



Peoria Astronomical Society, Inc.

P.O. Box 10111 Peoria, IL 61612-0111
Section of Peoria Academy of Science
Affiliate of the Astronomical League
www.astronomical.org

STARLITE

Winter, 2023

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25 years ago
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**Nick Rae
September
22, 2023
Solargraph**



Officers:

President: Dan Son, sonshine1992@gmail.com

Vice-President: Jesse Hoover

Secretary: Linda Groezinger

Treasurer: Dave Monroe, dave.monroe@comcast.net

Directors:

Parliamentarian: Dave Monroe, dave.monroe@comcast.net

Nominating Chairman: Open

Legal Agent: Rodney Nordstrom

Northmoor Chairman: Dan Son, sonshine1992@gmail.com

Jubilee Chairman: Jesse Hoover

PEORIA ASTRONOMICAL SOCIETY IS NOW ON FACEBOOK:

www.facebook.com/PeoriaAstronomicalSociety

Update your address, phone or email changes

Please notify Dan Son at sonshine1992@gmail.com if you will be getting a new mailing address, email address and/or phone number. It is important that he has your personal information correct so you will continue to receive the Starlite and the Reflector.

NEW MEMBERS:

The Peoria Astronomical Society welcomes new members: Carol Hootman and Vivian and Chuck Hoette.

2023 Meteor Shower Schedule:

Geminids Meteor shower will peak on December 14th and will 2 days past new Moon. The radiant will be highest around 2am and the comet that produces the shower is 2P/Encke. So go out to a nice dark site and bring that hot chocolate to enjoy the show.



Christmas Tree Cluster

Newborn stars glow pink in this translated-color infrared image from NASA's Spitzer Space Telescope

Presidents Ramblings:

Well we had our 1st snowfall, Thanksgiving food is gone and life is still gearing up for the coming holidays and New Years. I hope everyone is enjoying December and planing a few outside astronomy events for the coming months. Northmoor season is done and we have a new key holder (Jake Schultz) who is looking to do some photography with the scope, I hope you have great success. We also had over 900 visitors and this is low since not everyone signs in. Thanks to all the keyholders and helpers..without you we cant run the scope.

A reminder that 2024 dues for most members are due and we now have paypal on our website that you can use to pay those dues and save a stamp. I big thanks to Stan Pope who maintains the website and all the improvements he has done. I can run scopes, point out objects in the sky and even edit and create the Starlite but that web page work is a different skill set.

Next year is just around the corner, Decembers members meeting is about the coming eclipse. What plans have you made, have you made any plans? Riverfront Museum is selling solar glasses, do you have yours? Take a moment to think about next year and the possibilities and make plans for doing some of them, set dates and make it happen. Space is in continual motion, make something good happen.

Dan Son
President

Facts ...just the Facts..

A neutron star's density is mind-boggling. These stars are composed almost entirely of neutrons packed together in a tiny radius. Just a teaspoonful of this material would weigh over a trillion kilograms — more than the weight of the entire human population (which reaches a few hundred billion kilograms). To make something as dense as a neutron star, the whole of humanity would need to be crammed into a space the size of a sugar cube.

What is the average daytime temperature on the Moon? 224 degrees

Submission of photos / article content for the Starlite: Dan Son

If you have a photo that you would like to submit for the Starlite, please send these to Dan Son sonshine1992@gmail.com along with a little write-up about the photo. Photos can be from star parties, club events, personal view, etc. Astrophotography is encouraged. Also, if you have educational content, tips, techniques, lessons learned or how-to articles with photos, we encourage that material for the Starlite. We can also put these on our Facebook page if you so desire.

<https://www.facebook.com/PeoriaAstronomicalSociety>

The Caterpillar Matching Gifts Program: Brian Hakes

Employees/Retirees are asked to submit matching gift forms electronically via the Caterpillar Foundation website, www.caterpillar.com/foundation. The process is easy. Once you made your gift to the PAS you can go online to the Cat Foundation website and complete the electronic form, there is no paper involved. Once the form is registered with the foundation they will notify the PAS and the treasurer will then verify the gift has been received. Because there will be no mailings, the turnaround time for the whole process will be negligible. This is especially advantageous at the end of the calendar (tax) year. This is an excellent way to support the PAS. If you can, please participate in this generous program. This is a great way to help the society and the promotion of astronomy in the greater Peoria area.

Reflector:

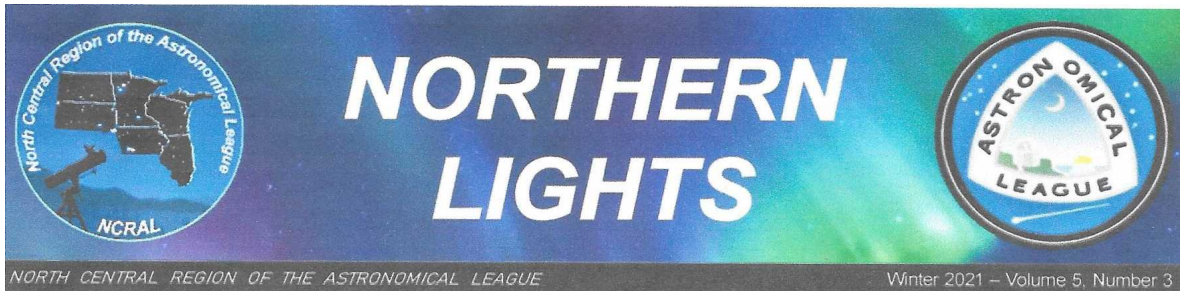
Reflector Magazine digital edition is available for download. You may access an archive of digital issues from the AL website by visiting:

<https://www.astroleague.org/reflector>

NCRAL Newsletter:

The North-Central Region of the Astronomical League (NCRAL) is made up of member societies... the six states commonly thought of as the Upper Midwest of the USA, plus the Upper Peninsula of the state of Michigan. The PAS is a member of the NCRAL. Their Region Newsletter, also named "Northern Lights", has been resurrected and is

better than ever! The latest issue's can be read on their website can be found here:
<https://ncral.wordpress.com/newsletter-archive/>
You can access the current issue and all other back issues through this link.



Add Your Email Address to NCRAL Member Database

Add your email address to the NCRAL member database now so that you can get direct mailings of NORTHERN LIGHTS and important and timely announcements about Regional conferences, star parties, and so forth. Your email address will never be shared with or sold to outside entities. Sign-up takes only about a minute. You'll need to provide your name, email address, astronomy club affiliation (including at-large), and indicate if you hold particular positions within your club. Go to the following case-sensitive URL to add your information to our database:
<https://docs.google.com/forms/d/e/1FAIpQLSdGCQJiekqrqVV3SY4BGrQdow5N7Elxv3VbX2YmFPA4AJZ2iag/viewform>

Program Schedule 2023-2024 possible final draft – All speakers confirmed

Meeting Time 7:00 p.m. CST/CDT (note new time)

Meeting in the Dome Planetarium at the Peoria Riverfront Museum (speakers via Zoom)

December 6, 2023 **The April 8, 2024 Eclipse** – Planing & sharing of members plans to observe + Oct 2023 Annual Eclipse recap
January 2023 **No Meeting in January**

February 7, 2024 **New Full Dome Show**

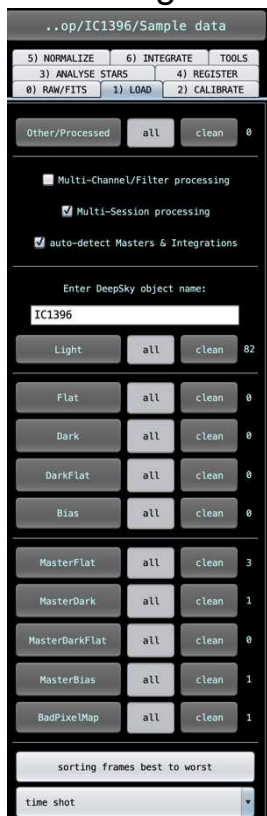
March 6, 2024 **Titan Dr. James Dire**

Inclement weather notice: Monitor email (e-group), local radio stations or PAS Facebook Page if a program, board meeting, viewing, or star party may be canceled due to weather. If we determine a risk in the weather, the Society will cancel the event. If we host an event and you feel the weather or road conditions are questionable, please take the safest actions and do not attend the event.

Processing Astro Photos – Part 2 by J Nowack

This time I wanted to look at creating bi-color images captured using dual- or tri-band filters for one shot color (OSC) cameras. These filters are a very economical way to get into narrow-band imaging without having to invest in many hundreds of dollars in filters, a filter wheel, and most of all (for me) the time to image every target 3 or 4 (or more) times to capture data with each filter. Yes, it's a compromise, but for me, my opportunities for imaging time are so limited. Maybe if I were able to image from my back yard, I'd be more able to invest the time required for monochrome imaging.

Quite a few image processing software will allow you to create bi-color ("HOO color") from data captured with a color camera using dual-band filters. I'm going to use Astro Pixel Processor for my example because it's the one I have. If you don't use APP, there is a trial version to download if you want to try. If you use a different software package like Pix-Insight there are probably ways to do the same thing with those. Last time, I included a link to a set of sample data that I had captured over several nights at Jubilee, I'm going to be using that data for this example. Feel free to download that data and give this type of processing a try. Once you download the sample, you'll find three nights of captures in the folder "Lights" as well as the flats that go with each night in the folder named (what else?) "Flats". Also included in there are the master bias (the file starting with "MB") and master darks (the file starting with "MD") from my library, and the processed flats for each session (named starting with "MF"), corresponding to each night's data.



If you haven't used APP before, uncheck the "Multi-channel" checkbox, and load the data on Tab 1 of APP as normal, by clicking on the "Lights" button. Assign each night's files to session 1, 2 or 3 by date, and then use the "Flats", "Darks", and "Bias" buttons to load the corresponding calibration files. The flats get assigned to the same sessions as the lights, and the darks and bias get assigned to "all sessions". You'll notice that it will automatically put any masters loaded into the appropriate "Master" category.

If you used the masters, when you're all done your Tab 1 should look like the image to the left.

Now, it's time to move to the mysterious Tab 0. Here you will find the options on how to debayer your image. It's probably best to leave that set to "supported" unless APP can't detect the bayer pattern of your camera. The important option here is the "algorithm" setting. Normally when shooting with a dual-band filter you will want to set this to "Ha-OIII color" but we want to separate out the Ha and OIII channels of our data

into separate files. So, select “Ha-OIII Extract Ha”. Now let it process the data by going to Tab 6. Since this data was shot over multiple nights with varying sky conditions, you’ll want to enable Local Normalization Correction. Selecting 1st degree with 3 iterations should be sufficient. Select your save directory where it will store the resulting files (I usually save in the same directory as the working directory), click on the “integrate” button and go get a cup of coffee. This will take a while. When finished, you’ll see a new file at the bottom of the file list that contains the Ha signal that was extracted from the color data. If you open that file you will see a monochrome image. That’s what we’re wanting, because we’ll assign that to a color channel later.



Now, go back to Tab 0 and change the algorithm to “Ha-OIII extract OIII”. When asked if you want to re-run the normalization you MUST select “Yes” or things won’t work right. Again, go back to Tab 6 and select “Integrate” and go re-fill that coffee cup.

So, now we have two monochrome images, one containing the Ha data, and one containing the OIII data. We want to combine those back into a color image by assigning them to the appropriate channels. Go to the “Tools” tab and select “Combine RGB”.

Click on “Add Channel” and add your Ha data, selecting the “Hydrogen alpha” filter option, and then add the OIII data by clicking on “Add Channel” again, selecting the OIII data and use the “Oxygen III” filter. Select “add-scale” for the normalization option, because we used flats (hopefully you read the previous article and used flats!) and our data is “well and flat illuminated”.

I find I get the results I like by using the “H00 2” preset but you may prefer the “H00 1” setting. These are just pre-sets, a starting point. Try both and see which palette you prefer. After you choose which of the two algorithms you’re going to start with, click on “New Formula” to load the defaults for that algorithm. Click on “re-calculate” and your combined image will appear in the preview page on the right.

Now, comes the subjective part. Adjust the sliders at the bottom, clicking on recalculate after each adjustment to see what happens. I get the results I like by generally boosting the OIII signal by between 1.5 and 2, and reducing the green on the Ha channel just a bit to make the Ha a bit redder than the default, but you do you... I would also suggest checking the “Saturation” box on the Preview pane and increasing the saturation to about 20-25 so you get a better idea what the final image will look like.

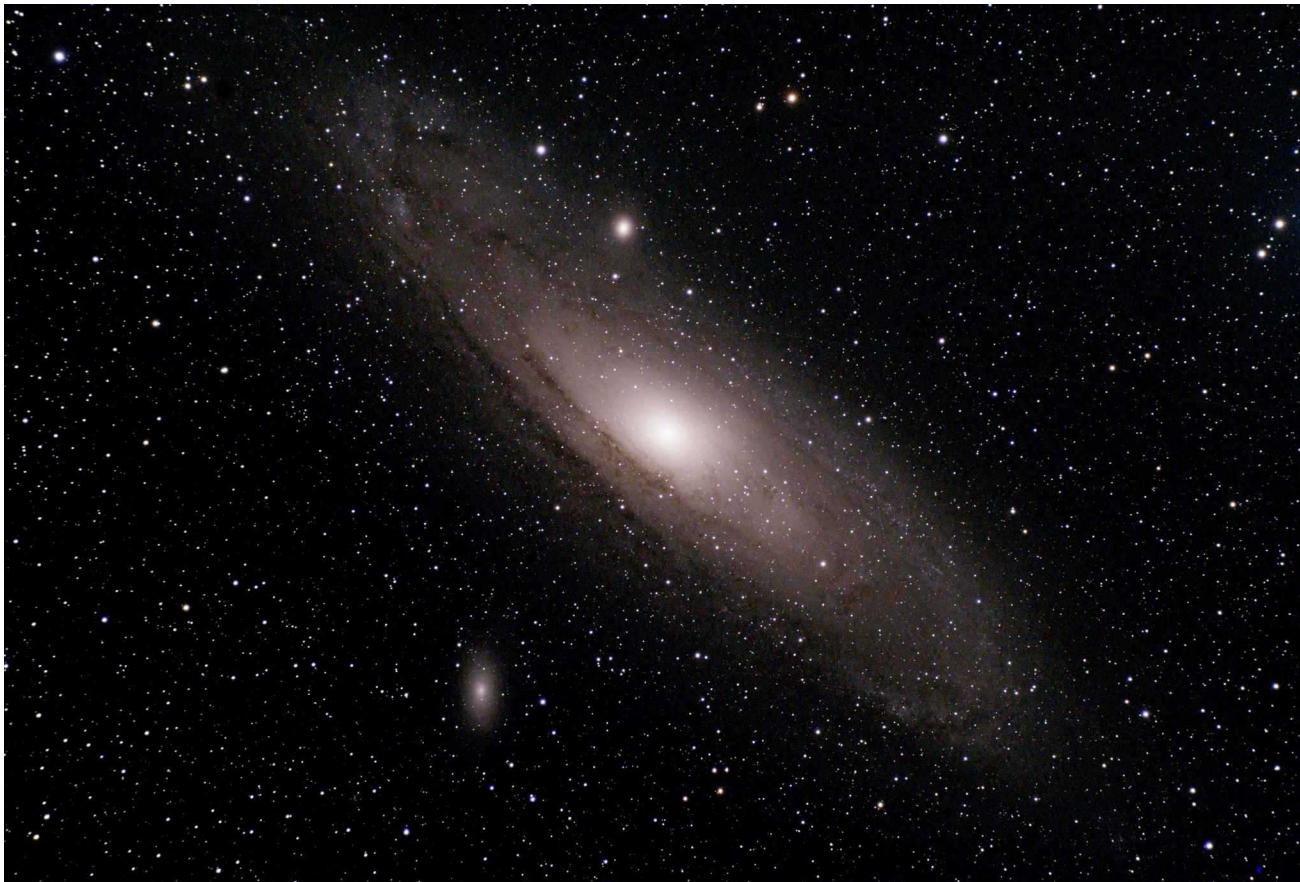
Once you get a color palette you like, save it and then proceed with the processing as normal. Run the “Remove Light Pollution” process, and I like to use the star reducer to

tame the stars and help the nebulosity stand out a bit better without all the busy stars distracting from it. You may want to avoid calibrating star colors, I find that most times, after boosting the OIII signal, using that tool will undo most of the work you did in adjusting the colors, plus you will wind up with blue stars! Sometimes it will work, most of the time it will make things worse.

I usually save the end image as a 32-bit TIFF and take it to something like lightroom, photoshop, GIMP or what have you to make some light adjustments like noise reduction, maybe a little curve adjustment to bring the background down and the mid-tones up just a tiny amount. Don't crush those blacks! You're losing signal if you do...

So, there it is, using a dual-band filter you can get comparable results to all those folks posting their "Hubble Palette" images on Astrobin, but with a fraction of the cost and a fraction of the imaging time.

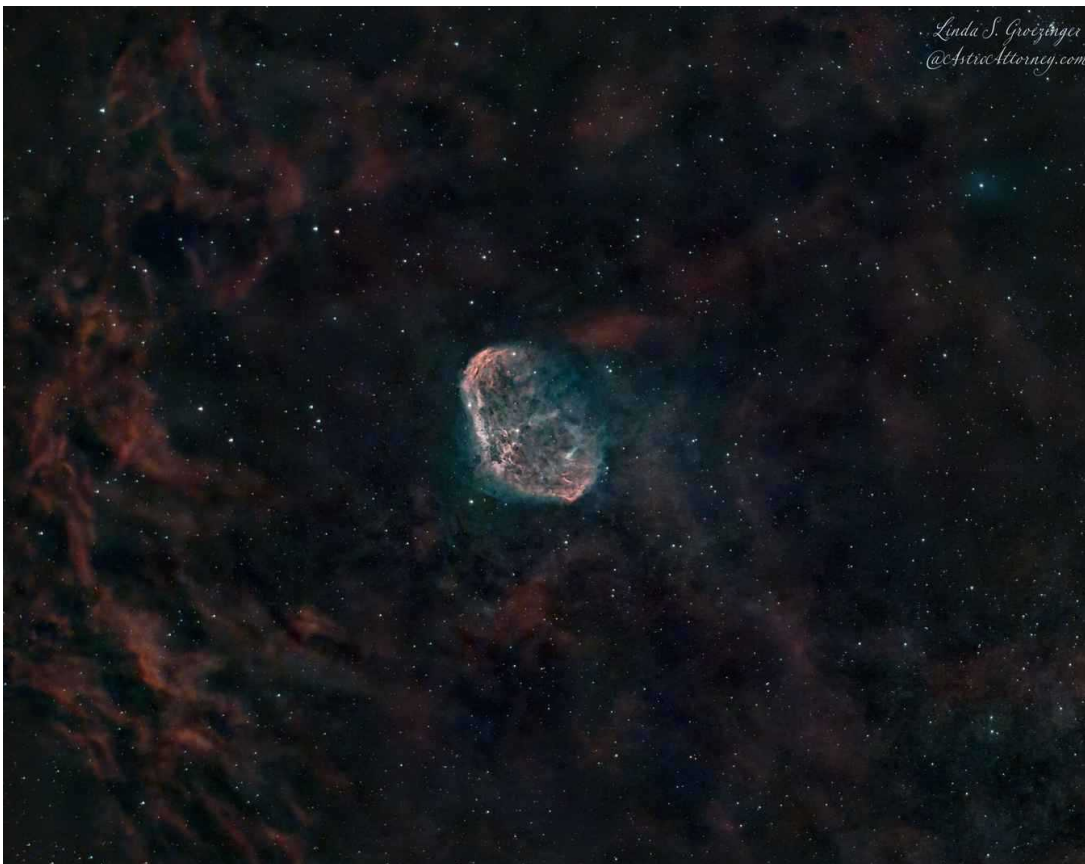
Photos from Members:



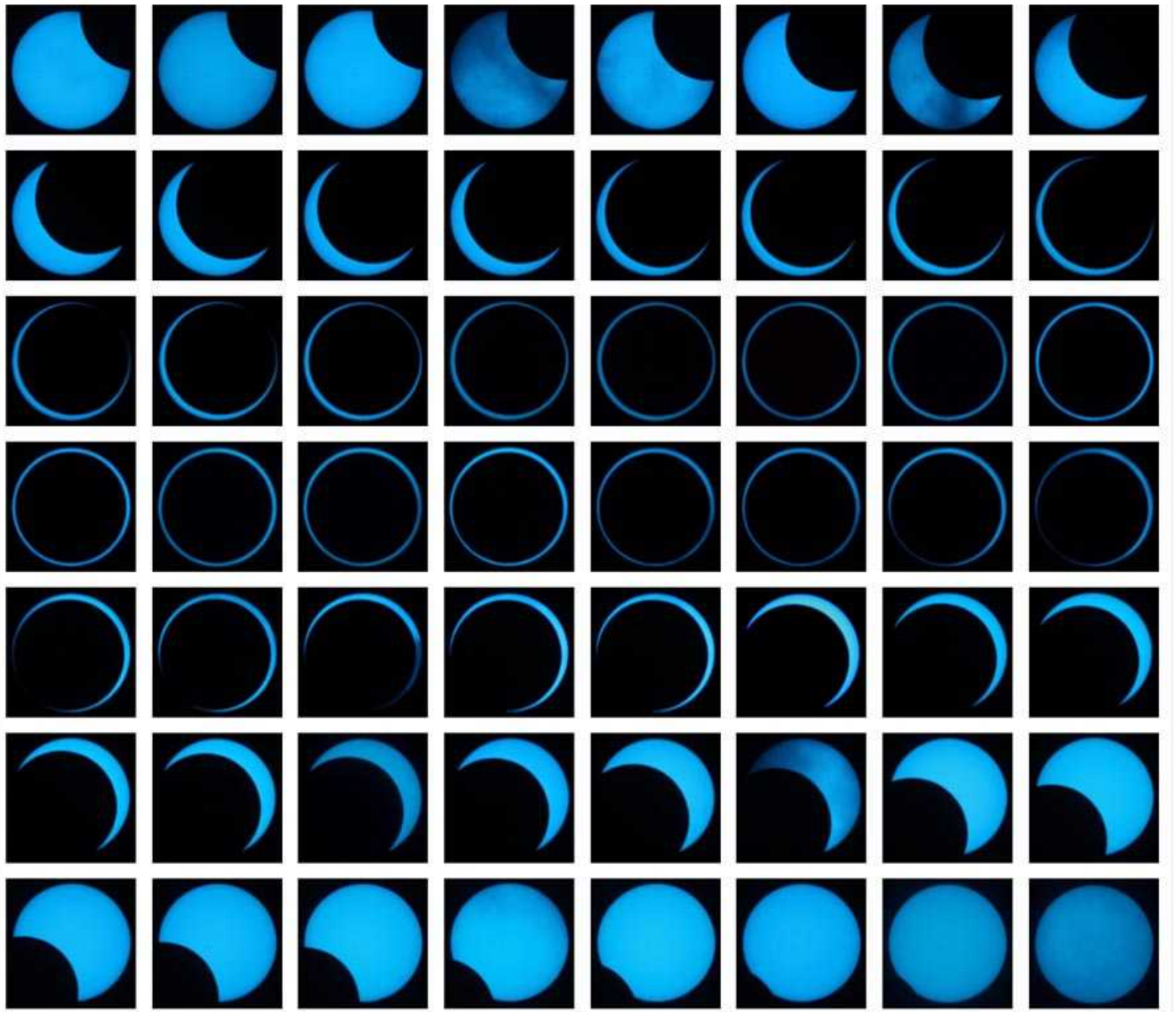
M31 S Mukherjee camera ASI294mc



**California Nebula J
Schultz**



**Crescent Nebula
L Groezinger**



2023 Annual Solar Eclipse J Dire WO110 scope Cannon 600D camera



L Groezinger



Observe the Moon night at Northmoor Observatory with Peoria Public Library.



NGC 7000 North American Nebula by J Nowack

Trip to Karl G. Jansky Very Large Array (VLA) Radio Telescope

During a recent vacation drive through New Mexico, we took a quick side-trip to see the Karl G. Jansky Very Large Array (VLA) Radio Telescope. Here are a few highlights.

Where is the VLA?

The VLA is located at 7,000 feet above sea level in the dry, flat plains of San Agustin – a dry ancient lake bed -- in central New Mexico. It is accessed via US-60 about 60 miles west of Interstate 25 and Socorro, New Mexico.



The VLA is open for a limited self-guided tour with pre-purchased tickets (on-line or visitor center kiosk), which includes a brief film, informational signs, and access to view a radio telescope. There are apparently some educational tours on Saturdays; a great source of information is a virtual on-line tour with many brief videos:

<https://public.nrao.edu/explore/vla-explorer/>

What is the VLA?

The VLA is a radio astronomy observatory consisting of twenty-seven, 25-meter (82 feet) diameter radio dishes arranged in a “Y” shaped array with 9 dishes along each of the three array arms. The VLA is a component of the National Radio Astronomy Observatory (NRAO). The individual radio dishes are linked to enable *radio interferometry* -- combining signals with an appropriate delay to act as a single large telescope – the VLA. This allows a very large effective telescope size (up to 22 miles in diameter) that provides high angular resolution, but with lower brightness (intensity).



VLA Radio Dish (Photo from Visit note relative size to bystander)

What is Radio Astronomy?

Radio astronomy observes low frequency, long wavelength electromagnetic radiation (radio frequencies) emanating from space. Electromagnetic radiation is commonly classified by wavelength into radio, microwave, infrared, visible light, ultraviolet, X-Ray, and gamma ray radiation.



A VLA Tour Station Showing the Whirlpool Galaxy at different Visible and Invisible Light Frequencies

Radio astronomy has contributed to a surprising number of discoveries and insights that include:

- Cosmic microwave background (big bang theory)
- Pulsars
- Quasars
- Galaxy Dynamics
- Inorganic Interstellar Molecules

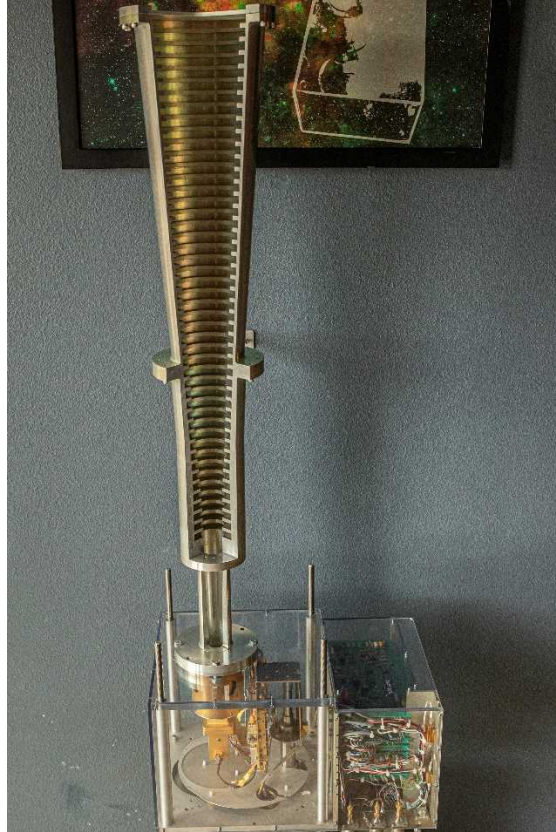
How does a Radio Telescope Work?

The radio waves are focused by the large dish to an asymmetric reflector (suspended above dish) where they are focused down to one of eight receivers (middle of dish). Larger receiver diameters are for longer wavelength radio waves.



VLA Radio Telescope Dish – Receivers in Center (Photo from Visit)

The radio waves are fed through the horn and into the receiver electronics. Here is an example of an older receiver (horn section and electronics) as displayed at the visitor center.



Radio Telescope Horn and Electronic Sensors (Photo from Visitor Center)

Array Configurations

The array can be configured into 4 basic sizes (A to D) ranging in diameter from about 22 down to 0.6 miles, respectively. Each dish is lifted off its supports by a special transporter that runs on rails, moved along the rails, repositioned over different supports, and lowered onto the supports to form a different configuration (array diameter).

During our visit, the array was arranged in Configuration A (22-mile diameter) and is scheduled to change around October 2, 2023. The array is so large, that part of the array was in sunshine and part in thunderstorms during our visit.



VLA Telescope Array -- Configuration A (Photo from Visit)

For more information, see the National Radio Astronomy Observatory web site

<https://public.nrao.edu/>

Under the 'Telescope' topic and 'VLA' in the drop-down menu.

Jim Carroll

Peoria Astronomical Society

*A Primer for the Intermediate
Lesson Four: Observing Galaxies*

by John Barra

Lessons One through Three appeared in Starlite Issues # 133-135, March-September 1998

Observing galaxies is not as easy as observing open clusters, globular clusters, or double stars. It takes both patience and skill. Even then, do not expect to see in the eyepiece anything remotely like the long-exposure photographs shown in astronomy magazines. Yet, if you have a good sky chart and have accomplished the art of starhopping, you are ready to learn to locate fainter galaxies.

VISUAL MAGNITUDE

The first problem you must overcome is being fooled by the posted visual magnitudes of the galaxies. Visual magnitude is based on the total light emitted from any particular object. We are accustomed to judging magnitude from stars, tight open clusters, and compact globular clusters. Galaxies observable in most amateur telescopes tend to be much larger in apparent size than these other more compact objects.

Since the light is spread out over a larger area, galaxies appear fainter. It has been my experience that galaxies appear between 1 and 2 magnitudes dimmer than most open and globular clusters of the same stated magnitude. I will explain several techniques for compensating for this problem. But first I will list the different types of galaxies.

BASIC TYPES OF GALAXIES

The most common galaxies we see are spiral galaxies like our own. They are made of spiraling arms of stars and dust coming from a central core. How one sees them depends on the tilt of their galactic plane as seen by us.

Assume our "plane" is the ground, and we are looking at a spiral galaxy straight overhead. If its

galactic plane is parallel to us, the galaxy is considered face-on. These are the most difficult to see because their total light is spread out. Their opposites are called edge-on because their galactic planes are perpendicular to us. They appear as a narrow line with a center bulge. They appear somewhat brighter because their total light covers a smaller area. However, a lane of dust, which can be seen in some of them, blocks some of that light. Finally, many galaxies have galactic planes that are inclined to us somewhere between 0° and 90°. They tend to be the brightest of the spirals.

The second type of galaxy is called elliptical. They are usually circular, or ovals that are near circular in shape. They tend to be the brightest of galaxies but with almost no observable details. Ellipticals remind me of very faint globular clusters — round with no resolvable stars.

Finally, odd-shaped galaxies are called irregulars. Each has its own unique shape.

Since face-on galaxies appear the faintest and therefore the most difficult to observe, I will tell you my pointers to assist you in viewing them. You can then use the same techniques when necessary to view the other types.

OBSERVING TECHNIQUES

Follow the general rule for locating deep sky objects: start with the lowest power eyepiece you have. I use a 40 mm eyepiece, which is 25x in my scope. More light is concentrated in a smaller area, usually making the galaxy easier to see.

But if you can't locate a rather faint object with low power, don't give up. Try a little higher power. I have been able to see some fainter galaxies with my 27 mm, 35x eyepiece when I could see nothing with the 40 mm.

Another technique that is very helpful in seeing faint galaxies is learning how to use averted vision. It does work. Instead of looking directly out of the center of your eye, look through the side

(Continued on page 7)

It takes both patience and skill...

Name	Constellation	Type	Magnitude	Size
M31	Andromeda	Spiral	3.4	185' x 75'
M32	Andromeda	Elliptical	8.1	11' x 7'
M110	Andromeda	Elliptical	8.1	20' x 13'
M33	Triangulum	Spiral	5.7	67' x 42'
M51	Canes Venatici	Spiral	8.4	8' x 7'
NGC5195	Canes Venatici	Irregular	9.6	6' x 5'
M81	Ursa Major	Spiral	6.9	24' x 13'
M82	Ursa Major	Irregular	8.4	12' x 6'
M104	Virgo	Spiral	8.0	7' x 4'
NGC4565	Coma Berenices	Spiral	9.6	14' x 2'
M87	Virgo	Elliptical	8.6	7' x 7'

Primer...

(Continued from page 6)

of your eye. More light is allowed in through the side of your eye. Looking through the upper portion of your eye is supposed to work best.

Continue to stare at the exact position the galaxy is supposed to be in, according to your star charts. Sometimes it helps to gently tap on the side of your telescope. Occasionally this tapping will cause the faint object to suddenly "pop" into view.

If you do suddenly think you can see a faint galaxy with one of these techniques, be careful. Assuming that you do not have a clock drive, make sure that this sudden find moves with the stars and does not stay in the center of your eyepiece. If it doesn't move, then your discovery has been one of wishful thinking rather than actual seeing. Don't be embarrassed; it's happened to me many times. But I have also have seen many fainter galaxies that did move when they were supposed to by using these techniques.

On smaller, dimmer galaxies, increasing to higher power will help to confirm a find. Otherwise, high power is reserved for those bigger and brighter galaxies that will allow for the observation of some detail.

TESTING YOUR SKILLS

To test your skills in locating galaxies, you might want to start on the list below. It contains examples of the different types of galaxies observable in most amateur telescopes.

M31, the Great Andromeda Galaxy, is observable with the naked eye, but viewed best with binoculars. Perfect seeing and a large telescope are necessary to see much detail in this tilted spiral. However, good seeing and a modest telescope are all that are needed to see its smaller and fainter companions, M32 and M110.

The Pinwheel Galaxy, M33 in Triangulum, is a large face-on spiral that is easy to locate with binoculars but can be downright elusive with a telescope. Even then, you can see very little detail because the light is spread out over such a large area. The best face-on spiral to view is M51 in Canes Venatici. Under dark skies and moderate power, you can begin to see its spiral arms. Its outermost arm stretches to its smaller and fainter companion, NGC5195.

M81 in Ursa Major is another bright spiral galaxy that is slanted toward us. If you look at it with low power, you can see its companion M82 in the same field of view. M82 is probably the most viewed irregular galaxy. By kicking up the power, you should notice a mottled or blotchy effect to this rectangular-shaped object.

M104, the Sombrero Galaxy, in Virgo and NGC4565 in Coma Berenices are the best looking edge-on galaxies. They are both easy to locate with low power. However, they can be seen in their best glory

with high power. It allows you to see their galactic bulges and central dust lanes under good seeing conditions.

One of the brightest elliptical galaxies is M87 in Virgo. Because it is relatively bright, you might be able to locate it among the many galaxies in Virgo. However, if you cannot, be patient. Navigating the Virgo Cluster will be the topic of a future article in the Primer for the Advanced series. ✨

NEXT ISSUE: LESSON FIVE: OBSERVING PLANETARY NEBULAE



Three from Naperville Visit PAS Observatories by John Barra

Despite cloudy skies and rain, three members of the Naperville Astronomical Association traveled to Peoria on October 17th to see the PAS observatories at NorthMoor and Jubilee. Herb Shulz, members service chairman of the NAA, brought home numerous photographs of our telescopes and domes.

PAS members Steve Wrigley, John Barra, Jim Kelly, Tim Lester, and Barry Redenbo showed the trio the 9-inch refractor at NorthMoor and the 14-inch and 24-inch reflectors at Jubilee. In between, both groups had a pizza party at Moni-

cal's.

The Naperville members took careful note of the historical value of our famous refractor. But their greatest admiration and awe was reserved for the craftsmanship and detail of the massive, society-made reflector at Jubilee.

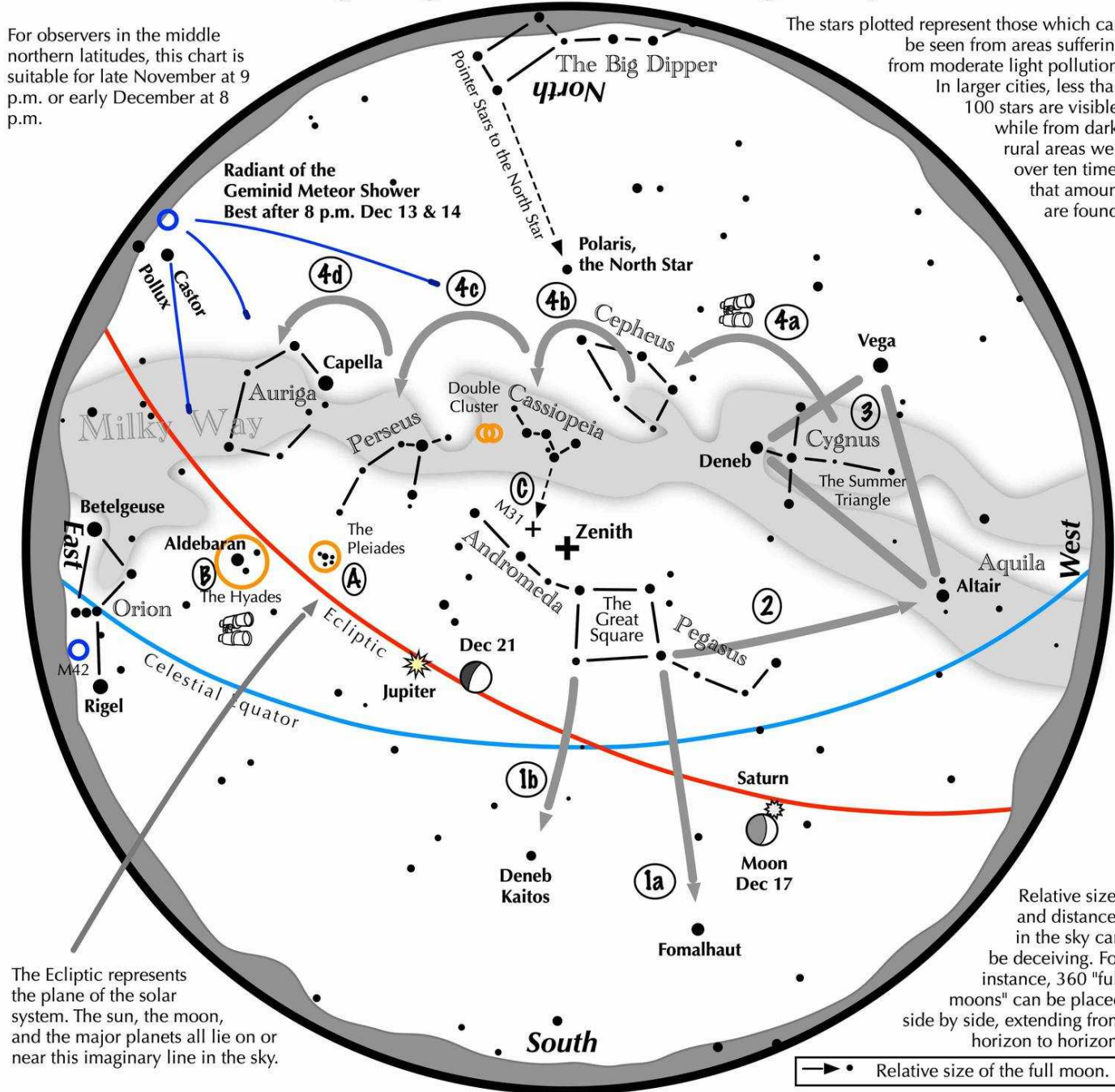
The greatest value of their visit, however, was the information exchanged between the two clubs. Common problems such as light pollution and public education were discussed, as well as various experiences and ideas from club events of the past. The PAS hopes to be able to implement some of the ideas from past Naperville membership programs.

Since the weather kept them from observing through our fine telescopes, they indicated a desire to come back on some clear night. We also laid the foundation for a future PAS trip to the Naperville club and their observatory. ✨

Navigating the December Night Sky

For observers in the middle northern latitudes, this chart is suitable for late November at 9 p.m. or early December at 8 p.m.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

→ • Relative size of the full moon.

Navigating the December night sky: Simply start with what you know or with what you can easily find.

- 1 Face south. Almost overhead is the "Great Square" with four stars about the same brightness as those of the Big Dipper. Extend an imaginary line southward following the Square's two westernmost stars. The line strikes Fomalhaut, the brightest star in the southwest. A line extending southward from the two easternmost stars, passes Deneb Kaitos, the second bright star in the south.
- 2 Draw another line, this time westward following the southern edge of the Square. It strikes Altair, part of the "Summer Triangle."
- 3 Locate Vega and Deneb, the other two stars of the "Summer Triangle." Vega is its brightest member while Deneb sits in the middle of the Milky Way.
- 4 Jump along the Milky Way from Deneb to Cepheus, which resembles the outline of a house. Continue jumping to the "W" of Cassiopeia, to Perseus, and finally to Auriga with its bright star Capella.

Binocular Highlights

A and B: Examine the stars of the Pleiades and Hyades, two naked eye star clusters.

C: The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval.

D: Sweep along the Milky Way from Altair, past Deneb, through Cepheus, Cassiopeia and Perseus, then to Auriga for many intriguing star clusters and nebulous areas.

