January, 2014 Volume 55, Issue #1

The Prairie Astronomer

The Official Newsletter of the Prairie Astronomy Club

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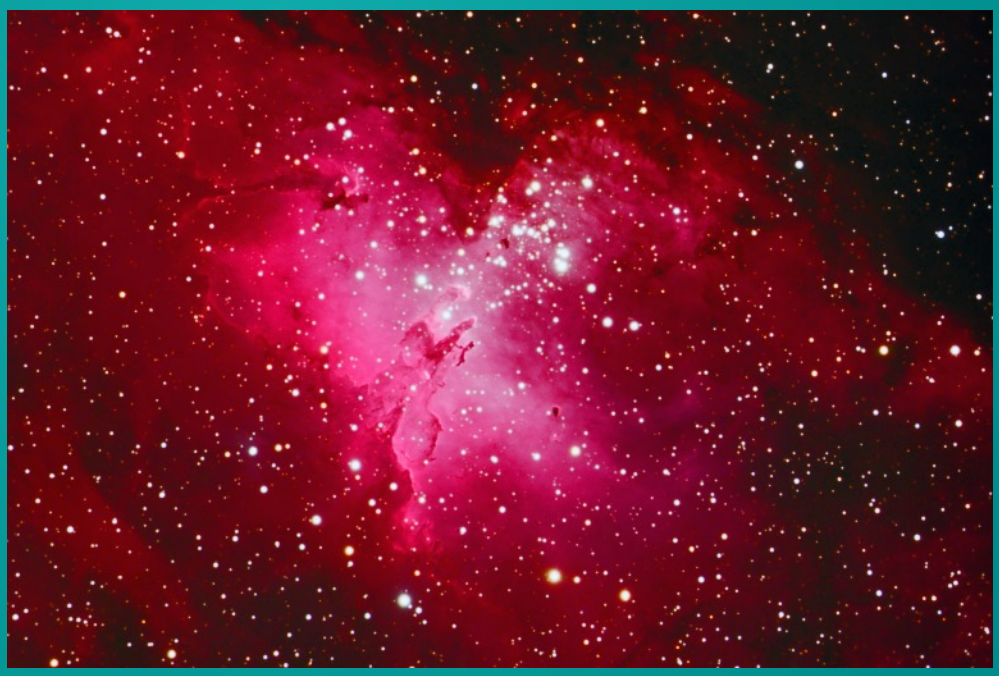
January Program

How to Use a Telescope

Getting a telescope for Christmas can be as frustrating as it is exciting. If you know of someone who recently purchased or you have had one in your closet for years and would like to learn the basics of using a telescope. Feel free to bring your telescope along for some help from our club members if you wish. Some topics we will discuss are how to align the optics, accessories to buy, and how read and understand star charts.

Featured Photo: SH2-49, also known as GUM 83, IC 4703, NGC 6611, LBN 67, the Star Queen and M16 or the Eagle Nebula. By Rick Johnson. 14" LX200R @ f/10, L=5x10' RGB=2x10', STL-11000XM, Paramount ME.



Night Sky Network

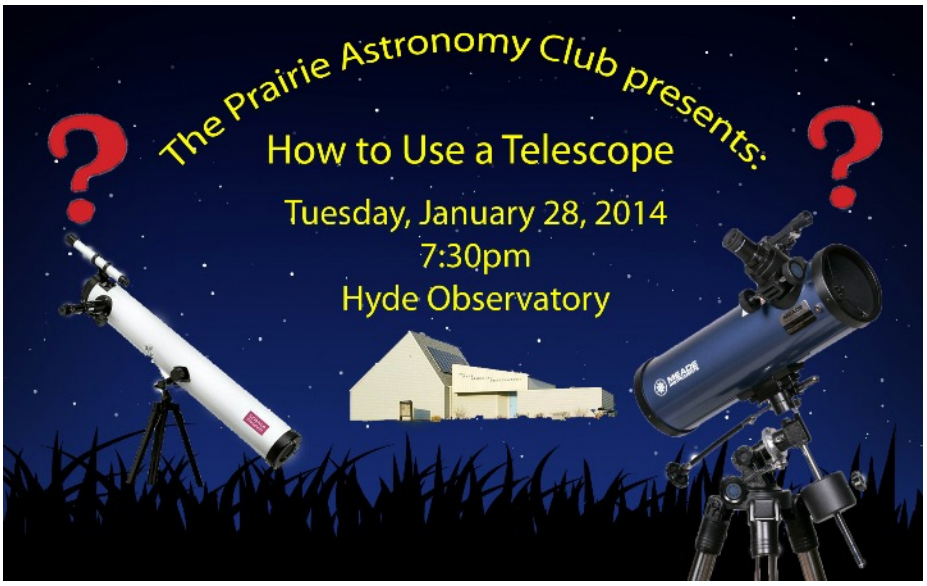
The Prairie Astronomer is published monthly by the Prairie Astronomy Club, Inc. Membership expiration date is listed on the mailing label. Membership dues are: **Regular $30/yr, Family $35/yr**. Address all new memberships and renewals to: **The Prairie Astronomy Club, Inc., PO Box 5585, Lincoln, NE 68505-0585**. For other club information, please contact one of the club officers listed to the right. Newsletter comments and articles should be submitted to: **Mark Dahmke, P. O. Box 5585, Lincoln, NE 68505 or** mark@dahmke.com, no less than ten days prior to the club meeting. The Prairie Astronomy Club meets the last Tuesday of each month at Hyde Memorial Observatory in Lincoln, NE.

Telescopes and John Dobson - Jack Dunn, PAC President

Just yesterday we lost one the most important figures in amateur astronomy John Dobson. He not only pioneered a reflecting telescope design, he inspired thousands, maybe millions with the concept of "sidewalk astronomy." So many of us take for granted the degree of outreach amateurs do to let the public look through their telescopes. Dobson was an evangelist for just this simple act of sharing the universe. Sure as amateurs we can get wrapped up in more and more light grasp and attempts to view the most faint deep sky objects. What Dobson did was to get people started - to get them excited about just seeing the Moon or a planet or simple star cluster. Without that tease - that introduction, who knows how many amateurs might have missed out on our hobby? And further, how many of the undereducated in science public might think Astronomy was a difficult subject with no relation to them. If Carl Sagan was the intellectual leader to bring us the cosmos, John Dobson was the worker bee who tirelessly introduced people to building telescopes. He was kicked out of a monastery for spending too much time teaching people to build telescopes. But he kept doing it and we are all the better for this. Inexpensive and uncomplicated, the Dobsonian telescopes revolutionized amateur astronomy. It is true his ideas about cosmology bordered on the strange and unscientific. But we won't fault him for speculating on those long nights under the stars because he always brought conversations back to the joy of viewing through the telescope. So here's to a great innovator and leader who brought the cosmos to eyepieces near everyone.

John Dobson (Photo from Wikipedia)

And in that spirit, remember this month is our annual "how to use a telescope" program for PAC's meeting January 28th. Bring your own scopes to help us explain the different types. And PLEASE be prepared to help in our informal session to help individuals who have brought their new scopes - hoping to learn the excitement the John Dobson shared with thousands - a telescope view of the heavens.



From our Outreach Coordinator, Cassie Etmund:

Although an exact date has not been set yet, the Homestead National Monument would like to hold a star party. They would like 2 or 3 telescopes. Before I set up a date, I want to make sure we have a few people willing to help out. It would be on a Friday or Saturday evening in February. Please contact me via e-mail If you would be interested in helping!

ANNUAL MEMBERSHIP

REGULAR MEMBER - $30.00 per year. Includes club newsletter, and 1 vote at club meetings, plus all other standard club privileges.

FAMILY MEMBER - $35.00 per year. Same as regular member except gets 2 votes at club meetings.

STUDENT MEMBER - $10.00 per year with volunteer requirement.

If you renew your membership prior to your annual renewal date, you will receive a 10% discount.

Club members are also eligible for special subscription discounts on Sky & Telescope Magazine.

Club Telescopes

To check out one of the club telescopes, contact Cassie Etmund. If you keep a scope for more than a week, please check in once a week, to verify the location of the telescope and how long you plan to use it. The checkout time limit will be two weeks, but can be extended if no one else has requested use of a club scope.

100mm Orion refractor: Available

10 inch Meade Dobsonian: Available

13 inch Truss Dobsonian: Available

PAC Star Party Dates

Dates in bold are closest to the new moon

2014 Star Party Dates
January 24, **31**
February 21, **28**
March 21, **28,** April 25
May 2, 23, **30,** June 20, **27**
July 18, **25**
NSP: July 27-Aug 1
August **22**, 29, Sept 19, **26**
Oct 17, **24,** Nov 14, **21**
Dec 12, **19**

Lunar Party Dates
May 9, June 6, Sept 5, Oct 3
* Lunar party dates are tentative, sites to be determined.

PAC E-Mail:
info@prairieastronomyclub.org

PAC-LIST:
To subscribe send a request to PAC. To post messages to the list, send to the address:

pac-list@prairieastronomyclub.org

Events

PAC Meeting
Tuesday Jan 28th, 2014
@Hyde Observatory

PAC Meeting
Tuesday Feb 25th, 2013
@Hyde Observatory

PAC Meeting
Tuesday March 25th, 2013 @Hyde Observatory
Program: 3D Printing and Amateur Astronomy

PAC Meeting
Tuesday April 29th, 2013
@Hyde Observatory

Newsletter submission deadline
February 18, 2013

Links

PAC: www.prairieastronomyclub.org
Night Sky Network: https://nightsky.jpl.nasa.gov/
CafePress (club apparel) www.cafepress.com

www.hydeobservatory.info
www.nebraskastarparty.org
www.OmahaAstro.com
Panhandleastronomyclub.com
www.universetoday.com/
www.planetary.org/home/
http://www.darksky.org/

NGC4603 Credit: NASA

The Last Star Party (of 2013)—Dave Knisely

DATE: December 28th, 2013, 0130 to 0440 hrs UTC.
LOCATION: Prairie Astronomy Club site: 40.452N, 96.647W, 1402 ft (427m) elev.
INSTRUMENTS: 14 inch f/4.6 Newtonian, 52x, 135x
FILTERS: Orion Skyglow, DGM Optics NPB, Lumicon UHC, Lumicon OIII, Lumicon H-Beta
CONDITIONS: Clear, Temp. 34F, Wind S at 5 mph.
UNAIDED-EYE ZENITH LIMITING MAGNITUDE: 6.2 SEEING (above 45 deg. altitude): 1.5" to 4" arc (Atoniadi II)

OBJECTS OBSERVED: M45, NGC 1499, NGC 7000, NGC 40, IC 1396, NGC 896/IC 1805 ("Heart" Nebula), LBN 667 ("Baby" Nebula), IC 405 ("Flaming Star" Nebula), Lambda Orionis nebular complex, Sh2-276 ("Barnard's Loop"), M42, M43, IC 434, NGC 2023, IC 418 ("the Raspberry" nebula), NGC 2237-38 (Rosette Nebula), Sh2-273/NGC 2264 ("Christmas Tree" cluster and Cone nebula), M1, Jupiter.

OBSERVATIONS: While on my Christmas break from work, I finally managed to attend at least one Prairie Astronomy Club star party in 2013. I got things together rather late in the afternoon, so after a lot of rushing around, I managed to get to the club site just as Astronomical Twilight ended, only to be greeted by only one other club member who had his 12.5 inch Obsession on the Pleiades. The Zodiacal light was very nicely shown and could be traced all the way to the Pleiades, which was striking in its own right. We talked for a while, and then I went back to my van and started setting up my own equipment. Orion Telescopes (U.S.), in their infinite wisdom, had been stupid enough to use a two-inch thick piece of glass for the primary mirror on my 14 inch Dob, so it took over an hour to finally get cooled down enough to be at least somewhat usable (even with the fan on). During that time, I played around with some naked-eye observing and my 2" nebula filters. Looking up at the Pleiades, I noted seven of the cluster's stars with direct vision, but about 11 members visible with averted vision, so it wasn't going to be too bad a night. Indeed, averted vision kept giving the impression of a faint glow around them, something that was not seen with the nearby Hyades or Alpha Persei groups, so perhaps this was a little of the nebulosity seen naked-eye. Orion was getting a little higher above the horizon, so I pulled out my 2" nebula filters and held them up to my eye to see what they would show. The H-Beta showed the small elongated glow of the California Nebula (NGC 1499), as well as Barnard's Loop and the somewhat marginal but huge glow of the Lambda Orionis nebular complex. Much later on, I held up the UHC filter and could also see the little "puff" of the Rosette Nebula, once again showing the usefulness of filters even without a telescope.

My friend had to leave as he was having trouble with the cold, but I stayed and played around a bit with my scope until it was cooled down enough to begin observing. My first target was the North America Nebula, which, although not optimally placed for observation, still looked quite nice when filtered. I started with my Lumicon H-Beta filter and was notably pleased as to the way it made the "Gulf of Mexico" next to the long "Mexico" band of nebulosity turn jet-black. Indeed, the contrast was very high with that filter, although I preferred the view using the OIII, as the nebulosity was notably brighter. Even the UHC filter did well, showing the largest extend of nebulosity of all the filters, although again, the contrast was definitely higher in the OIII.

My next stop was the "boxy" planetary nebula NGC 40 in Cepheus. I had observed it several months ago, but deeper images suggested that there were faint large wing-like extensions of the main annular 'box' of the nebula's main shell that I hadn't noticed at the time. I went back, but even with filters, there was no more than a vague suggestion of very slight flaring extensions of the main shell off both the north and south sides. Those sides just looked like they were a little "tattered" rather than being more smooth like the notably brighter east and western sides of the main annulus. The 11th magnitude central star was

quite easy to see, along with the somewhat brighter arcs in the east and west parts of the main shell.

With my acquisition of the 14 inch Dob, I had intended to also revisit many of the emission nebulae I had observed for my object/filter survey a number of years ago, and a number can be found in Cepheus. My first target there was the large diffuse emission nebula IC 1396, located south of the "Garnet Star", Mu Cephei. This one is huge, so to survey it with the 14 inch even with the 1.33 degree field of my 36mm Hyperion required a lot of panning around. Mainly, the nebula is a large diffuse glow of variable intensity that is roughly centered on the scattered open cluster Collinder 439. Without a filter, almost nothing of the nebulosity could be seen, although the richness of the star field made for a few "false" glows in various areas. With the narrow-band DGM NPB filter, the nebulosity was easy to see although somewhat faint. The large darker bay in the northern part stood out fairly well, as did the eastern lane that contains, "The Elephant's Trunk" feature. The OIII filter provided more contrast, but the overall extent of the nebulosity dropped somewhat. Indeed, the H-Beta also provided a similar boost in contrast although the view was just a bit less extensive than in the OIII. One thing I have started to do is rapidly switch between the filters and scan around the nebula, as there are a number of discreet structures or features within a large nebula that are notable in one particular filter but not another one. In the case of IC 1396, each of the filters I had got a workout. The almost conical dark nebula near the center of the complex (Barnard 164) was particularly prominent in both the OIII and H-Beta filters, as was the dark lane that extends to its west. The dark lane of "the Elephant's trunk" area was visible as well somewhat south of the eastern dark lane, but it didn't have quite the form it shows in many images.

Next on my list is a pair of emission nebulae: Sh2-171 (CED 214) and NGC 7822, both in eastern Cepheus. Sh2-171 is the brighter and easier of the two, responding well to filter use. It consists of a series of two or three irregular patches of nebulosity around and south of the sparse open cluster Berk 59. The largest and brightest patch is roughly 10 arc minutes to the southwest of the cluster, containing the magnitude 5.7 star HD 225216 a little off-center from the nebula's glow. This area is roughly 10' arc in size and is separated from the cluster's faint nebular glow by an irregular dark band. A smaller and fainter patch lies immediately south of the cluster and there is some irregular dark detail in and around it. The nebula was sharper in the OIII filter than in the NPB filter, although it wasn't terribly bright in any filter. A little over a degree to the north lies NGC 7822, a very large dim east-west band of very faint nebulosity over a degree in length, which was visible in the NPB and OIII but was not much to look at. It appeared more as a variation in the sky background brightness than anything with a lot of structure, although you could tell when you passed beyond its boundaries.

One of my main targets was to have been the "Heart" and "Baby" nebulae, but with Orion high in the southern sky, it was time for the Horsehead. In went the H-Beta and the scope went flying to the eastern belt. One glance into the eyepiece and BAM!! There it was in all its glory: a jet black Knight-like inclusion into the dim band of IC 434. It wasn't even remotely hard, although it wasn't exactly bright either. At 52x, I could get the Horsehead and much of the Flame Nebula (NGC 2024) in the same 1.34 degree field of view, and it made a nice combination view. Higher power showed the snout better, but overall, I liked the 52x wide-scale view for its "composition". I tried the NPB filter, and the view was suprisingly good, although the contrast of the Horsehead itself wasn't quite as high as with the H-Beta. Still, NGC 2024 showed its multiple bands and dark features somewhat better in the NPB filter. I also tried 135x without a filter, but there was little sign of the Horsehead other than a hint of a darker area in the very vague glow of the faint background nebulosity.

I did spend a little time on M42 with the various filters. I still liked the NPB probably the best on this object, as it extends the faint outer tendrils of nebulosity far beyond what is seen without a filter. The OIII filter seemed to cause M43 to merge

with M42, but the H-Beta filter greatly enhanced the difference and showed more structure to M43. While the NPB has shown me some of the faint pinkish hues, I was surprised when my 14mm ES100 eyepiece (135x) also showed some pinkish streaks in the "wings" portions of M42 even without a filter being present. Seeing had also settled down enough that the E and F components of the Trapezium were just visible.

Back on the "Heart" nebula IC 1805, this object showed more detail in it than I have ever seen. The brightest area is the small roughly triangular patch NGC 896 located northwest of the "heart" portion, and was just about the only area clearly visible without filters. With the NPB filter, the main portion of the nebula was centered on a a tiny pair of stars on the nebula's western end, but a brighter patch was just off the west edge of the main spot with a dim arc of nebulosity extending around the west side to enclose and connect it to the main patch on both its northern and southern sides. The OIII filter really brought out the large amount of fine dark detail in this little area, and while the object isn't bright, it does have a lot of stuff to look at. There was a nice dark lane bordering the east edge of the main NGC 896 patch that isolated a dimmer more diffuse area east of the main patch extending to the north, where several fainter patches were noted. Indeed, with averted vision, there was an additional very very faint diffuse oval "loop" about maybe five arc minutes wide located 13 arc minutes north of the main brightest patch of NGC 896. I had to go to some really deep images to verify that really dim loop, so the 14 inch and the filters were really doing a bang-up job. The H-Beta filter dimmed some of the nebulosity but brought out a wide dim band-like glow that directly connects NGC 896 to the main base of the "Heart". No other filter showed that connection the way the H-Beta did, which is yet again another reason that amateurs should have multiple filters ready to quickly use and change-out to show all the structure that these objects have to offer. I find my Lumicon Multi-filter Selector quite useful for this, although it does require considerable outward focus travel and a rather high focal point (both of which I now have).

In the main IC 1805 region, there is a central open cluster (Collinder 26) containing perhaps 30 to 40 stars in a moderately rich oval grouping. Nebula filters show a dim diffuse glow of nebulosity over the cluster extending and broadening to the southeast where it brightens and splits to form the "V" chevron of the top of the "heart". Here, the OIII really brought out the structure, with multiple dark patches, lanes and some fine filamentary structure along the northern of the split's branches. Indeed, I could follow several of these filaments around the north side of the heart all the way back to the faint glow that connects the heart to the NGC 896 portion. The OIII made them look like some of the filaments I see in the Veil. Off the northeastern branch of the Heart's chevron is a more diffuse glow that extends over a fairly rich but faint open star cluster NGC 1027. The cluster is anchored by a 7th magnitude star near its center, and showed perhaps 30 to 40 fairly faint stars in a nice grouping less than 15 arc minutes across. The other side of the "heart" consisted of a faint diffuse curving band of nebulosity which had two or three brighter areas within it.

About a degree and a half to the southeast of the "heart" is the large "Baby" nebula LBN 667. Some refer to this one as the "soul" nebula, but I always felt it looked like a little baby lying on its back and about to suck on its thumb. It is more diffuse and a bit fainter than the Heart nebula, but with filters, it does show some interesting detail. The star field here is very very rich with two recognized but somewhat sparse open clusters within the nebula: IC 1848 and Collinder 34. The nebula appears as an elongated diffuse glow about 100 arc minutes by 40 arc minutes in size using the narrow-band NPB filter, with a vague sort of "notch in the northern side representing the gap between the baby's chin and hand. The OIII showed several slightly brighter filamentary sections. The ones at the base (west) of the "baby" appear as a "Y" shape with a south end that abruptly turns to the east, while the one with the baby's "arm" and hand appears as just an elongated bar with a broader northern end that flares a bit. The Baby's "chin" also is slightly brighter than the rest of the "head", but again, this object is rather diffuse, so it isn't all that well defined. Interestingly enough, the H-Beta filter showed the

The Last Star Party (of 2013), continued

largest extent of nebulosity over the other two nebula filters, although the contrast of the detail was somewhat higher in the NPB and OIII filters. None of these nebulae were clearly visible without nebula filters.

I took a brief stop at the small planetary nebula IC 418 in Lepus, which is also known as, "The Raspberry Nebula". At 135x, that really showed as the nebula displayed a small slightly oval pale bluish central patch around a 10th magnitude central star. However, immediately surrounding that oval patch was a narrow distinctly reddish fringe or shell-like feature that was so red it was startling! When people wonder about the "seeing red in nebulae" on-line controversies, I just point the scope to IC 418 and let them decide for themselves.

I went back up to M1, as it was close to as high as it could get. At 135x, I was pleasantly surprised to see quite a bit of detail in it. The edges all looked distinctly tattered, and three dim but distinct irregular narrow low-contrast filaments could be seen crossing the main glow (no filter used).

I put the H-Beta filter back into the 36mm Hyperion and took a look at "the Flaming Star" nebula IC 405 in Auriga. Initially, I though I had breathed on the eyepiece, as here was the associated star (6th magnitude AE Aurigae) was surrounded by a big oval glow. However, when I took the filter out, the glow almost completely vanished! I quickly put the H-Beta back in and examined things. The nebula is a fairly well defined oval area about 20 arc minutes in diameter with AE Aur in the west-central portion. In the H-Beta filter, it appeared distinctly mottled with a broad arc of brightening in the northwestern part curving down to near the star, and another extending almost radially to the southeast. The nebula almost vanished in the OIII filter, while it was still shown in the NPB filter with lower contrast than in the H-Beta. There was also a very faint diffuse glow extending to the west and then south from AE.

I wanted to try for the Cone nebula but initially ended up on the Rosette (NGC 2237-8). With the NPB, the field was filled with almost billowing clouds of nebulosity surrounding the central open cluster. Once I corrected the position of the scope, I got on the Christmas Tree Cluster NGC 2264 and could easily see the faint glowing nebulosity that is spread over the cluster. I could just barely see the vague darkening of the Cone near the southern part of the nebula, but it was rather vague at best and was definitely a lot harder than the Horsehead had been.

I took a quick look at Jupiter and noted a shadow transit and some fair detail before finally packing it in due to the cold temperature. Still, I had a fairly good night considering one of my fingers was rapidly going numb. Clear skies to you.

February Observing—Jim Kvasnicka

This is a partial list of objects visible for the upcoming month.

Planets

Venus: At maximum magnitude -4.9 in the dawn sky.
Uranus: Very low at dusk and difficult to see.
Neptune: In conjunction with the Sun and not visible in February.
Jupiter: In Gemini at magnitude -2.4 and its disk is 42” wide.
Mars: Rises around 11 pm to start the month and by 9:30 pm at the end in Virgo.
Saturn: Rises around 1:30 am in Libra to start the month and before midnight at the end. The rings are tilted at a maximum 23º.
Mercury: Starts the month low in the WSW until February 4th. It passes through inferior conjunction on February 15th and may be visible before sunrise at the end of the month.

Messier List

M1: The Crab Nebula in Taurus.
M35: Open cluster in Gemini.
M36/M37/M38: Open clusters in Auriga.
M42: The Orion Nebula.
M43: Emission nebula next to M42.

February Observing, continued

M45: The Pleiades.
M78: Emission nebula in Orion.
M79: Class V globular cluster in Lepus.
Last Month: M33, M34, M52, M74, M76, M77, M103
Next Month: M41, M44, M46, M47, M48, M50, 67, M81, M82, M93

NGC and Other Deep Sky Objects
NGC 2362: The Tau Canis Majoris Cluster.
NGC 2392: The Eskimo Nebula in Gemini.
NGC 2403: Oval shaped galaxy in Monoceros.
NGC 2440: Planetary nebula in Puppis.
NGC 2451: Large bright open cluster in Puppis.
NGC 2452: Greenish Planetary nebula in Puppis.

Double Star Program List
32 Eridani: Yellow and white stars.
55 Eridani: Yellow primary with a pale yellow secondary.
Gamma Leporis: Pair of yellow stars.
Epsilon Monocerotis: White and pale yellow stars.
Beta Monocerotis: Three bluish white stars.
Kappa Puppis: Equal white pair.
Alpha Ursa Minoris: Polaris, yellow-white primary with a white secondary.
N Hydrae: Equal yellow stars.

Challenge Object
NGC 2438: A planetary nebula within open cluster M46 in Puppis. The PN is not part of M46 but in the foreground.

NGC Objects—Jim Kvasnicka

The Tau Canis Majoris Cluster
NGC 2362

NGC 2362 is the ninth brightest open cluster in the sky at magnitude 4.1. It was discovered in 1654 by Giovanni Battista Hodierna. It is 5,000 light years distant.

It is named The Tau Canis Majoris Cluster after the bright star in the center of the cluster. Tau is one of the most luminous super giants known. Its absolute magnitude is -7, that makes it 50,000 times brighter than our Sun.

NGC 2362 is estimated to be 2-5 million years old depending on the model you use to calculate its age. It is one of the youngest open clusters known and the final product of star formation.

Through a telescope Tau dominates the view and is surrounded by 30-40 8th and 9th magnitude stars and several dozen much fainter stars. When observing the cluster you will see some nebulosity around Tau and the center of the cluster. The cluster has a diameter of 8 arc minutes. The Tau Canis Majoris Cluster is a beautiful sight in your telescope and worthy of your observing time.

Never Give Up, Never Surrender!—Clayton Anderson

Galaxy Quest -- a wildly popular science-fiction parody made in 1999 spoofing the realm made famous by Gene Roddenberry's Star Trek TV series -- is considered a cult classic. Many fans pay homage by adorning themselves in space and/or superhero costumes at Comic-Cons throughout the United States and around the world.

One of my favorite tag lines in the movie is the one nasally and robotically uttered by Mathesar, the outwardly human -- but inwardly octopoidal -- leader of the Thermians. I can hear him even now: "Never give up, never surrender!" It is a line that has significant meaning to me, a now-retired, 15-year veteran astronaut.

Why significant? The answer, along with my story, is simple. I applied with NASA to become an astronaut 15 times. That's right, 15 times. Once per year, for 15 years, I dutifully submitted all of my application information to the governmental monolith I revered, only to be rejected by a few choice words on a small, white, NASA-addressed postcard. Kicked to the curb 14 of those 15 years, I was finally selected in 1998. I felt like the epitome of "never give up, never surrender."

It's time for America to do the same with her space program. It is time for all of us to step up and proclaim that we will "never give up and never surrender" our pre-eminence in space leadership. It is time for us to contact our representatives and voice our opinions that NASA is worth it. Yes, there are naysayers out there; people who believe that NASA is its own intergalactic "collapsing star," where U.S. tax dollars disappear like rays of light into a black hole's event horizon, with little to no visible benefits.

There is nothing further from the truth. When you use your cell phone to tweet about how NASA wastes money, you can do so because of NASA technology. After a natural disaster, while you're wondering when the government will provide financial assistance as you re-assemble your fence, you are probably using portable power tools, technology developed by NASA in the 1970s, as we conquered the moon. There are many more examples. The Apollo Program alone provided U.S. taxpayers with a return on investment that has been estimated to range from seven to 20 dollars per $1 invested! Is there anyone today that wouldn't take that share?

The technological benefits resulting from our investment in NASA and her programs don't just show up in Walmart, Target and Costco overnight. These things take time -- and, as a whole, we Americans are impatient -- we want it now! We should follow the sage advice of Yoda and Obi Wan, who were so fond of telling Luke Skywalker, "Patience, my young Jedi."

As we watch our leaders in Congress, debating bills that threaten NASA budgets, we too must be patient. But while we watch what is going on within the Beltway, we can pick up our NASA technology-enabled smart phones, laptops and tablets and send them our thoughts (over Al Gore's internet) regarding America's Space Program. Tell them, "Never give up, never surrender."

I'm not out to save the world. I just want to save NASA... a little bit at a time.

Here's the link to Clay's TEDx talk.
http://www.youtube.com/watch?v=cXfQRhFBTBs

Surprising Young Stars in the Oldest Places in the Universe—Dr. Ethan Siegel

Littered among the stars in our night sky are the famed deep-sky objects. These range from extended spiral and elliptical galaxies millions or even *billions* of light years away to the star clusters, nebulae, and stellar remnants strewn throughout our own galaxy. But there's an intermediate class of objects, too: the *globular star clusters*, self-contained clusters of stars found in spherically-distributed halos around each galaxy.

Back before there were any stars or galaxies in the universe, it was an expanding, cooling sea of matter and radiation containing regions where the matter was slightly more dense in some places than others. While gravity worked to pull more and more matter into these places, the pressure from radiation pushed back, preventing the gravitational collapse of gas clouds below a certain mass. In the young universe, this meant no clouds smaller than around a few hundred thousand times the mass of our Sun could collapse. This coincides with a globular cluster's typical mass, and their stars are some of the oldest in the universe!

These compact, spherical collections of stars are all less than 100 light-years in radius, but typically have around 100,000 stars inside them, making them nearly 100 times denser than our neighborhood of the Milky Way! The vast majority of globular clusters have extremely few heavy elements (heavier than helium), as little as 1% of what we find in our Sun. There's a good reason for this: our Sun is only 4.5 billion years old and has seen many generations of stars live-and-die, while globular clusters (and the stars inside of them) are often *over 13 billion years old*, or more than 90% the age of the universe! When you look inside one of these cosmic collections, you're looking at some of the oldest stellar swarms in the known universe.

Yet when you look at a high-resolution image of these relics from the early universe, you'll find a sprinkling of hot, massive, apparently *young* blue stars! Is there a stellar fountain of youth inside? Kind of! These massive stellar swarms are so dense -- especially towards the center -- that mergers, mass siphoning and collisions between stars are quite common. When two long-lived, low-mass stars interact in these ways, they produce a hotter, bluer star that will be *much* shorter lived, known as a *blue straggler star*. First discovered by Allan Sandage in 1953, these young-looking stars arise thanks to stellar cannibalism. So enjoy the brightest and bluest stars in these globular clusters, found right alongside the oldest known stars in the universe!

Learn about a recent globular cluster discovery here:
http://www.nasa.gov/press/2013/september/hubble-uncovers-largest-known-group-of-star-clusters-clues-to-dark-matter.

Kids can learn more about how stars work by listening to The Space Place's own Dr. Marc:
http://spaceplace.nasa.gov/podcasts/en/#stars.

Globular Cluster NGC 6397. Credit: ESA & Francesco Ferraro (Bologna Astronomical Observatory) / NASA, Hubble Space Telescope, WFPC2.

THE *Prairie Astronomy Club*

Amateur Astronomy — A Hobby as Big as the Universe

The Prairie Astronomer
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FIRST CLASS MAIL

Next PAC Meeting
TUESDAY
January 28, 2013
6:30 PM
Hyde Observatory