NORTHERN LIGHTS

NORTH-CENTRAL REGION OF THE ASTRONOMICAL LEAGUE

Winter 2017 - Series II , Volume 1, No. 3

Rochester Astronomical Society to Host NCRAL 2017

By John Attewell, Conference Chair

Mark your calendar now for April 21-23, 2017. This is the weekend that the Rochester Astronomy Club will host the annual conference for the North Central Region of the Astronomical League (NCRAL). This year's theme is on "astronomical observing." We will be presenting a full line-up of lectures, panel discussions, demonstrations, and vendor exhibits during the conference. The speaker roster already includes astronomers and scientists from the University of Iowa, Iowa State University, NCRAL, the Minnesota Astronomical Society, University of Minnesota, Mayo Clinic, and Winona State University. Their expertise ranges from astronomical observing to aerospace medicine.

This is going to be a truly different experience! The venue is going to be at the campus of the Eagle Bluff Environmental Learning Center located on the crest of the rolling hills north of Lanesboro, Minnesota (about 40 miles southeast of Rochester). Eagle Bluff is a very unique facility that is a year-round host to a wide variety of environmental, conservation, and science educational programs. Visitors to the facility range from K–12 field trips, adult education, to graduate programs. The reason we chose this venue is not just for the facility itself but, since we have the ability to control all external lighting, it is THE premier location for dark sky observing in Southeast Minnesota. Bring your telescopes for two nights of incredible observing – you won't believe the skies or your eyes!

Eagle Bluff is not a hotel but a campus, so this event will have the feel of both a star party and a conference. There is a large dining hall, classrooms, reception/exhibit areas, a multi-use auditorium, and 31 on-site dormitory-style "pods" (http://www.eagle-bluff.org/). Rooms will also be available in nearby Lanesboro but I highly suggest you take advantage of the adventurous overnight accommodations and stay on-site at Eagle Bluff the entire weekend.

We'll let you know when we launch the NCRAL 2017 conference website so you can get further information.

IN THIS EDITION:

- **Rochester Astronomical Society to Host NCRAL 2017**
- **EDITOR/REGIONAL REP'S MESSAGE**
- **Seeking Nominations for NCRAL Region Award**
- **80th Anniversary of Popular Astronomy Club**
- **Challenger Learning Center of Central Illinois Publishes Eclipse Guide**
- **NCRAL Now on Facebook**
- **Starlight, Star Bright…**
- **Driftless Dark Skies: Time Travel with the Winter Hexagon**
- **The Art of Astronomical Observing**
- **TCAA Publishes Free 56-Page Guide: Introduction to Amateur Astronomy**
- **How Many Planets in our Solar System: 8 or 9?**

EDITOR/REGIONAL REP'S MESSAGE

This is issue No. 3 (Series II, Vol. 1) of NCRAL's ***NORTHERN LIGHTS*** newsletter. As you will see by reading this issue, the newsletter has grown in size quite a bit since the inaugural issue last summer. This expansion has occurred thanks to the willingness of several amateur astronomers within NCRAL who are willing to contribute information suitable to our NCRAL readers.

This Winter 2017 issue of ***NORTHERN LIGHTS*** is filled with numerous articles. As editor-in-chief of this publication, I want to acknowledge the contributions of the following NCRAL members to this issue: Assistant Editor Jim Gibbs (Twin City Amateur Astronomers), and authors John Attewell (Rochester Astronomy Club), Sara Sheidler (Popular Astronomy Club), Anne Bauer (Popular Astronomy Club), John Heasley (Iowa County Astronomers), and Dino Milani (Popular Astronomy Club). As always, this newsletter contains important information and serves several purposes:

It serves as a benefit of membership to our NCRAL-affiliated clubs.

It helps get the word out about events nationally and in the North-Central Region of the Astronomical League.

It provides an avenue for members' contributions to be published for readers across the NCRAL region.

It provides an potential avenue to recruiting new clubs that are not currently NCRAL affiliated.

The editors hope that this newsletter makes its way to ALL members of AL-affiliated clubs in the North-Central Region. ***NORTHERN LIGHTS*** it is disseminated via email through a network of ALCors, club presidents, and newsletter editors. The newsletter is intended for all club members, not just these leaders. So, if you haven't received your copy through one of your club's leaders (but have found it by way the NCRAL website or the NCRAL Facebook page), you might want to contact your club's leadership. Perhaps I don't have your ALCor's, president's, and editor's email address in my database.

I recently sent out a notice to ALCors and presidents asking them to confirm email addresses. I only heard from back from 6 of the 35 or so groups in NCRAL. Readers, I ask you to forward contact information for your group to me if it serves no other purpose than to confirm that I have proper contact names and email addresses. Feel free to contact me via email (carlwenning@gmail.com) with the correct information and I'll see to it that your leaders receive newsletter mailings directly.

I also want to note that as your Regional Representative to the AL Council, you should feel free to contact me with questions or concerns about the national program. I'm now in regular contact with AL President John Jardine Goss and other national officers, and regional chairpersons and representatives.

Please consider making a nomination for the 2017 NCRAL Region Award. I'm sure that each club has one or more people who contribute greatly to amateur astronomy and its popularization. This is a wonderful way to recognize their efforts. See the next several pages for additional information.

Lastly, we need to be thinking ahead to electing NCRAL officers at the next business meeting at NCRAL 2017. To the best of my understanding, the positions of Chairperson and Vice Chairperson will once again be open for two-year terms. I understand that our Secretary/Treasurer (Don Klemt) and Regional Rep. (your's truly) have terms that will expire in 2018 and 2019 respectively.

Carl Wenning, Editor/Regional Rep.

carlwenning@gmail.com

REGIONAL OFFICER CONTACT INFORMATION

Chairperson: **Gerry Kocken**
gerryk@kockenwi.com

Vice Chairperson: **Charlotte DuPree**
grdupree@charter.net

Secretary/Treasurer: **Donald Klemt**
donklemt@ameritech.net

Regional Rep. & Newsletter Editor-in-Chief: **Carl Wenning**
carlwenning@gmail.com

Seeking Nominations for NCRAL Region Award

Charlotte M. DuPree
Vice Chair, NCRAL
6219 Jay St.
Trenton, WI 53095-9578

NCRAL club members,

Do you know someone who has dedicated his or her time and energy to promoting astronomy? Wouldn't you like to let them know they are appreciated for their hard work? This is your chance! It's time to make nominations for the NCRAL's Regional Award. This award recognizes exceptional individual effort and meritorious service to amateur astronomy through the member's local astronomy club, public outreach, the NCRAL, or the Astronomical League.

Using the guidelines and submission forms attached, we have made it easier than ever to nominate someone you feel deserves this award. This award will be presented in a special ceremony concluding the dinner banquet, of the NCRAL convention, on Saturday, April 22, 2017, at the Eagle Bluff Environmental Learning Center located north of Lanesboro, Minnesota.

The Rules for nomination are as follows:

The individual must be a member in good standing, either through an A.L. member organization or as a current member-at-large in the North Central Region.

The three current regional officers and the regional representative are NOT eligible for this award. Past winners are also ineligible for this award.

The regional officers and the regional representative are the voters and will base their decision on the information provided. Each member votes independently and will use his/her best judgment. All decisions are final.

The winner will not be revealed until the time of the presentation. Those not selected, will not be revealed.

All non-winning nominations will be kept on file for two years after submission. After such time, a new nomination will need to be competed.

There are many deserving candidates within our region. It is our hope to have a least one nomination from each society of the NCRAL. I look forward to receiving your nominations by March 21st. If there are any questions, please contact me via phone, email, or mail at the above listing.

Sincerely,

Charlotte DuPree
Vice Chair, NCRAL
(262) 675-0941
grdupree@charter.net

Submission Form for the NCRAL Region Award

Candidate's name (as it will appear on plaque) _____

Shipping Address _____

City _____State _____Zip_____

Club Affiliation _____

Nominator's name _____Club affiliation_____

Address_____

City _____State_____Zip_____

Phone_____

E-mail_____

Submission Guidelines:

Prepare a statement of the nominee's accomplishments in one or more of the areas listed under criteria. This statement should not exceed 3 double-spaced pages (1,000 words). Length does not necessarily equal strength. The statement should include number of years in office or committee membership and dates of said membership. The statement should also include length of time participating in public education, number of presentations, etc.

Supporting data; please include any relevant newspaper clippings, photos, and other articles that support the nomination. For service to groups such as schools, scouts, etc., it would help the committee if you could obtain a brief statement from the teacher, leader, chair etc. on the usefulness of the presentation.

NOMINATIONS MUST BE RECEIVED BY **Monday, March 20, 2017**. Any nominations received after this date will be kept on file for 2018. All nominations must be sent to:

Charlotte DuPree
NCRAL Vice-Chair
6219 Jay Street
Trenton, WI 53095-9578

80TH ANNIVERSARY OF POPULAR ASTRONOMY CLUB

by Sara Sheidler

The 80th banquet of the PAC was held on the evening of October 21st at the Viking Club, Moline, Illinois. This special event marked 80 years since club founder Carl H. Gamble formed the club. To commemorate this, we invited former members and friends of PAC to attend. Past President of the Astronomical League Carroll Iorg and his wife Betty came from Kansas City to help us celebrate. We also were honored to have Beth and Jeff Forrett attend. Beth is the great granddaughter of Carl H. Gamble and she brought along a picture of her great grandparents to share. During the social hour, everyone had a chance to look over display boards detailing the club's history and past presidents, recent AL awards for our Astronomy Day events, and the 1934 lattice tube telescope which was restored in 1987 after being found in the basement of Centennial Hall at Augustana College. This unique telescope had been stored at PAC founder Carl H. Gamble's Sky Ridge Observatory and was believed to have been built by PAC member August Wendt in 1934. Attendees also voted on the entries in the astrophotography contest.

PAC president Al Sheidler offered the invocation before the evening buffet of chicken, ham, scalloped potatoes, vegetables, and salad was served to the 53 attendees. Jan Gustafson and Anne Bauer graciously served the birthday cake which was donated by Hy-Vee. Wayland Bauer introduced the evening speaker, Mr. Floyd Perkins who gave an interesting program on his association with Dr. James Van Allen and their work on the Air Density-Injun Explorer satellites in the 1960's. Mr. Perkins was a WW2 veteran who began his career as a lab technician at Collins Radio in Cedar Rapids. He worked his way up to electrical engineer and managed the Collins satellite tracking station. He was borrowed by Dr. Van Allen to help develop two satellites which were later launched from Vandenberg Air Force Base. Mr. Perkins described those years of work as the most interesting and satisfying of his long career.

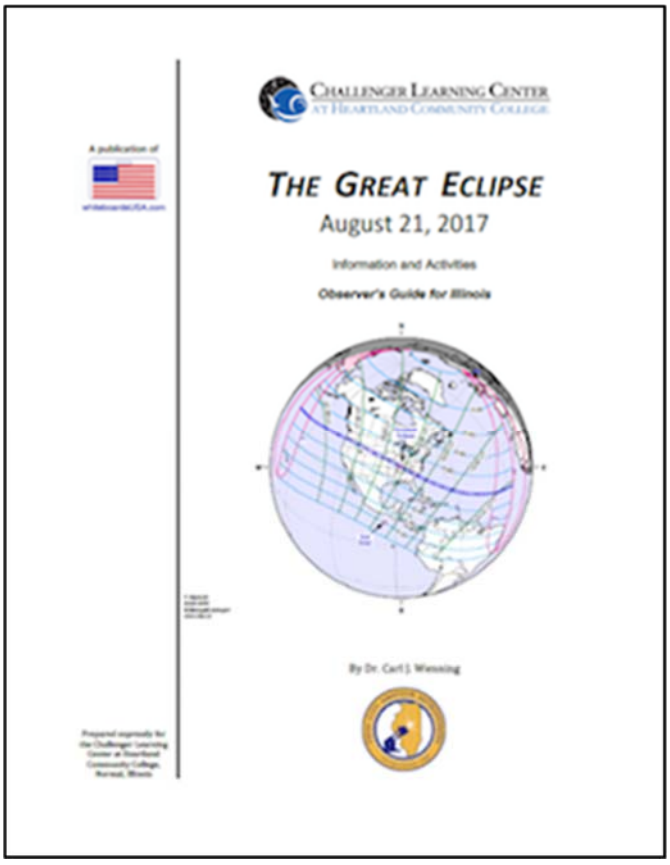
Roy Gustafson then gave a brief program on the history of the club. He talked about the long search for a permanent observatory site and the eventual determination that the answer was a mobile observatory which filled the need for public outreach. To this day the PACMO is an integral component of our efforts and we also have a fixed dark sky site in the area where club members can meet to engage in their hobby.

Wayland Bauer announced the Photography Contest winners. Mike Ombrello was the overall winner with his spectacular picture of the Milky Way. Al Sheidler then gave numerous awards to club members who have contributed significantly to the club in the last year. AL Outreach awards were given to Mel Schroeder, Mike Ombrello, Peter Soble, and John Schaub. Rusty Case and Terry Dufek were recognized for their enthusiastic contributions during the last year. Cindy Pippert was given a plaque to commemorate her 30 years of dedicated service as club secretary. Mark Schroeder was recognized for his 36 years as a member and Joel Carter for 35. The attendance award drawing was conducted by Terry Dufek and was won by Liz Robinson. The member of the year award went to Wayland Bauer for his outstanding participation and support of the club this year.

Carroll Iorg took the floor and gave a few words about the PAC and their prominent place as a founding member of the AL in 1941. He presented the club with a "Proclamation in Appreciation" award and thanked everyone for their commitment to amateur astronomy.

The evening ended with the annual door prize drawing. Mitch Milani won the Celestron telescope grand prize generously donated by Celestron. Everyone was a door prize winner as all the tickets were eventually drawn from the basket. The evening concluded with tours of the PACMO which was parked in the Viking Club lot.

Challenger Learning Center of Central Illinois Publishes Eclipse Guide



The Challenger Learning Center (CLC) at Heartland Community College in Normal, IL, (co-host of NCRAL 2016) will soon publish a revised and updated version of The Great Eclipse 2017: Observer's Guide for Illinois. NCRAL members who attended NCRAL 2016 received a pre-production, draft version of this booklet.

This lavishly illustrated 24-page booklet is tailored to provide detailed information specific to Illinois observers, and includes scientific background, local circumstances of the eclipse, and a host of preparatory and eclipse day activities. Dr. Carl J. Wenning, member of the Twin City Amateur Astronomers and former director of the Illinois State University Planetarium, authored the publication.

The booklet is intended not only to inform the public about the August 21, 2017, total solar eclipse, but to provide observers with the information and basic tools in order to do so. Each copy of the Observer's Guide includes a set of certified-safe solar eclipse viewing glasses manufactured on behalf of the Astronomical League, the nation's largest association of amateur astronomers.

The distribution of this booklet is intended as a fundraiser for both the CLC and other educational non-profits willing to distribute this Guide. The author suggests that the publication either be sold for a minimum of $10 or given in recognition of those who donate $10 or more to a club, museum, or science center. The document is digitally printed on durable 80# velvet stock paper and is saddle stitched at two points near the center and trimmed on three sides.

Pre-publication BULK orders are now being accepted by the CLC. Guides MUST be ordered in multiples of 20 only. Guides will be available in exchange for a donation of $6.00 per copy to the CLC. Shipping and handling is included in BULK orders. Please remit your tax-deductible contribution (made payable to Challenger Learning Center – a federally registered 501(c)(3) educational non-profit) and mail it to the following address: Challenger Learning Center, Attn: Stacey Shrewsbury, Heartland Community College, 1500 West Raab Road, Normal, IL 61761-9446.

facebook

NCRAL Now on Facebook

Did you know that NCRAL now has a Facebook page for sharing information about your Region's AL-affiliated clubs? This feature was added following the NCRAL 2016 meeting when the number of "hits" on the meeting's Facebook site did not subside as would have been anticipated follow the end of the meeting. It was as through people were searching for NCRAL information and were not finding what they wanted. Hopefully users can now find what they are looking for, and others are free to post images and messages to this un-moderated group. You may now like us and follow NCRAL on Facebook at:

https://www.facebook.com/northcentralregionastronomicalleague/

North Central Region of the Astronomical League - NCRAL

@northcentralregionastronomicalleague

Home | About | Photos | Likes | More

Starlight, Star Bright…

by Anne Bauer, Popular Astronomy Club

"…first star I see tonight! I wish I may, I wish I might have the wish I wish tonight!"

Generations of young people have scanned the sky at dusk searching to spot a star to wish on and then have repeated this rhyme! Most often a person first sees beautiful Venus. Although in reality it's a rocky planet, not a blistering star, its proximity to Earth plus the sun's rays reflecting on its constant cloud cover makes it so bright. It is called the "evening star" and also "the bright morning star!"

The second star you may see will probably be another with "strong" light. There are actually 21 of these. Several November stars of that category have been named Capella, Deneb, Vega and Altair. If you wish (while you are wishing) to know more star names and their locations, several sources are available – Sky & Telescope and Astronomy magazines have a Sky Map Section where constellations and stars in view for that month are shown. As the Earth rotates and revolves, people have a changing view of the heavens, but the constellations are still fixed in their relationship to one another! Bookstores may also carry a plastic or paper "Planisphere." This directs you to any day and hour of the year by dialing double circles. And, of course, technology has a handy answer. By entering skymaps.com you can readily see what to look for on any given date on your screen.

The Greeks classified stars by brightness and called it "magnitude." On their scale numbers 0-1 are the biggest, most luminous spots of light beaming through the darkness we call "The Night Sky." Sky Charts list that Greek Scale, which descends 0-5,

and show star dots in six sizes. Many constellations have only one or two stars of top brightness. Brightness is determined by size, heat and the distance the star is from us.

A fun idea to experiment with when you are star gazing is to try to see the subtle colors of some stars. They are not only interesting to behold, but indicate both temperature and the stage a star is in during its lifetime! Blue is the hottest (i.e. Rigel or Vega) followed by white. The star called Arcturus is said to be Ginger-Ale colored! Next is yellow, like Capella, sequenced by orange (see Albireo). Lastly, red is the coolest. Red Betelgeuse is very large and is in one of the final phases in the life of a star.

Deliberately putting a star slightly out of focus while using binoculars or a telescope gives more area to a star's color by extending its rays. This is a tried and true method used by amateur astronomers. If viewing with binoculars, sit in a chair and lean against something solid to steady your view or buy an adapter part, which allows you to attach your binoculars to a tripod.

There are variables which may affect the clarity of your views when stargazing in general: When the Moon commands the sky, it makes star-hunting more of a challenge. Also, the amount of moisture in the atmosphere makes a difference. (However, this is not all bad because it is our many layers of atmosphere which cause stars to appear to flicker or "twinkle!") Lastly, man-made lights create "Urban Glow." These definitely can wipe out the dark sky making many stars look faint or even absent.

In this year of the 100th Anniversary of National Parks, it is noteworthy that all of the parks have declared that dark skies are a RIGHT every human has – to be able to know the natural universe setting in which we live. Educating the public to realize ways in which man-made light pollution can be minimized is a pertinent challenge which they have embraced.

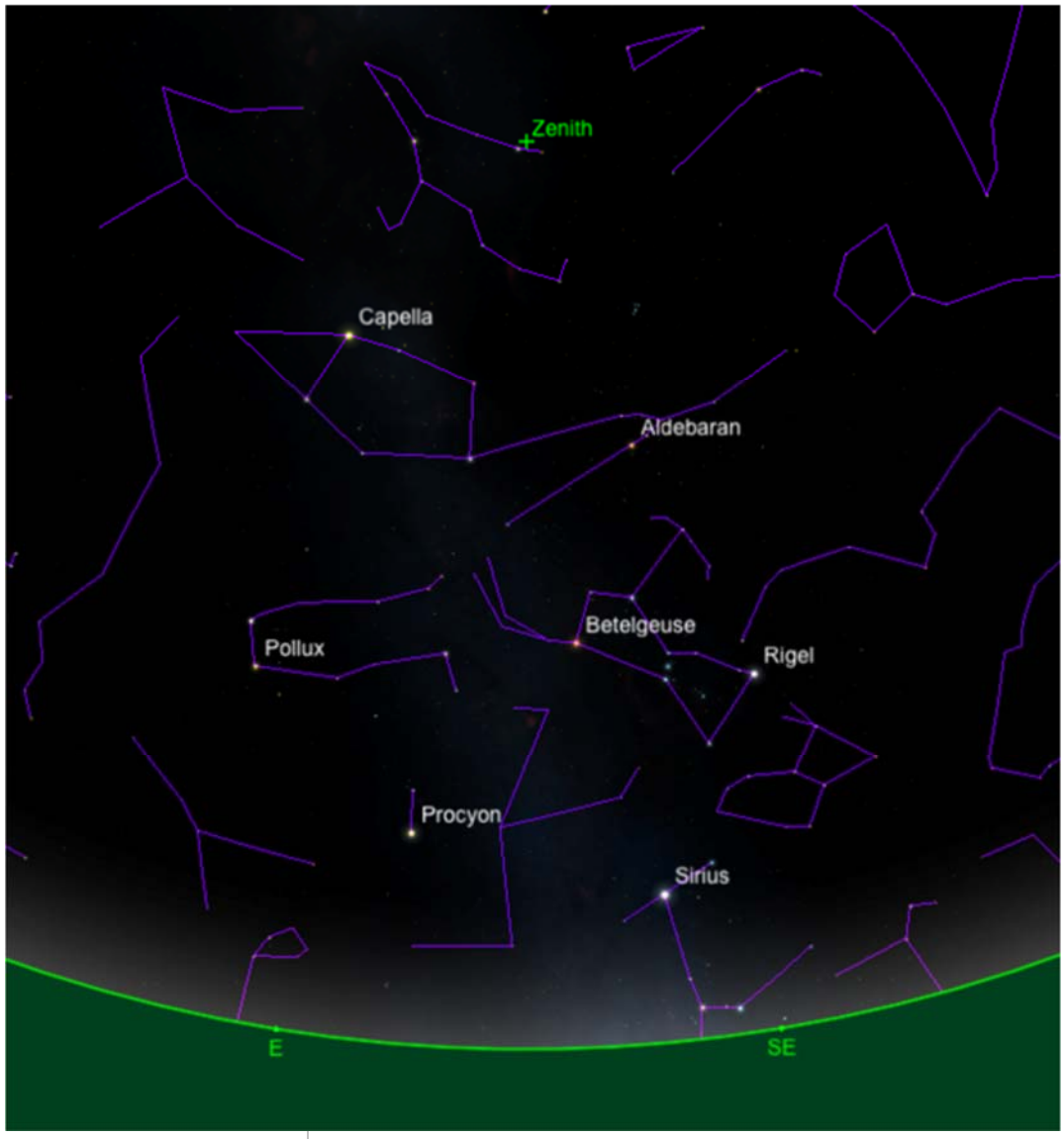
To learn more, you are invited to join the Popular Astronomy Club (now in its 80th year in the Quad-Cities). It meets in the John Deere Planetarium on Augustana's Campus at 7 pm the second Monday of each month, except August and October.

Research for facts/ideas gleaned from The Stars by H.A. Reye, The Little Giant Book: Astronomy by Knocke, and The Star Book by Burnham.

Driftless Dark Skies: Time Travel with the Winter Hexagon

by John Heasley, Iowa County Astronomers

We know that when we are looking out into the cosmos that we are looking back in time. The bright stars of winter are an excellent way to share the experience with the stargazing public. Orion is a good guide. Look for him in the south in the evenings this season. The shiniest stars in and around Orion form an asterism called the Winter Hexagon. They will be the first stars to appear after sunset. These six stars are roughly 25 degrees apart. That's the distance between your pinkie and thumb when your fingers are fully extended and your hand is held out before you.



You can use these six stars to travel back in time. The light from Sirius (the brightest) left in the spring of 2008. Above Sirius and going clockwise is Procyon whose light left in the spring of 2005. Photons from Pollux have been traveling since 1982. The light from Capella goes back to 1973, and the light from Aldebaran goes back to 1949. It's fun to consider what we (or our ancestors) might have been doing in each of those years. The light from Rigel is far older and is from the vintage year of 1156.

Or you can imagine our music traveling out in an ever-widening sphere at the speed of light. We are broadcasting photons in the form of radio waves. Sirius is just now hearing Katy Perry's "Hot N Cold"; Procyon is giving a listen to Mariah Carey's "Shake It Off"; Joan Jett's "I Love Rock 'n Roll" has reached Pollux; Capella is enjoying Gladys Knight and the Pips' "Midnight Train to Georgia"; "Baby It's Cold Outside" has made it all the way to Aldebaran; and Rigel is missing out on some really great troubadour music.

As you get dark adapted, you'll see that the stars have colors. Binoculars will help to gather in more photons to trigger those cones in your retina. Try softening the focus to bring out more of the colors. Look for the red of Betelgeuse, the orange of Aldebaran, the yellow of Capella, the white of Sirius, and the blue of Rigel. Even though we cannot travel to the stars, their colors tell us about them. From red to blue, the temperature of the star is increasing. That's a little different from everyday life where we use blue to mean cold and red to mean hot, but it makes sense. The hottest part of a flame from a match or candle or campfire is blue not red.

Enjoy the stellar colors as you time travel clockwise around the Winter Hexagon!

John Heasley is an astronomy educator and stargazer who enjoys connecting people with the cosmos. He volunteers with NASA/JPL as a Solar System Ambassador. For more information about stargazing in southwest WI, like Driftless Stargazing LLC on Facebook and find out whenever there's something awesome happening in the skies. Driftless Dark Skies appears monthly in the Voice of the River Valley.

The Art of Astronomical Observing

by Carl Wenning, Twin City Amateur Astronomers

There is more to looking through a telescope than putting one's eye up to the eyepiece. Having observed the heavens for more than 50 years now, I can tell you that there are things that an observer can do to improve what (s)he sees. Keep in mind, though, that you'll never see Hubble quality images. Most of us humans will be restricted to viewing celestial objects from the confines of Earth while peering through its turbulent atmosphere. Astronomical viewing is much akin to bird watching conducted from the bottom of a swimming pool! The ripples of the water make it difficult to see things clearly. Be that as it may, there are many things that one can do to optimize views obtained through the eyepiece.

Plan your observing session. If you set up your telescope under the stars without a plan for observing, you'll be surprised by how little you will end up seeing. Yes, there's the moon and planets, but then what? Unless you have a catalog of celestial objects to observe in your head, your viewing will be quite limited. I've been observing the sky for over 50 years, and I'd still be limited to viewing a handful of representative objects were it not for the fact that I pursue observing programs. Consider pursuing first and foremost the Messier objects. Here you'll have a list of 110 objects you can observe throughout the year. At any one time about half of these objects are above the horizon at any one time. They generally constitute the best and brightest clusters, nebulas, and galaxies. The Astronomical League has many such observing programs you should consider.

Acquire a quality "goto" telescope. Nothing opened up the sky for me like my CPC 11" goto telescope. I had observed for years, but was getting tired of the struggle to find "faint fuzzies" using a finder scope all the while bending and twisting my body like a contortionist. After seeing the ease with which event faint objects can be found using a goto telescope, I had to have my own. It was the best money I ever spent on amateur astronomy and accounts – at least in part – for why I get out to observe so much. On any given evening I can see several dozen objects I have never seen and would not have seen were it not for my goto telescope.

Get an observing aid. Even with a goto telescope, you'll be pleasantly surprised by how much an observing application can enhance your experience of looking through binoculars or telescope. I frequently use my iPhone, iPod, or iPad while observing. My favorite application – *SkySafari Pro* – helps control my telescope (when I care to do so), but always provides critical observing information like where a faint object is located relative to brighter stars. I used to make observing cards, but today they are instantly available to me through the *SkySafari* application. Also, I can find information immediately about the size or distance of an object.

Establish and maintain your dark adaptation. Once you have achieved dark adaptation, work to maintain it. Use faint red lighting to provide illumination as necessary. Red light – no matter how intense – does not have sufficient energy to break down rhodopsin whereas blue light does.

Seek to observe rather than merely see. There is a difference between these two acts. One can see things merely by looking at them. An observer – someone who looks carefully – will note things that the casual viewer will otherwise miss. Viewing with intent is the best way to see fine detail. Knowing what to look for also markedly improves what one views. It's no wonder that experienced observers will see things that casual observers overlook.

Take observing notes. It is helpful to make written descriptions during observing. Keep track of atmospheric transparency and seeing, sky darkness, weather conditions (temperature, humidity, and winds), telescope used, the eyepiece and magnification, filters used, observing location, date/time, relative difficulty of viewing, and so forth. Refer back to your notes when re-observing an object. Compare this time with prior observing sessions and learn how different conditions affect what you see.

Make eyepiece sketches. You will be surprised at how much more detail you perceive when you make drawings at the eyepiece. When viewing an object pay attention to and record such things angular size in relation to the eyepiece's field of view, elongation, image brightness, density, and color. Record field stars in such a way that depicts star density, counts, and locations accurately. Consider partitioning the field of view into quarters, and draw each quarter separately if helpful.

Know the details for which to look. You will be amazed at how much detail you can actually perceive if you know what to look for. For instance, I never really "saw" the Dumbbell Nebula until I started comparing a photograph of the object with the view in my eyepiece. Study your objects patiently and try to see every detail visible to your eye.

Use averted vision. Looking out "the corner of one's eye" can improve what one sees when looking through an eyepiece. The color receptors in the center of the retina are not well suited to dim light conditions and don't work well at night. This is why things appear in shades of gray rather than in living color. The eyes' rods, however, distributed around the

eye but concentrated outside the fovea where most color perceiving cones are located, are very sensitive to subtle differences in lighting. Learn how to avert your vision and use the rods to observe faint celestial objects. Avoid, however, averting your eye toward the bridge of your nose as the eyes' bind spots (where the optic nerve connects the eye to the brain is attached) will then be at the center of your field of view.

Jiggle the image. A "trick" you can employ for seeing finer detail is to "jiggle" your telescope while viewing the object in question. Tap the side of the telescope, and the object in the field of view will rapidly oscillate back and forth. For reasons still somewhat unclear, one can see more detail in an object in motion than one that is completely stationary – at least in a telescope.

Remember transparency and seeing. Recall that not all nights are the same. When the sky is perfectly clear it has high transparency. When the sky is completely overcast, it has low transparency. Observe on nights when the sky is as cloud and haze free as possible. Also, despite a completely transparent sky, the sky can also be very turbulent with poor seeing. When stars near the horizon are twinkling violently, keep in mind that seeing is probably not very good and so objects that tend to show fine detail such as the moon and planets will not likely show it on nights when the seeing is poor.

Use a proper observing stance. If you prefer to stand while observing, your approach to the telescope should be carefully considered. Ergonomics suggests a particular observing stance. Do not, for instance, look through the eyepiece as shown in the illustration to the right. Imagine the neck and back strain if a person were trying to view something much higher up in the sky. The person would need both to bend over more and throw the head back further. This can lead to terrible back and neck pain that few observers can long endure. Consider changing your observing stance. Avoid lining up your body with the telescope as shown. Rather, stand with your body at a 90° angle to the optical axis and turn your head left or right to the eyepiece. Rest your hands on your knees for additional support. So positioned, an observer can easily spend several minutes comfortably viewing object even when they are much higher in the sky than shown.

Employ comfortable seating. Ergonomics is the name of the game when looking for yet another way to increase observing prowess. Experienced observers know that the best views to be obtained through the eyepiece are obtained when the observer is comfortably positioned and relaxed. Using a good observing chair can satisfy the need better than an observing stance alone. Many observers use firm chairs and even step stools for sitting while observing. Specially designed observing chairs can be more readily adapted to the changing height needs while viewing. Regardless, any sort of seating can help observers avoid neck, back, foot, and leg strain while observing.

Seek the darkest observing location possible. Seek out the darkest location you can if you hope to see things at their best. Perhaps the most expensive lesson I ever learned was purchasing an 18" telescope. When viewing side-by-side with my 11" telescope, I found that the views were not really all that different. Yes, a larger telescope collects more starlight and shows more details, but it also collects more atmospheric light. Large telescopes used for visual observing perform best when used under truly dark sky conditions. Unfortunately, central Illinois rarely has truly dark observing locations due to light pollution emanating from nearby cities. Still, the darker the observing location the better because the contrast between celestial objects and the background sky is much better. Higher contrast means better views. Note that poor contrast between celestial objects and the bright background is the very reason why we don't see stars during the daytime.

Use the best eyepieces you can afford. Most telescopes come with eyepieces that typically are of lower quality. Depending on the manufacturer, you will normally receive tolerably good eyepieces, but they cannot provide the stunning views that more expensive eyepieces can. The apparent fields of view of inexpensive eyepieces might only subtend 40° or 50°. Your more expensive eyepieces (for instance, of Nagler design with a number of manufactures such as TeleVue and Orion) can provide fields of view on the order of 82°, 100°, or even 120°! These ultra-wide apparent fields of view give larger true fields of view and the impression of "falling through the eyepiece" as the edges of the field of view often extend into the regions of peripheral vision where they are barely noticed.

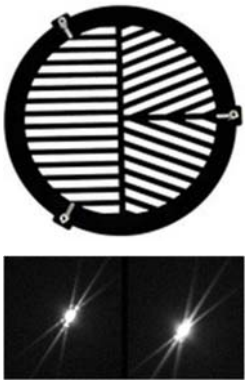
Consider using eyepiece filters. Eyepiece filters come in quite a variety. Some of the more common are the Skyglow and UHC (ultra high contrast) multi-band pass light pollution filters, the neutral density moon filter, broadband filters such as red, green, blue, orange, and yellow, and narrowband filters such as OIII, SII, and Hα. The broadband filters are good for heightening contrast when observing planets, whereas the narrowband filters are good for enhancing contrast between the sky and certain nebulas. There are numerous other types of filters besides. Broadband filters often come in sets and are rather inexpensive. Narrowband filters are sold individually due to their varying appeal and the fact that they are quite expensive.

Maintain the cleanliness of your telescope and eyepieces. Cleanliness is one of the most important things to consider when maintaining your telescope and eyepieces. The

need for cleanliness should be obvious. A lens or mirror coated with dirt, dust, and oil from one's hands will not be a good reflector of light. Cleaning lenses and mirrors is beyond the scope of this handout, but you can consider using a good quality lens cleaner and cloth to clean up your lens surfaces. Do NOT spray lens cleaner on your optics; rather, spray it on the lens cloth so excess fluid doesn't leak through and get between lens surfaces. Once that happens, you'll have no choice but to disassemble your eyepiece. This is not something recommended for the novice.

Maintain good telescope collimation. Establishing the proper optical alignment of lenses and mirrors in your telescope system is critical to proper views. Poor collimation results in stars appearing out of round, and produces scattered light. More of a problem with reflectors than refractors, collimation should not be done the first time without the advice of an expert. Novices often make things worse rather than better when trying to collimate optics when they have little or no experience doing so. A poorly collimated telescope cannot be properly focused because the image plane is no longer perpendicular to the telescope's optical axis.

Be certain you have the sharpest focus. Focus is generally at its best when stellar images are as small as possible. By turning your telescope's focusing knob back and forth, you can obtain the best focus. Still, you might want to consider using a Bahtinov mask for focusing telescope to achieve the best possible focus. This screen – placed over the objective end of the telescope – produces diffraction patterns as shown in the pair of star images shown here. In the leftmost star image, the diffraction lines do not cross at a single point; the telescope is not in focus. In the right star image, the lines do intersect at one point; the telescope is in focus.



Watch out for dewing and frost. When the air temperature drops to the point of condensation (a.k.a. the dew point), either dew (if T > 32°) or frost (if T ≤ 32°) will begin forming on your observing equipment. This is a significant problem with SCTs and refracting telescopes whose corrector plate or objective, or a reflector's mirror used with an unshielded truss system, is not protected by any sort of a shield such as a screen or tube. It's amazing how quickly condensation of some sort can occur on your equipment. Check for it regularly, but especially on evenings when the temperature is dropping quickly and the wind is calm. There two approaches to dealing with this condensation: (1) either prevent it, or (2) treat it. In the former case, consider using a dew shield on exposed optics or get a heater for your telescope. In the latter case, you can purchase a heated electrical strip that is placed around the telescope's optics to keep them warmer than the night air or use a low-wattage hair dryer to evaporate the condensation. If you don't have heating equipment – aim your telescope toward the ground and leave it in that position for a while. Infrared radiation from the ground will slowly evaporate the condensation (though frost will take longer than dew to evaporate). When all else fails and you just can't keep up with the rate of condensation, it's best just to pack up and go home.

Ensure thermal equilibrium of your equipment. Telescopes yield the best views if their optical systems are in thermal equilibrium with the air. As the temperature of optical and mechanical components rises and falls, these items will expand or contract respectively. Different parts of a lens or mirror will cool at different rates due to variations in thickness, so while temperature change is taking place the physical features of the optical shapes and surfaces change. Such changes reduce the quality of views provided by these telescopes. If you keep your telescope shaded and outside, you generally won't have to wait for it to come to thermal equilibrium with the air. If, however, you keep you telescope in a colder house or warmer vehicle, you might need to set it up and wait for at least an hour for it to reach thermal equilibrium with the air. Some of the more expensive telescopes come with built in fans to increase the rate of thermal exchange with the air.

Avoid unnecessary air currents. Choose your observing site carefully. There are many factors to keep in mind when choosing an observing site. If you set up on a hard surface such as concrete or asphalt, you won't have to worry much about your feet getting wet due to dew formation. However, you will have to worry about air currents caused by thermal convection. Asphalt due to its dark color tends to absorb heat from the sun during the day and give it off at night. This produces convection currents to form over the observing spot. Your best views are obtained when the atmosphere is stable. Convection currents cause images to shimmer thereby reducing the quality of the view. Concrete is much the better choice for viewing on a hard surface. It is lighter in color and therefore does not absorb and give off as much heat as asphalt. Viewing from a grassy spot is even better, but there is a problem with dew. In a similar vein, avoid viewing through an open window or viewing objects located not far above rooftops. Thermal currents form due to convection in both situations.

Choose your observing location carefully. Sky darkness is only one factor in choosing an observing location. Observatories built in the flatlands of the Midwest are frequently built near lakes and reservoirs. Have you ever wondered why? This is so because water has much higher thermal inertia (it takes a lot of heat to change the temperature of water substantially) than land, and the water temperature changes very little over the course of day and night. Less heat being emitted from a lake at night means that air over it is less likely to experience the thermal effects commonly seen over soil whose temperature can range widely over the course of day and night.

TCAA Publishes Free 56-Page Guide: Introduction to Amateur Astronomy

The above article was taken from a revised and extended 56-page guide – *Introduction to Amateur Astronomy* – published recently by the Twin City Amateur Astronomers (Bloomington-Normal, IL). It was authored to go along with a new member course by the same name. The guide is now freely available online – along with several others.

With the approval of its Board of Directors, the club produced a number of guides for the TCAA membership. This was in response to both the club's current 5-year plan and requests of the membership during a summer 2015 club survey. Additional guides will be developed as warranted. Most guides are now available for download through the TCAA website. The names of the more relevant guides are as follows:

Guide #1 – ***Introduction to Amateur Astronomy*** (56 pages) – This guide addresses the basics that everyone needs to know in order to become an amateur astronomer. It deals with the use of eyes, binoculars, and telescopes to view the night sky. It should not be mistaken as a textbook in astronomy.

Guide #2 – ***TCAA Membership and Benefits*** (14 pages) – Even long-time members do not know everything they need to know about membership in this club. Many benefits are overlooked and this publication does what it can to clearly illustrate the benefits of membership.

Guide #3 – ***Astronomy as a Hobby*** (9 pages) – Why is it that we don't attract as many amateur astronomers as we would like? Our club has lots of great benefits, and it's more the just lack of knowledge of benefits. Part of the problem today stems from the fact that many people don't understand the meaning of a hobby and the benefits derived from it.

Guide #4 – ***The Art of Sky Interpretation*** (14 pages) – Interpreting the sky requires more than just standing in front of a group of people and talking. If it were that easy, there would be many more speakers in our club! There is an art of sky interpretation, and this guide describes it. Even if one doesn't intend to give public talks, this guide provides a wealth of information about what can be seen in the sky with the unaided eye.

Guide #5 – ***Coordinating TCAA Observing Sessions*** (3 pages) – While coordinating observing sessions might appear to be an easy task to those who attend them, there is considerable background work associated with both public and members-only sessions. Consider hosting an observing session and use this guide to assist.

These guides are freely available for download at http://www.tcaa.us/TCAAGuides.aspx. Guide #1 is being revised and extended at the current time. Guide #6 – ***Introductory Astrophotography*** – is under development and will include basic information about imaging and includes instruction in how to use a digital SLR camera to photograph the sky using fixed and motorized mounts, as well as how to do basic color imaging using a telescope. So, watch this website for updates.

Another example about winter observing from ***Introduction to Amateur Astronomy…***

Chapter 32. Dealing with Weather

There is a myriad of legitimate excuses for NOT getting out to observe, and among them is the weather. It's said that nothing can put a damper on observing like an overcast sky. That's true, and there is nothing that can be done about it. The other complaints are that it's too hot or too cold. Fortunately, we can do something about these if but to a limited extent. The advantage that winter observing has over summer observing is that there are more things that can be done to overcome the cold than the heat. Let's look at a few guidelines for dealing with the cold and heat while observing.

Cool and Cold Weather Observing

Dress in layers. Dressing so allows air to get trapped between layers of clothing where it serves as an insulator. It is better therefore to suit up in several thin layers of loose fitting clothing than in one thick layer. The advantage of doing so is that you can add or subtract layers of insulation should you get too warm.

Keep your core body temperature up. The best way to keep your hands and feet from getting cold during observing is to maintain your core body temperature. When your torso is warm, extra blood is shunted toward to extremities as a way of cooling off. If the core body temperature drops, the blood flow is reduced and hands and feet will rapidly become intolerably cold. To help keep your hands and feet warm, keep your core body temperature up. Proper attire and hot refreshments can help ward off that chill.

Avoid alcoholic drinks. While consuming an alcoholic beverage might seem to be a good way to keep warm, it is a double-edged sword. Shortly after imbibing, alcohol's byproducts sometimes cause a flushing effect. This can make the skin feel warmer – at least temporarily. This is achieved when capillaries open and warm blood moves to the skin where it then rapidly cools. Cool blood then returns to the body's center where it drops the core temperature that is the opposite of the effect we intend to achieve.

Start with a high calorie snack. Eating a healthy, high cal-

orie snack prior to observing can fortify an observer against the heat loss that is to come. When one loses heat, the body's cells will produce it by burning energy supplies.

Take periodic warming breaks. There's nothing to take the chill off an observer like periodic warming breaks. Sitting down in a warm location (your running vehicle or a building) can help you maintain your core body temperature and fight the effects of heat loss. It is best to take warming breaks before you get so cold that you start picking up a "chill" and begin shivering. When this occurs, the battle against the cold is lost. It's time to pack up and go home.

Don't delay dressing up. Dress warmly before you start observing. If you wait to get cold before dressing properly, it will be very difficult for your body to catch up when sustaining constant heat loss. The time to dress warmly is before you start feeling cold. When you step out of your vehicle to start observing on a cold night, it is fine to be uncomfortably warm so long as you are not beginning to perspire. Perspiration will have an unwanted cooling effect.

Wear gloves. If your body core temperature is maintained, the blood coursing through your hands will be maintained. If your core temperature is maintained, even thin gloves will keep your hands warm. Bare hands can get cold when touching metals that can more rapidly conduct heat away from your hands than can still cold air. A similar situation occurs with blowing wind and the accompanying wind chill. Your body might not be able to keep up with excessive heat loss even with a well-maintained core body temperature. If you are using electronic equipment while viewing such as a cellphone or tablet, consider getting a set of touch screen gloves that are electrically conductive and permit you to use these devices while your hands are covered.

Cover your head. More heat is lost from the head and around the neck than from any other parts of the human body. Lots of blood flows close to the surface here, and the face tends to get directly exposed to the air whereas other parts of the body are frequently covered. A hat with ear covers and good insulating properties can dramatically reduce this heat loss.

Wear a hood, hoodie, scarf, cowl, or balaclava. Wrapping or otherwise protecting the neck and face region is very important when observing on cold nights. The best material for doing so is micro fleece fabric. Micro fleece is a thin poly fleece fabric that is a light but highly effective insulator that wicks moisture away from the skin. The fabric is soft against the skin, not scratchy like wool. Be certain to avoid trapping breath (as with a neck gaiter) as this results in condensation around the lower portion of the face and can lead to discomfort and evaporative chilling. The best hoods, hoodies, and hood scarves are those with flexible draw cords that can hold the fabric close to your face and reduce contact of your skin with the cold night air.

Consider a Micro Fleece vest or jacket. Micro fleece is so effective in keeping the observer warm that it keeps making its appearance among these recommendations. It can be one of your multiple layers.

Consider a coat with a draw cord at the bottom. Draw cords are elastic bands that can be used to close off areas of undesirable wind flow such as around the wrists, waist, and neck regions.

Wear thick pants. Avoid wearing thin pants during cold weather observing. Blue jeans provide better protection. You might also want to consider the use of thermal underwear.

Wear insulating socks and shoes. Avoid thin socks and dress shoes. They provide little defense against heat loss to the cold ground. Better are thick-soled work boots worn with thicker cotton socks. Avoid, however, tight socks as these can restrict blood flow to the feet.

Consider augmented heating. There are actually electric gloves and socks that an observer might consider. Also, chemical-based hand warmers kept in each of two coat pockets can provide an added boost if electric gloves are out of the question.

Stay out of the wind. Wind chill can have a devastating effect upon the observer. When a cold air passes over human flesh it conducts away heat faster than if there were no wind at all. This produces a wind chill factor. The wind chill temperature is the effective temperature the exposed skin experiences. Staying out of the wind will all but eliminate the wind chill factor.

NCRAL Website

Jeff Setzer

Did you know that NCRAL has it's own website? It's true! Point your browser to ncral.wordpress.com and you'll see a central repository for information about our Region and constituent clubs.

As Webmaster, I maintain the information on the website, but the original idea was — and still is — to publish contributions from members. As part of that mission, we will be hosting the emailed newsletters at the website, so people can easily access back issues.

Will the website progress from an occasionally used reference to something more? That's entirely up to you, dear reader. If you have ideas or submissions, contact me at astrosetz@hotmail.com

How Many Planets in our Solar System: 8 or 9?

By Dino Milani, is a member of the Popular Astronomy Club

Nine Planets: Growing up, we learned there are nine planets. Mercury, close to the sun, Venus next, Earth – where we live, the red planet Mars, the largest planet Jupiter, Saturn with its rings, the light-blue planet Uranus, Neptune and the most distant, Pluto.

Pluto was discovered in February, 1930, by Clyde Tombaugh while he was at the Lowell Observatory. In 1906 Tombaugh was born in Streator, Illinois. His family moved to Burdett, Kansas in 1922. In 1929 he moved to Flagstaff, Arizona, to work at the Lowell Observatory and worked there until 1945. He also discovered many asteroids, comets, variable stars, star clusters, galaxy clusters, a galaxy super-cluster and he was active in presenting astronomy to the public throughout his life.

In August, 1992, JPL scientist Robert Staehle called Tombaugh and requesting permission to visit his planet. "I told him he was welcome to it," Tombaugh later remembered, "though he's got to go one long, cold trip." With that call JPL created the New Horizons space probe to Pluto. Clyde Tombaugh died on January 17, 1997, well before the New Horizons probe had left the ground. The probe was launched in January, 2006, and it would be 9 ½ years before it arrived at Pluto, 4.577 billion miles away.

A small portion of Clyde's ashes were placed aboard the New Horizons spacecraft. The container has this inscription: "Interned (sic) herein are remains of American Clyde W. Tombaugh, discoverer of Pluto and the solar system's 'third zone'."

Eight Planets: In August, 2006, Pluto was removed as a planet by the International Astronomical Union. IAU is a group of astronomers who decide on types and names for new objects found in space. IAU also decides what is real or conjectured; etc. In 2006 they created three rules about what is a planet and then voted on Pluto. It was a fairly close vote, but their reason for removing it as a "planet" was the last of the three rules:

1. A planet needs to orbit around the Sun.

2. It should have sufficient mass to assume hydrostatic equilibrium (a round shape).

3. And it should "clear the neighborhood" around its orbit (add moons or expel objects).

They assumed that Pluto did not "clear the neighborhood" and they renamed Pluto as a "dwarf planet". By "dwarf planet" they meant that Pluto circles the sun, is round and bigger than a comet or an asteroid but too small to be a planet.

Was the IAU decision right? Personally, I was disheartened when Pluto was removed. Then I thought of something that made some sense. Imagine you are watching the TV show "The Big Bang Theory". With the show's characters, Sheldon is always arguing about science and tries to force the rest to accept his theories. Eventually, the rest concede or "give in". It doesn't matter if it's right or wrong, they agree just to stop Sheldon's arguing. Instead of four characters, the IAU has thousands of members, but a member with a strong opinion may force the rest to listen and concede – whether it's right or wrong.

Some famous astronomers have publicly apologized for the change, including Neil deGrasse Tyson, director of the Hayden Planetarium in New York. You may remember him when he hosted the TV show "Cosmos". He even apologized (again) about Pluto when he appeared as a guest on "The Big Bang Theory".

New Discoveries for Pluto: When the IAU made its decision, New Horizons would not arrive at Pluto for nine years, but, in that time, new discoveries were made and Pluto does not seem to be what they thought.

The outer planets – Jupiter, Saturn, Uranus and Neptune – all have and acquire moons. They "clear the neighborhood" in their orbits. Their gravity adds new objects as moons or ejects them – sending them hurtling away. We knew that Pluto had a moon, Charon, when the moon was discovered by James Christy in 1978. Then two more moons were discovered in 2005, Nix and Hydra (they were named by the IAU, of course!). Getting ready for New Horizon's arrival at Pluto, NASA viewed Pluto with the Hubble Space Telescope and discovered two more moons, Styx and Kerberos. It certainly seems that Pluto does "clear the neighborhood" of new objects in its orbit and has added five moons.

In June, 2015, the New Horizons space probe flew past Pluto and found it to be much larger than expected; much larger than the other known bodies such as Quaoar, Sedna, and Eris. It has an atmosphere. It has an active surface with hills, rifts, canyons, frozen lakes, mountains made of ice and very few craters – many older craters are covered or eroded away. It has liquid water under it surface, 60 to 120 miles deep. It has a solid, rocky core. It has large temperature changes, so the surface ices "melt" or sublimate when it's warmer.

New Horizon's data and photographs of Pluto and its moons are remarkable. In the next few years, much more will be found out about Pluto.

Even with this new information, the IAU has not changed Pluto back to a planet, but it is being considered. The ninth planet, again? Let's see what happens!

The author, Dino Milani, is a member of the Popular Astronomy Club. The club meets on the 2nd Monday of each month at 7:00 pm in the John Deere Planetarium, Augustana College Rock Island, Illinois. The club also has night-time public observing sessions every 3rd Saturday of the month, March through November, at Niabi Zoo, Coal Valley, Illinois.