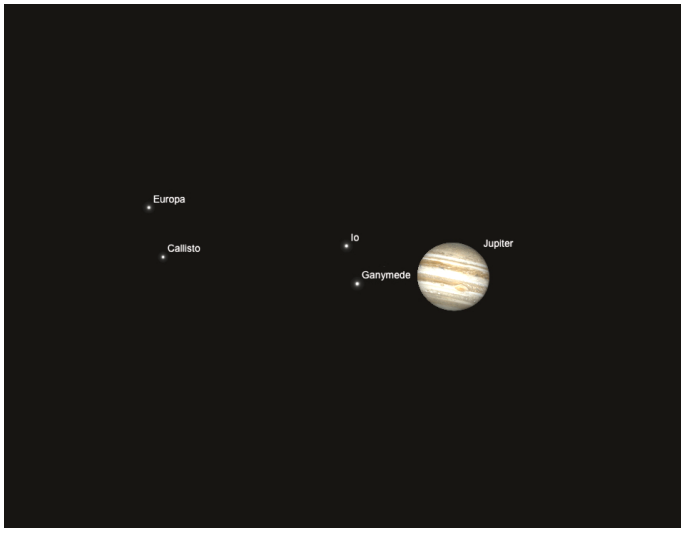
Lee informed Carl the next day that the TCAA component of the How-To Festival display was prominently noted on the front page of ***The Pantagraph,*** "just below the fold." The following picture and caption were found there. To read the accompanying story, go to this case-sensitive short URL: http://bit.ly/2JhXlzy

Ellison Bryant, 9, of Downs, looks through a reflective telescope that was on display Saturday, July 6, 2019, by the Twin City Amateur Astronomers during the How-To Festival at the Bloomington Public Library. (Image credit: DAVID PROEBER, THE PANTAGRAPH)

Again, it is the editor's considered opinion that the TCAA should nominate Lee for the NCRAL Region Award for 2020. Lee has done an exceptional job with public outreach as both a TCAA member and a NASA Solar System Ambassador. He does multiple public outreach events for school, scouts, and other social groups each month throughout the year about which most of our members are woefully unaware. Congratulations, Lee, on another outstanding event for the sake of the TCAA and our community!

The public viewing session at SGNC on July 13th was met with a partly cloudy sky and warm and humid conditions. This didn't stop about 60 from participating in the event. We listened with rapt attention as Lisa Wentzel spoke about "human computers," a history of woman who worked at Harvard College Observatory around the turn of the last century and made a number of extremely important discoveries. Afterward we viewed the heavens through a wide variety of six telescopes in the parking lot and observatories of the TCAA. Of particular note, Jupiter and its Galilean moons appeared in a very rare parallelogram configuration. As President Tim Stone would later say, "It was a fabulous night with great attendance, and if you didn't see Jupiter through Lee Green's C14, you missed a REAL treat." By the way, Tim also provided a spectacular treat showing stellar spectra through his telescope. Just before these events, Scott and Emily Wade received certificates of achievement from Bob Finnigan who recognized them for being the first two graduates of the astronomical imaging school at PSO. (Bob videotaped the presentation and various comments at the request of Farah Payan of *Woodland Hills Camera & Telescope* for posting on their website. See the video here: https://youtu.be/cLZVJ16utBE. What an evening to remember! In

attendance were 19 club members: Tony Cellini, Paul Pouliot, Dave Osenga, Sunil Chebolu, Lee Green, Paul Pouliot, Sandullah (Sandy) Epsicokhan, Scott and Emily Wade, Lisa Wentzel, Brian Barling, Mark and Bryce Heiniger, Allan Griffith, Carl Wenning, Bob Finnigan, Pam Willmitch, and Tim Stone. Also attending with Steve Richter who had been at the Summer Picnic at the Wenning residence.



Jupiter and amazing assemblage of the four Galilean moons.

Emily and Scott Wade joyfully receive their "graduation certificates" from Bob Finnigan.

On the afternoon of Tuesday, July 16th, Lee Green gave a presentation at Mount Hope-Funks Grove Library. He addressed the theme *A Universe of Books.* The theme was chosen due to 2019 being the 50th anniversary of the Apollo 11 moon landing. Lee shared some concepts of the solar system with young kids (1st – 5th grade) during his 2:30 PM program. A *SunSpotter* telescope provided a view of the sun, but no sunspots were seen. 36 members of the public were in attendance.

TCAA Social and Summer Picnic Enjoyable

Saturday, July 13th, saw a bevy of activity for the Twin City Amateur Astronomers. Events began at 5:30 PM in the ISU Planetarium when Director Tom Willmitch hosted a talk by Carl Wenning. The talk was titled, *Fire or Ice? The pending Collapse of Earth's Magnetic Field.* Carl spoke about the possible consequences of the "B field loss" and noted that the future fate of our technological society is by no means certain. We might perish from global warming or a new ice age. About 25 were in attendance including Tom, Carl, and the following TCAAers: Sandullah (Sandy) Epsicokhan, Scott and Emily Wade, Sharon MacDonald, Lisa Wentzel, Brian Barling, Mark and Bryce Heiniger, and Allan Griffith.

After Carl's talk, club members headed over to the Wenning residence in Normal to a short summer picnic meal consisting of hamburgers, hotdogs, beans, potato salad, chips, lemonade, water, cookies and a dessert cake brought by Cheryl & Bob Finnigan and their grandson Alex. Also making an appearance at the picnic in addition to the above were Pam Willmitch, Tim Stone, Carolyn Wenning, and Steve Richter – Carl's friend who came over to assist with the cooking in Carl's absence.

Central Illinois Astronomy Mini Conference Saturday, September 21st

The Central Illinois Mini Conference for amateur astronomers will return to McLean County on Saturday, September 21st. It was hosted by the Champaign-Urbana Astronomical Society (CUAS) last year as an "Astronomy Jamboree." At that time, we heard a number of invited talks at Staerkel Planetarium on the campus of Parkland Community College and celebrated the opening of their new roll-off-roof observatory with a cookout at their rural site.

This year, 2019, we hope to do something similar with contributed and invited talks starting midafternoon at the newly refurbished ISU Planetarium. NCRAL President and TCAA member Dr. Carl J. Wenning will start off the event with his presentation titled, *Fire or Ice? Pending Collapse of*

Terrestrial and Solar Magnetic Fields. What is our Technological Society's Fate? After a series of short contributed talks, we will head out to Sugar Grove Nature Center for a complimentary cookout.

While at Sugar Grove Nature Center, we will have open houses at both Sugar Grove Observatory (11") and Prairie Sky Observatory (90mm Hα, 11", 14", and 17" telescopes – our premier astrophotographic training facility).

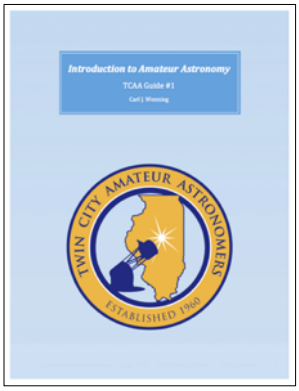
With the approaching dark (sunset at 6:52 pm; astronomical dusk at 8:27 pm), we will journey in small groups to Waynesville Observatory – our dark-sky site (only about 7 miles distant from SGNC) – to view its 6", 10", 16", 20", and 24" telescopes as well as the photographic systems and facilities located there.

Members of other Illinois amateur astronomy groups are most welcome to join us. We especially encourage members of CUAS, Sangamon Astronomical Society (SAS), Peoria Astronomical Society (PAS), and Popular Astronomy Club (PAC) who have joined us in the past. This year we also encourage members of the Rockford Astronomical Society (RAA) and the U of I and ISU astronomy clubs to join us.

Registration is required for this free event so we can prepare appropriately. Register online by September 14th at the following URL: http://bit.ly/2NSKAQg If you wish to give a talk, you may apply by going to this same URL. Just follow the appropriate link.

INTRODUCTION TO AMATEUR ASTRONOMY COURSE TO RESUME

The TCAA's *Introduction to Amateur Astronomy* course is making a comeback for the first time since 2017. Started in September of 2015 as *Universe Sampler*, the course (later named *Introduction to Amateur Astronomy*) was successively taught three times, twice by Carl Wenning and twice by Darren Erickson with a one course taught by both. Approximately 30 individuals passed through the first three courses.



The 2019 course is being supported by an inaugural $250 mini grant provided by the North Central Region of the Astronomical League (NCRAL) and awarded at its Regional convention in Moline on May 3-5, 2019. The purpose of the grant is to help a club to recruit new members and is the first of its type. In this instance, the money will be used to pay for as many copies of the course's textbook, TCAA Guide #1, as possible. The grant will allow us to reduce the cost of the course in the hope of recruiting new members. The course will be promoted at all public viewing sessions this year.

TCAA Guide #1 was written by Carl prior to the start of the course in 2015 and subsequently updated and expanded. The Guide constitutes a comprehensive introduction to amateur astronomy but is not to be mistaken for an introductory astronomy text. The Guide addresses the basics that everyone needs to know in order to become a successful amateur astronomer. It deals primarily with the use of eyes, binoculars, and telescopes to successfully view the objects of the night sky.

Introduction to Amateur Astronomy will be offered for a reduced fee in comparison to the past (registration fee will be $15 per household this year rather than $25). Each of the course's three 2-hour classes will be held at the ISU Planetarium courtesy of Director Tom Willmitch. Classes will be taught by Carl Wenning with Tom's assistance. The dates for the three sessions are Saturdays, October 12, 19, and November 2. (There will be no class on Saturday, October 26 due to a schedule conflict.) Classes will run from 3:30 PM to 5:30 PM each day. This will allow for evening viewing sessions should the sky be clear.

The course Guide (not the course) will be provided free to non-TCAA-member participants (one per household), and a one-year introductory membership in the TCAA will be included. (TCAA members may attend the course without paying the $15 course fee but will have to either use an electronic version or print their own copy of *TCAA Guide #1* for use in the course. (N.B. The Guide is currently being updated. If you are a TCAA member and intend to take the course, do not print your copy for the course until (1) you have been admitted and (2) the revisions are complete.)

Those who successfully complete the course (determined on the basis of course attendance and successfully passing an optional written test which will be new this year) will be eligible for training on the SGO's 11-inch Celestron "goto" telescope. Keys to the observatory will be provided only after an acceptable introductory period, the length of which has yet to be determined by the TCAA Board of Directors.

To apply for this course, go online to the following case-sensitive URL: http://bit.ly/2V8eGxL. Be mindful of the fact that application does not guarantee enrollment. The number of seats in the course is limited, and priority will be given to non-members. Should you have any questions or concerns, contact Carl Wenning at carlwenning@gmail.com.

DID YOU KNOW? Three TCAA members are now NASA Solar System Ambassadors: Lee Green, Tom Willmitch, and now Sandullah Epsicokhan.

VENUS ENTERING EVENING SKY

~ by Carl Wenning ~

Venus will soon enter the evening sky. It will be at superior conjunction on the far side of the sun on August 14th. Within about a month's time from then, it will start appearing in the western evening sky at the end of civil twilight. It will be hard to see at first and will continue to hug the western horizon until November when it starts to rise more rapidly higher up in the twilight glow. Jupiter and Saturn will also grace the western sky during the autumn but will slowly disappear into the glare of the sun as the sun's faster eastward motion along the ecliptic overtakes them. Mercury will make cameo appearances during this time as well. The drawing shows the western evening sky about 30 minutes after sunset.

Venus at monthly intervals from September through May. End of civil twilight will occur about 30 minutes past sunset. [cjw]

AUGUST 2019: SIRIUS AND MERCURY IN THE MORNING, A NEAR WASHOUT FOR THE PERSEIDS, AND A MINI-MOON

~ by Jeffrey L. Hunt ~

At the beginning of the month, only three bright planets are visible during twilight or night hours. Jupiter and Saturn shine brightly from the southern sky during the early evening. Mercury is low in the predawn eastern sky. It is headed for its morning greatest elongation. While the separation from the sun is only 19°, Mercury puts on a favorable display brightening after its greatest angular separation. As for the other two planets, Venus is only 4° west of the sun, hiding in the sun's glare. It reaches superior conjunction later in the month. Mars is 10° east of the sun in the constellation Leo. It is visible in bright twilight with a binocular. As the month progresses Mercury brightens, competing in visual intensity with Sirius. The star makes its first morning appearance (heliacal rising) during the first half of August. Locate a clear eastern horizon to view Mercury in the east-northeast and the first appearance of Sirius in the

morning sky in the east-southeast. The Perseid meteor shower peaks on the morning of August 13, but the bright moon sets about a quarter of an hour before the beginning of morning twilight, washing out the event for that morning. Look for meteors a few mornings before the peak morning, when there is a gap between moonset and the beginning of twilight. It is important to restate a realistic observable rate for the meteors. A year ago, I wrote in detail about this; it's worth repeating: The highest meteor counts occur as the shower's radiant approaches the zenith after midnight and before the beginning of twilight, when we see the meteoroids' orbits nearly head on. It is important to note that the predicted rates for meteors visible are for all meteors across the entire sky, not those visible to an individual observer. To get a maximum meteor count, watch in a group of five observers, four looking above each cardinal point and one looking toward the zenith. Cut the official estimates in half if you're observing in or near town, because many of the meteors are dim; yet, others are bright and impressive to see. Divide the predicted rate by 5 if you're observing alone. So, at prime times, lone observers may see 10 meteors per hour in a dark location, 5 per hour in town. Because meteor showers can be seen anywhere in the sky, counting them requires several observers (or an automated all sky camera.) Astronomy is a social activity. Observe with others! Back to the sky: The Summer Triangle – Vega, Deneb, and Altair – is high in the west as morning twilight begins. In the south, the meridian bisects the Great Square of Pegasus. Alpheratz, the star shared with Andromeda, is over three-fourths of the way up in the sky. Farther east, bright Capella is well above the northeast horizon with Aldebaran to its lower right. Perseus and Cassiopeia are above Capella. At the end of evening twilight, golden-orange Arcturus is about halfway up in the western sky, with blue-white Spica to its lower left near the horizon. The Summer Milky Way arches from the southern horizon, between Jupiter and Saturn that includes the star fields of Sagittarius and Scorpius, high into the eastern sky through the Summer Triangle – Vega, Deneb, and Altair – and into the northeast horizon. Daylight is over 14 hours long during August, but it loses an hour by month's end. Darkness, from the end of evening twilight to the beginning of morning twilight, gains over 100 minutes this month. As mid-month approaches the full moon occurs at apogee, a mini-moon, compared to the full moon at perigee.

- **August 1**: Thirty minutes before sunrise, Mercury (m = 1.9) is 5° up in the east-northeast, over 10° to the lower left of Pollux (β Gem, m = 1.2). Use a binocular to view them. The length of daylight and twilight is a few minutes over 18 hours. Mars sets before Civil Twilight when the sun is 6° below the horizon. One hour after sunset, Jupiter (m = −2.4) is 26° up in the south, immediately west of the meridian. It is nearly 7° to the upper left of Antares (α Sco, m = 1.0). Saturn (m = 0.1), nearly 20° up in the southeast, is over 30° to the lower left of Jupiter.
- **August 2**: The moon is at perigee at 2:11 a.m. CDT when it is 223,320 miles away. Thirty minutes before sunrise, Mercury (m = 1.6) is 5.5° up in the east-northeast. Watch the planet brighten rapidly during the next several mornings. Forty-five minutes after sunset, the moon (1.9 days old, 6% illuminated) is 7° up in the west.
- **August 3**: Thirty minutes before sunrise, Mercury (m = 1.3), is 6° in altitude in the east-northeast. In the evening an hour after sunset, the moon (3.0d, 12%), 11° up in the west, is over 8° to the lower left of Denebola (β Leo, m = 2.1).
- **August 4**: In the morning about thirty minutes before sunrise, Mercury (m = 1.1) is nearly 7° up in the east-northeast. As the sky darkens, about an hour after sunset, the moon (4.0d, 21%), about 17° up in the west, is 3.4° to the right of Gamma Virginis (γ Vir, 3.4).
- **August 5**: As the eastern sky brightens, about 30 minutes before sunrise, Mercury (m = 0.8) is nearly 8° up in the east-northeast, 9.4° to the lower right of Pollux. In the evening, one hour after sunset, the moon (5.0d, 32%), over 20° up in the west-southwest, is nearly 7° to the upper right of Spica (α Vir, m = 1.0). At the same hour, Jupiter is 26° up in the south, a few degrees west of the meridian. Saturn, over 30° east of Jupiter, is over 20° up in the south-southeast. The Ringed Wonder passes 0.6° below Omicron Sagittarii (o Sgr, m = 3.8)
- **August 6**: Thirty minutes before sunrise, Mercury (m = 0.6) is 8.5° up in the east-northeast. In the evening, one hour after sunset, the moon (6.0d, 43%), over 25° up in the southwest, is over 13° to the upper left of Spica and over 10° to the right of Zubenelgenubi (α Lib, m = 2.8).
- **August 7**: In the morning, 30 minutes before sunrise, Mercury (m = 0.4) is 9° up in the east-northeast. The planet is 9.1° to the lower right of Pollux. At 12:31 p.m. CDT, the moon reaches its First Quarter phase. One hour after sunset, the moon (7.0d, 54%) is nearly midway from Zubenelgenubi to Zubeneschamali (β Lib, m = 2.6), although it is east of a line that connects the two stars. It is 4.9° to the lower left of Zubeneschamali.
- **August 8**: Thirty minutes before sunrise, Mercury (m =0.2) is over 9° up in the east-northeast and 9.1° to the lower right of Pollux. Beginning tomorrow, the sun rises after 6 a.m. CDT. In the evening, one hour after sunset, the moon (8.0d, 64%), over 28° up in the south-southwest, is 1.9° to the upper right of Graffias (β Sco, m

= 2.5). At the same time the moon is over 10° to the upper right of Antares (α Sco, m = 1.0) and nearly 12° to the right of Jupiter.

- **August 9**: Mercury (m = 0.1) is nearly 10° up in the east-northeast, 30 minutes before sunrise. The Mercury – Pollux gap is opening; this morning it is 9.2°. Mercury reaches its greatest elongation west (19°) at 6:08 p.m. CDT. In the evening sky, one hour after sunset, the moon (9.0d, 74%) – 27° up in the south – is 2° to the upper left of Jupiter. At the same time the moon is nearly 9° to the upper left of Antares.
- **August 10**: As the sky brightens, 30 minutes before sunrise, Mercury (m = −0.1) is nearly 10° up in the east-northeast. In the evening sky, one hour after sunset, the moon (10.0d, 82%), 25° up in the south, is nearly midway between Jupiter and Saturn. The gaps: Moon – Jupiter, 14°; Moon – Saturn, 16°. Jupiter is nearly 26° up in the south, about 7° west of the meridian. Saturn is nearly 22° up in the south-southeast.
- **August 11**: The Perseid meteor shower is near its peak. The moon sets a few minutes after 2 a.m. CDT and morning twilight begins about 2 hours later. This morning look for the first sighting of Sirius (heliacal rising) in Normal. It is about 3° up in the east-southeast, 45 minutes to 30 minutes before sunrise. Use Orion's belt stars as a pointer, pointing downward, that guides us to Sirius. The sun is now setting before 8 p.m. CDT. In the evening sky, Jupiter's retrograde ends, 7° to the upper left of Antares and over 30° to the upper right of Saturn (m = 0.2). Jupiter moved 9.8° westward along the ecliptic. One hour after sunset, the moon (11.0d, 89%) is 22° up in the south-southeast, 3.9° to the right of Saturn.
- **August 12**: Jupiter is now setting before 1 a.m. CDT. For the Perseids, moonset occurs near 3 a.m. CDT and morning twilight begins an hour later. Mercury (m = −0.4) is 10° up in the east-northeast, 30 minutes before sunrise. One hour after sunset, the waxing gibbous moon (12.0d, 95%), 18° up in the southeast, is nearly 9° to the lower left of Saturn.
- **August 13**: For the peak morning of the Perseids, the moon sets about 15 minutes before morning twilight begins. About 30 minutes before sunrise, Mercury (m = −0.5) is nearly 10° up in the east-northeast. One hour after sunset, the moon (13.0d, 98%), 14° up in the southeast, is 7° below Beta Capricorni (β Cap, m = 3.0).
- **August 14**: Venus is at superior conjunction at 1:07 a.m. CDT when it is about 1.3° north of the sun. At the beginning of morning twilight, the moon (13.2d, 99%) is about 6° in altitude in the southwest. Thirty minutes before sunrise, Mercury (m = −0.6) is over 9.5° up in the east-northeast. If you're looking for Venus today during daylight, it is about 1.2° to the upper left of the sun. Take great care when looking for an object near the sun through any optical instrument. Through a telescope Venus is 100% illuminated and about 14" across. An hour after sunset, the moon (14.0d, 100%), about 10° up in the southeast, is in eastern Capricornus, about 6° to the upper right of Delta Capricorni (δ Cap, m = 2.8).
- **August 15**: At the beginning of morning twilight, the moon (14.2d, 100%) is nearly 15° up in the southwest about 4° to the lower right of Delta Capricorni. This full moon is a "mini-moon," a full moon that occurs near apogee, compared to the supermoon, the full moon that appears near perigee. As the sky brightens, thirty minutes before sunrise, Mercury (m = −0.8) is over 9° up in the east-northeast. Have you looked for Sirius? The moon is full at 7:29 a.m. CDT. One hour after sunset, the (mini) moon (15.0d, 100%) is just above the horizon in the east-southeast.

At midmonth, Mercury is past its greatest morning elongation. It continues to grow in brightness, but it loses altitude during morning twilight. Venus is now slowly moving into the evening sky. Mars, now less than a month from its solar conjunction, hides in bright evening twilight. The two evening planets, Jupiter and Saturn, are in prime locations in the early evening for telescope viewing, although they are low in the sky. The sun's highest point is about 10° lower than its noon solstice location. In the evening sky, Scorpius and Sagittarius stand at the meridian for us to admire the Milky Way and its wonders. Higher in the sky, the Summer Triangle is at the meridian. At the beginning of morning twilight, the Summer Triangle is in the west and the Great Square of Pegasus is now past the meridian. Farther east, Orion is now clearing the eastern horizon. If you've not spotted Sirius, it appears above the east-southeast horizon about 45 minutes before sunrise.

- **August 16**: One hour before sunrise, the moon (15.3d, 99%) is 17° up in the southwest. Thirty minutes before sunrise, Mercury (m = −0.8) is 9° up in the east-northeast. This morning, Mercury is directly below Pollux. The gap is about 14°. At the end of evening twilight, the moon (16.0d, 98%) is less than 10° up in the east-southeast in central Aquarius.
- **August 17**: One hour before sunrise, the moon (16.3d, 97%) is nearly 26° up in the southwest. As the sky brightens toward sunrise, locate Mercury (m = −0.9)

about 9° up in the east-northeast. The moon is at apogee at 5:49 a.m. CDT when it is 252,429 miles away. An hour after the end of evening twilight, the moon (17.0d, 94%) is over 10° up in the east-southeast in eastern Aquarius.

- **August 18**: One hour before sunrise, the moon (17.3d, 93%), in eastern Aquarius, is nearly 35° up in the southwest. At about 30 minutes before sunrise, locate Mercury (m = −1.0) over 8° in the east-northeast. Look for Mercury and Sirius (α CMa, m = −1.5). Find the star in the east-southeast. Both nearly have the same altitude for the next few mornings, but they are over 45° apart. One hour after the end of twilight, the moon (18.0d, 88%) is less than 10° up in the east. It is in Cetus again this month.
- **August 19**: One hour before sunrise, the moon (18.3d, 87%) is less than 45° up in the south-southwest. The moon is in Cetus this morning and for the next two mornings. As the morning sky brightens toward sunrise, Mercury is nearly 8° up in the east-northeast. One hour after the end of evening twilight, the moon (19.0d, 81%) is rising in the east.
- **August 20**: An hour before sunrise, the waning gibbous moon (19.3d, 80%) is nearly 50° up in the south. Thirty minutes before sunrise, Mercury (m = −1.1) is over 7° up in the east-northeast. As the moon leaves the early evening sky, the glory of the summer Milky Way is visible. In a dark sky it is dazzling, especially when the sky is dark enough to see the Great Rift, a dark band that runs from Deneb to Sagittarius. This is also the season to observe many gaseous nebulae and star clusters. Of the numerous that are visible, the focus here: Eagle Nebula (M16, NGC 6611), Omega Nebula (M17, NGC 6618), Black Swan Nebula (M18, NGC 6613), and the Sagittarius Star Cloud (M24, NGC 6603). The Sagittarius – Scorpius region is famous for star clusters and nebulae. Look above the Lagoon Nebula (M8, NGC 6523) and Trifid Nebula (M20, NGC 6514) region for the four features. Start with the Sagittarius Star Cloud. This is a curious entry in the Messier catalog and often misunderstood. In Robert Burnham's *Celestial Handbook*, he describes the location and other characteristics: "This is the bright star cloud between the Lagoon Nebula and M17; it is approximately 6° northeast from M8…Roughly rectangular in shape, the cloud measures about 2° x 1° with the longer dimension oriented more or less northeast to southwest. Several very distinct dark nebulae border the cloud along its northwest rim" (p. 1603). John Mallas, in *The Messier Album*, writes that "M 24 is not a true galactic (open) cluster but a small detached portion of the Milky Way…It is quite easily seen with the naked eye under good conditions and is a fine sight in binoculars or a rich-field telescope" (p. 71). The NGC object is an open cluster within this larger, brighter region. Harrington describes it in *Touring the Universe Through Binoculars:* "It now must be considered a separate object. In 7x binoculars, it is just visible as a dim, unresolved myriad of stars strewn throughout the region" (p 218). M17 is about 3° above the star cloud, at the northern boundary of Sagittarius, with dimmer M18 below it. Harrington writes that M18 "is one of the less impressive Messier objects. Consisting of 18 loosely packed stars, it appears in binoculars as a fairly obvious stellar arrangement" (p. 219). In contrast, through a telescope Mallas writes that the cluster "is a pretty sight, which may reveal more than a dozen stars" (p. 62). M17 is sometimes known as the "Horseshoe Nebula," after its well-known Omega Nebula moniker. The nebula is an emission nebula similar to the more famous Orion Nebula. It shines from stars within the nebula causing its gaseous composition to glow. Burnham proclaims it as "one of the most prominent of the diffuse nebula" (p. 1584). Further he describes it: "For the visual observer, the main feature of M17 is the long bright comet-like streak across the north edge; on the west end a curved 'hook' gives the whole nebula a resemblance of a ghostly figure '2' with a bright streak forming the base" (p. 1584). The final object is M16, nearly 2.5° to the upper right of M17 in Serpens. Burnham describes the Eagle Nebula: "M16 is a large scattered star cluster immersed in a vast diffuse nebula, a most wonderful object" (p. 1783). He introduced the name "Star-Queen Nebula," which is not as famous as the more popular Eagle Nebula name. Burnham's descriptions are worth reading. The three-volume handbook is now out of print, but it can be found for sale at online trading sites. The book is sometimes criticized because it lacks detailed footnotes, although the author cites some of his sources by name in the text. A Wikipedia page (http://bit.ly/burnham_stars) explains Burnham's handbook, his research at Lowell Observatory, and his life. It is worth the quick read. As you scan the Milky Way with a telescope using low power or through a binocular, you'll run across many clusters, nebula, and deep sky curiosities that are not labelled on your favorite charts. In the Milky Way regions, map makers must make choices of the features they include on their maps. Enjoy the views!

- **August 21**: An hour before sunrise, the gibbous moon (20.3d, 72%) is over 55° up in the south. Thirty minutes before sunrise, Mercury (m = −1.2) is about 6.5° in altitude in the east-northeast.
- **August 22**: An hour before sunrise, the moon (21.3d, 62%), nearly 60° up in the south-southeast is at the southern boundary of Aries. The gibbous orb is nearly 17° to the lower left of Hamal (α Ari, m = 2.0) and nearly 18° to the lower right of the Pleiades. As sunrise approaches, Mercury is less than 6° up in the east-northeast.
- **August 23**: An hour before sunrise, the moon (22.3d, 52%), nearly 58° up in the southeast, is about 9° to the lower right of the Pleiades and 12° to the upper right of Aldebaran (α Tau, m = 0.8). As the sky brightens toward sunrise, Mercury (m = −1.3) is less than 5° up in the east-northeast. If you've not seen Sirius, it is 10° up in the southeast at this time. The moon displays its Last Quarter phase at 9:56 a.m. CDT. Regulus (α Leo, m = 1.3) is at its solar conjunction today.
- **August 24**: An hour before sunrise, the thick waning crescent moon (23.3d, 42%), over 50° up in the southeast, is 2.1° to the upper left of Aldebaran. Thirty minutes before sunrise, Mercury is over 4° up in the east-northeast.
- **August 25**: An hour before sunrise, the waning crescent moon (24.3d, 31%), about 45° up in the east-southeast, is 0.7° to the upper right of Zeta Tauri (ζ Tau, m =3.0), the southern horn of Taurus. Watch the moon approach the star up until the star disappears into the approaching brightening sky from sunrise. The moon occults (covers) Zeta during predawn hours in the western United States. Thirty minutes before sunrise, Mercury (m = −1.4) is over 3° in altitude in the east-northeast. In the evening sky, an hour after sunset, Jupiter is 24° up in the south-southwest, about 16° west of the meridian. Saturn is about the same distance east of the meridian, with the same altitude. Jupiter is moving eastward against the sidereal background in southern Ophiuchus while Saturn continues to retrograde in eastern Sagittarius. They are over 29° apart.
- **August 26**: An hour before sunrise, the thinning crescent moon (25.3d, 21%) is 2.6° to the lower left of Mu Geminorum (μ Gem, m = 2.8). Thirty minutes before sunrise, Mercury is less than 3° up in the east-northeast. While Sirius is now higher in the sky, this is your last date to compare the brightness of the star and the planet. Good-bye, Mercury!
- **August 27**: One hour before sunrise, the waning crescent moon (26.3d, 12%), over 25° up in the east, is nearly 7° to the lower right of Pollux. In the evening sky, Jupiter is now setting before midnight.
- **August 28**: One hour before sunrise, the waning crescent moon (27.3d, 6%) is 14° in the east-northeast in the middle of Cancer. Look at the moon with a binocular to see Earthshine gently illuminating the night portion. Also take note that the moon is on the western edge of the Beehive cluster (M44, NGC 2632).
- **August 29**: Forty-five minutes before sunrise, the thin crescent moon (28.3d, 1%) is 5° up in the east-northeast.
- **August 30**: Saturn is now setting before 1 a.m. CDT. The moon is at its New phase at 5:37 a.m. CDT. The moon is at perigee at 10:53 a.m. CDT when it is 221,939 miles away.
- **August 31**: Thirty minutes after sunset, the thin crescent moon (1.6d, 4%) is about 5° up in the west. An hour after sunset, Jupiter (m = −2.2) is 23° up in the south-southwest. About 29° eastward along the ecliptic, Saturn is 25° up in the southern sky, east of the meridian. Venus, Mercury, and Mars are near the sun. Mercury and Mars are near their solar conjunctions. Mars is headed for the morning sky and Mercury is moving into the evening sky. Venus is slowly moving in the evening sky toward conjunctions with Jupiter and Saturn later in the year.

At month's end, Jupiter and Saturn are starting the evening farther west than earlier in the summer. Jupiter is now moving eastward along the ecliptic, beginning to close the gap on Saturn for next year's Great Conjunction. Saturn continues to retrograde until mid-September. Venus, Mercury, and Mars are near the sun and their solar conjunctions. While Venus is now east of the sun in the evening sky, it's only 5° from the solar disk. Just before the beginning of morning twilight, the Summer Triangle is visible low in the west while the Winter Triangle – Sirius, Betelgeuse, and Procyon – is visible in the east. The length of daylight is now nearly 13 hours long and diminishing quickly during the next few weeks until the equinox. As the sky darkens after sunset, the Summer Triangle is high in the south, with Vega near the zenith. As the sky darkens further, the Milky Way arches high in the sky through Cygnus.

SPECIAL NOTICE! Mark Cabaj will be giving away four (4) authentic meteorites as part of his August 10th Public Viewing Session talk at SGNC on Saturday, August 10th. There will be a door prize drawing near then end and you must be present to win! Thanks and a "tip 'o the hat" to Mark for his wonderful generosity. See details below.

REMAINING PUBLIC VIEWING SESSIONS FOR 2019

August 10: **Meteor Showers – There's More Than One** (Mark Cabaj) **8:30-10:30 PM**
The famous Perseid Meteor Shower peaks in a few days, but the moon will be nearly full. Will you have to wait until next August to see a meteor shower? Learn about other great meteor showers, when they are visible, and what you can expect to see.

September 07: **Your First Telescope – Binoculars?** (Mark Cabaj) **8:00-10:00 PM**
Virtually every serious amateur astronomer owns a pair of binoculars. If you're thinking about getting a telescope for yourself, or for a Christmas gift, we will tell you what to look for, how to use them for rewarding astronomy, and why you'll use them longer than any other telescope you'll ever own.

October 05: **Uranus, Neptune, and Pluto – Two Planets, or Three?** (Mark & Nataya Boulware) **7:00-9:00 PM**
We spend a lot of time looking at the inner planets, Mercury, Venus, Mars, Jupiter, and Saturn. Few have ever seen Uranus, Neptune, and Pluto. October presents a great opportunity to see all three in one night. We will learn about them, and hopefully have a look at them!

TCAA CALENDAR OF EVENTS FOR 2019

Date	Event	Coordinator(s)	Location	Times
August 10	Public Viewing Session	Mark Cabaj	SGNC	8:30 – 10:30 PM
Sept 7	Public Viewing Session	Mark Cabaj	SGNC	8:00 – 10:00 PM
Sept 21	Central IL Mini Conference	Carl Wenning	ISU/SGNC/WO	Afternoon/evening
Sept 26-28	Illinois Dark Sky Star Party	Sangamon Astro Society	Jim Edgar/Panther Creek	All day
October 5	Public Viewing Session	Mark & Nataya Boulware	SGNC	7:00 – 9:00 PM
Oct 12,19,26	Intro to Amateur Astronomy	Carl Wenning	ISU Planetarium	TBD
Dec 4	TCAA Presents to PAS	Carl Wenning/Tim Stone	Riverfront Museum	7:30 PM
Dec ???	Holiday Party	TBD	TBD	TBD

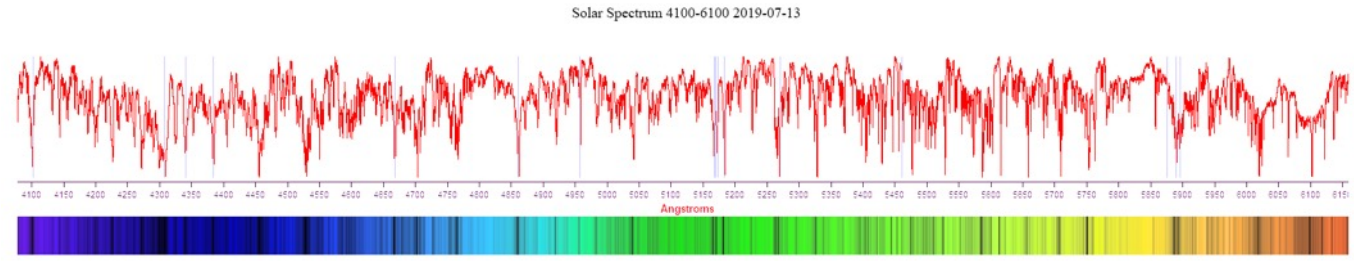
10" TELESCOPE DECLARED "UNWANTED PROPERTY"

At the last TCAA Board of Directors meeting, a serviceable 10" telescope donated to the TCAA about a year ago by the family of former club member Lenore Trainor (1956-2007) was determined to be unwanted property. This means that the club is willing to take a suitable donation in exchange for the telescope. The Odyssey 1 telescope is a very sturdy, but very heavy Newtonian reflector on a Dobsonian mount. The telescope is very low profile ("short") most suitable for either a youthful observer or a rather short adult. As a result it has wanted for observers and sat unused at Waynesville Observatory since it was first left there. It needs some cleaning but provides great views. A small variety of eyepieces is available with the telescope. If you are interested in this instrument and are willing to make a donation to the TCAA, please contact Secretary Carl Wenning at carlwenning@gmail.com. Please note that the accompanying image is a "file photo." It is not a photograph of the actual telescope.

TCAA Image Gallery

Milky Way, June 30, by Tim Stone. Tim wrote, "With Bob's 5D and 11-24 lens, here's a stack of 16x60-second exposures at ISO 3200. Fabulous result if you ask me. Couldn't be happier! At 11mm this lens takes the entire swath of the Milky Way from below Scorpius to above Cygnus. Amazing."

Messier 64, July 1, by Emily Wade. Emily imaged M64, the "Blackeye Galaxy," taking 9 frames. Bob Finnigan later assembled the images at home using MaxIm DL.



Solar Profile 4100-6200 Ångstroms by Tim Stone. Tim wrote, "Hey, I imaged the sun's spectrum Saturday morning (July 13th). I didn't get the whole thing, but I got the heart – 4100 to 6200 Ångstroms. I'll keep working on it, but here's a reasonable resize of the spectrum so far. Full size is already 30,000 pixels wide :) I really can't believe I can do this...

Messier 17 (Omega or Swan Nebula) with Sunil Chebolu, Sandullah Epsicokhan, and Bryce Heiniger. Ten 300-second subs. PSO QHY camera on 14" RC telescope. Processing by Scott Wade.

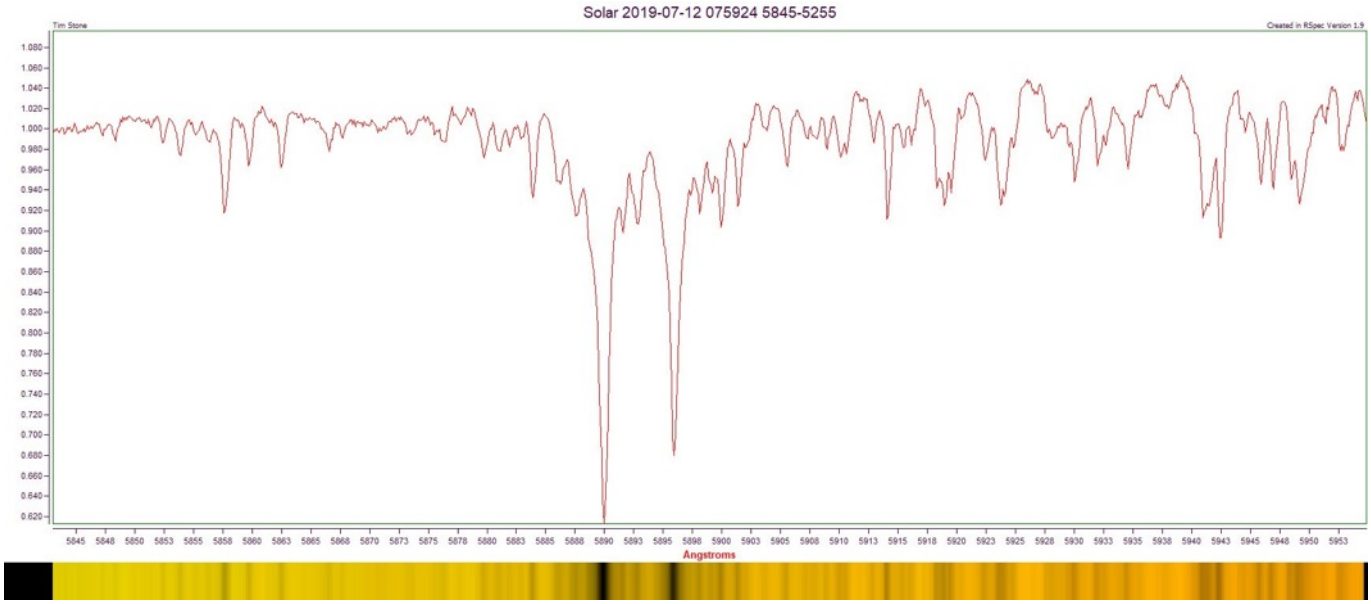
Messier 101. Scott Wade noted, "This object was captured last week with the 14" during our training session so we should credit Sunil Chebolu, Sandullah Epsicokhan and Bryce Heiniger (who were being led by Emily Wade)."

Messier 27 by Tim Stone. Tim noted, "Here's my M27 from the last three nights (July 22-24). 13 hours of RGB on the 16" which fought me every step of the way! Sometimes it seems like these systems actually have a personality and it's a stubborn one. This is a crop of the full frame.

THE SOLAR SPECTRUM

~ by Tim Stone ~

I've been interested in the solar spectrum for a long time. Since I've been able to actually do spectrography, it's been a goal of mine to study the sun's spectrum in detail. A while back, I acquired a spectrographic instrument that is well suited for this and I've been working with it since then. The learning curve has been a little steep, but it has been very rewarding. I set a goal (not a very ambitious one, but a goal nonetheless) of taking a spectral image of the wavelengths around the beautiful double Sodium lines. Splitting this doublet requires a decent amount of resolution, and so I set out to do that. It has taken some time learning about how this instrument works, but here it is.



These two lines, labeled D1 and D2 in Fraunhofer's catalog of solar spectrum lines, are outstanding examples of what happens when one examines a spectrum in more and more detail. At low resolution, these two lines appear as a single absorption line. In class G stars, like our sun, it is relatively weak still, growing in strength in stars cooler than the sun. K-class stars have strong D1/D2 bands, but by the time we get to the very cool M class stars, this band has been obliterated by molecular bands, primarily from titanium oxide.

When we increase the resolution, we discover not one but two dark bands. These two bands at these wavelengths are completely characteristic of the presence of sodium. There are many other "doublets" in the solar spectrum, including the famous calcium H/K doublet in the far violet. Magnesium has a very notable triple band in the green region, but the sodium doublet rules yellow.

Increasing the resolution even further shows additional fainter lines. There are two lines between the two sodium bands, one from nickel and the other from iron. This spectrum shows many bands outside the sodium doublet, almost all of them from one metal or another. If one goes beyond the resolution my spectrometer can achieve, one would see even more lines (NASA's spectrum shows at least twelve between D1 and D2), all telltale of the presence of some element at some degree of ionization.

We can do this kind of detailed spectrography on the sun and other bright stars. NASA has similarly detailed spectra of Arcturus and Procyon. These stars have different spectral classes than the sun and provide a wealth of information about conditions in and the composition of their atmospheres.

I'm thrilled to have created this image of the sodium doublet. Cross this one off my spectro-bucket list! Next up on my solar spectrography list is a complete visible spectrum. That will take more experimenting and learning, but that's what it's all about, right!?!

I've included the profiled spectrum, created using the outstanding software RSpec by Tom Field, along with the raw spectrum. Go download the software from rspec-astro.com (30-day free trial, Windows XP and up only). Then download my image from there and calibrate the left band to 5889.95 Ångstroms and the right band to 5895.92 Ångstroms. The videos on the website will show you how simple it is to do this. Create your own profile of the sodium doublet and then go to http://bass2000.obspm.fr/solar_spect.php, dial in 5889, and start identifying other lines in this spectrum. I guarantee you'll enjoy it, and like me, you might just get hooked!

TCAA Treasurer's Report as of July 29, 2019

Checking Account Information

Memo	Category	Amount
BALANCE 6/29/2019		**715.38**
State Farm Companies Foundation	Donation	500.00
Astro League Dues @ 40 members	Dues and Subscriptions	(210.00)
Electrical Service	Waynesville Observatory	(61.05)
To Create Account Activity	Transfer From Savings	500.00
BALANCE 7/29/2019		1,444.33

Checking Account Balance – July 29, 2019	$1,444.33
Savings Account Balance – July 29, 2019	$2,017.77
- Includes $0.03 cents interest as of this date	
- Includes the transfer of funds to the checking account	
Total TCAA Funds – July 29, 2019	**$3,432.10**

All transactions are reconciled with the bank statements as of this date.

Respectfully submitted,
Dave Osenga, Treasurer

TCAA Active on Facebook

Did you know that the TCAA is on Facebook? We encourage users of social media to follow the TCAA to see what the club is doing and to learn about nightly events that only require the observer to step outdoors and view with the unaided eye. You can find us on Facebook by searching either TCAA or Twin City Amateur Astronomers. If you haven't followed TCAA's Face-book page, you have missed out on a lot during the past couple of months.

Renewing Your TCAA Membership

The TCAA works to promote in every way among its members and the public an interest in and knowledge of astronomy and its allied sciences, to advance amateur astronomy and observational techniques, to render assistance to other individuals or organizations working in the same or related fields, and to do everything necessary and proper to further such on a formal or informal basis. The TCAA is a Federally recognized non-profit entity organized exclusively for education and scientific purposes within the meaning of Section 501(c)(3) of the Internal Revenue Service code.

The TCAA currently supports family friendly public observing sessions at SGNC, public outreach events such as the recent May 9, 2016 transit of Mercury and the August 21, 2017 total solar eclipse field trip, hosting of NCRAL meetings (2010 and 2016), September mini conferences, and education courses for our membership and the public. The TCAA maintains three observatories including payment of insurance and publishes an award-winning club newsletter. We support Sugar Grove Nature Center through their membership program, maintain a loaner telescope program, and provide many other benefits as outlined in TCAA Guide #2 – *Membership and Benefits*.

Your TCAA membership supports education and public outreach in Central Illinois and regions beyond. Membership dues and the generosity of its members are the club's primary means of financial support. We receive no grants or public funds. We have unmet needs. By renewing your membership when it comes due, you can help to ensure our continuing efforts.