



# Morning Star

## Winter 2020



### \*\*\* Club Info \*\*\*

#### Announcements

**Associate Members interested in becoming full members** make your interest known to one of the board members. To become a Full Member one has to actively participate in club functions and events and be active in some other aspects of astronomy (more details are in our by-laws).

#### Wanted - PR person

If interested in this position contact Jack St. Louis or Paul Walker.

#### Moving or Changing Email?

Please send changes to Paul Walker, 53 Valley View, Middlebury, VT 05753, [paulwaav@together.net](mailto:paulwaav@together.net) ([info@vtastro.org](mailto:info@vtastro.org) will also work)

#### Hinesburg Observing Site

We have an observing site in Hinesburg, VT. (Located on town property). A locked gate (required by the town) limits access to the site.

Associate Members can request access to the gate lock. They have to a member for 3 months. This provides access to the Warming Hut, 115v AC power and port-a-potty.

Full Members can request access to the gate lock and the observatory locks.

Board approval is required in both cases. Some training is required. There is a training checklist and an access agreement that need to be filled out.

Contact the Secretary, Paul Walker or Jack St. Louis for more information at [info@vtastro.org](mailto:info@vtastro.org)

#### Observing List for HOS

We have an email List for Member's interested in getting a heads-up

when someone will be at the Hinesburg Observing Site (HOS).

If interested in getting on the list contact [info@vtastro.org](mailto:info@vtastro.org)

#### Observing Certificates

Several certificates (beginner to advanced) are available to members as encouragement to get out under the stars and hone their observing skills. Follow the link on our web site.

#### Outreach

#### Acknowledgment Letter

To help record our broad community involvement with public star gazing events, projects and classes, we have developed an Outreach Acknowledgment Letter with a Sample Form. It is posted on the website and can be found under **Members, VAS Club Materials for Members, Outreach Acknowledgement Letter**. **Direct Link:** [http://vtastro.org/wp-content/uploads/2018/03/VAS\\_Outreach\\_Ack\\_Letter\\_V3.pdf](http://vtastro.org/wp-content/uploads/2018/03/VAS_Outreach_Ack_Letter_V3.pdf)

#### Dues

**Time to renew your membership**  
**Associate Members \$15**  
**Full Members \$25**

Send dues and any address or email updates to VAS, PO Box 782, Williston, VT 05495. Or bring to any monthly meeting or Contact Paul Walker, 802-388-4220, [paulwaav@together.net](mailto:paulwaav@together.net).

#### Connect On-line

[www.vtastro.org](http://www.vtastro.org)  
[Twitter@VTAstroSociety](https://twitter.com/VTAstroSociety)  
[Facebook.com/Vermont-Astronomical-Society-113053818706458/](https://www.facebook.com/Vermont-Astronomical-Society-113053818706458/)  
Email: [info@vtastro.org](mailto:info@vtastro.org) (Goes to President and Secretary)  
[webmaster@vtastro.org](mailto:webmaster@vtastro.org) (Goes to Secretary and Webmaster)

#### Board Members

Jack St. Louis	Pres	658-0184
Joe Comeau	VP	238-1664
Doug Williamson	Treas	388-3482
Paul Walker	Sec'y	388-4220
Bob Horton		879-7802
Keith Lawrence		453-5496
Jim Bosek		879-1697
Scott Turnbull	Webmaster	

Editor and Publisher - Paul Walker  
**Michelle Spaulding** Contributors: Maura Kelley, NASA Night Sky Network, Paul Walker, Terri Zittritsch. (My apologies if I missed anyone)

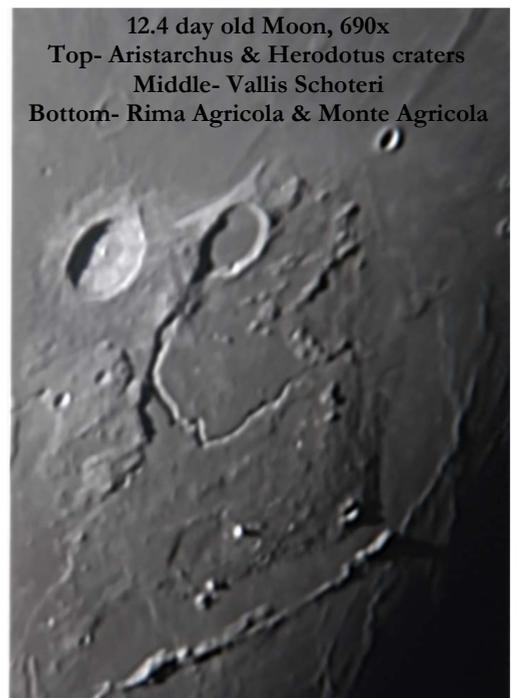


Image by Paul Walker

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## Stargazing and other Events

All observing events -are weather Permitting unless otherwise stated.  
Bring extra clothes. Even a summer evening can be chilly after standing still for a couple hours in damp air. We have an mail List for Member's interesting in getting a heads up on impromptu events at the Hinesburg Observing Site (HOS).

If interested in being on this list contact [info@vtastro.org](mailto:info@vtastro.org)

Events are listed on our website ([vtastro.org](http://vtastro.org)) and Google Calendar (<https://calendar.google.com/calendar?cid=Nzc5dnQ1bnZrN2ljcDA2NG9vbXFnczI1M2NAZ3JvdXAuY2FsZW5kYXluZ29vZ2xlLmNvbQ>)

### Member & Invited Guest Star Gazing at HOS & other events

**Note:** If you would like to be a host, greeter/orienteer or want some training on operating the scopes let Paul Walker know.

**January 17, 5:00 PM - 9:00 PM. Star gazing at Keith Lawrence's house in Bristol (almost in Starksboro). Rain dates - January 18, 19, 24, 25 or 26.** Call Keith, 453-5496, or email [info@vtastor.org](mailto:info@vtastor.org) for directions.

**Telescope Workshop Saturday February 22, 9:00 AM - 1:00 PM. At Brownell Library.** Contact [info@vtastor.org](mailto:info@vtastor.org) for more info.

Depending on the weather, snow and gumption: **We may also have impromptu events, watch for short notice emails.**  
**Contact [info@vtastro.org](mailto:info@vtastro.org)**

### Public Star Gazing at Schools, Libraries, and other groups.

If you know of a group or institution that would like to schedule a star gazing session have them contact: [info@vtastro.org](mailto:info@vtastro.org)

**Jan. 30, rain date Jan. 31, 4:30 - 7:30 PM. Viewing planets, moon, deep sky.** As part of the Waterbury Winterfest. Observing will be next to the library. Joe Comeau will do a presentation at the library if both nights are going to be cloudy. Location: Waterbury Public Library, 28 North Main Street, Suite 2, Waterbury, VT. Judi Byron, (802) 244-7036. VAS coordinator, Joe Comeau.

P.M. in the Kolvoord Community Room of the **Brownell Library**, 6 Lincoln St., Essex Jct (2nd building north of Essex 5 corners on the left on Rt. 2A). Extra parking is available in the Bank North parking lot across from the library. **For inclement weather call Jack St. Louis (802-658-0184) or Paul Walker (802-388-4220) to confirm.**

## New Members

VAS welcomes the following new member who joined us since the last newsletter:

Robert Lascelle

Gerald Davis M.D.

Neil Perlin

### New Full Members

Maura Kelley

## Meetings/Presentations

Meetings are held the first (non-holiday) Monday of the month, at 7:30

### Gary's Astronomical Events for the Month

can be viewed via WCAX at <https://www.wcax.com/weather/astronomy>

### Jack on the Radio

Listen to Jack's astronomy update on radio station WJOY AM (AM 1230) on Ginny McGehee's 'Breakfast Table' morning show. Airs the first Wednesday of the month at 8:40 AM.

### January 6

**Visually Observing the Planet Venus - 2020 Eastern Elongation  
Part 2 of 2  
By Gary T. Nowak**



Image by Paul Walker

**February 3**

2 talks

**Which Way is North? and South and East and West?**

By Keith Lawrence

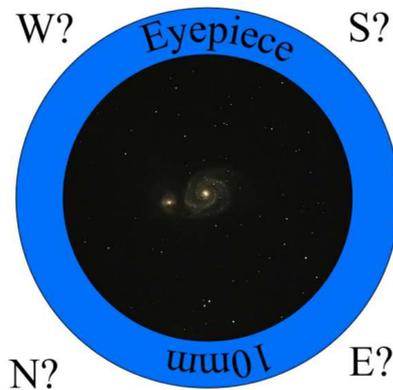


Image & graphics: Paul Walker

Keith will present a short talk on how to find North, South, East and West within the field of view of your telescope. This is important when star hopping, helpful identifying double stars and when observing multiple objects. He will demonstrate several pitfalls that may have you going South when you want to go North, East when you want to go West.

**Camera Basics  
(How cameras work)**

By Paul Walker



Image by Paul Walker

This presentation will cover DSLR (digital single lens reflex) cameras and touch on the more specialize astro-cameras. Paul will cover some basic concepts needed to understand how cameras work by answering the questions:

- What is f/ratio?
- What is focal length?
- What is ISO setting?
- How do these relate to taking pictures?

Venus is the brightest planet in the sky and the closest planet to Earth. Yet some planet watchers have never turned their telescopes toward the planet. The planet has developed a "bad" reputation of sorts of not being a good object for study with a small telescope.

Venus's almost blinding brilliance and thick, seemingly featureless cloud cover make this easy to believe. Thus Venus is sometimes given the nickname of "The Featureless Orb" or "The Blank Cloudy Planet."

This 2 part talk on observing Venus would like to dispel the myth of "Venus the Featureless Orb". The planet is not an easy object to observe, however, persistent observations with a good planetary telescope and good sky conditions will yield some interesting details. As Venus changes phases, there are certain anomalies that can sometimes be observed. The planet will have a favorable evening showing along with the Moon in late winter / spring of 2020.

**Part I of the talk: was  
2 December 2019**

There was a quick overview of the upcoming favorable Moon apparition. Then the following points about Venus were discussed:

- Introduction to the Planet Venus
- Orbital Parameters / Phases of Venus
- Amateur Telescopes for Visual Observations of Venus
- Filters for Visually Observing Venus
- Venus as an Optical Tester of Telescopes
- Observations of the Planet: Phases, Terminator, and Cusp Features

**Part II of the talk: 6 January 2020**

- More Observations of the Planet Venus: Cloud Markings
- Crescent Phase Anomalies
- Cloud Optical Illusions
- Unaided Eye Observations - Venus Effects
- Venus Illusions in Our Atmosphere
- Venus as "The Imposter UFO"
- Summary / Conclusion

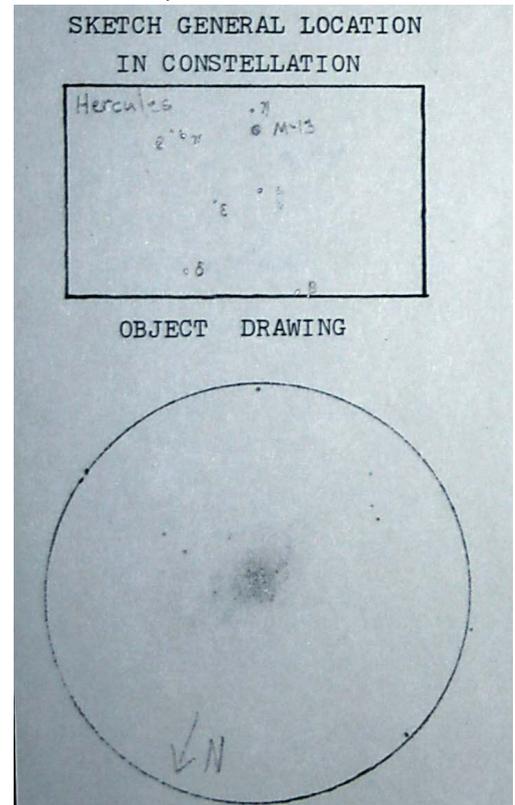
- How do the imaging sensors in cameras work?
- Does the size of the imaging sensor matter?
- Paul will discuss some of the trade-offs between choices of cameras.

**March 2**

2 talks

**Sketching Celestial Objects**

By Keith Lawrence



Sketch by Paul Walker (MI13 drawn 8/14/84)

Keith will present a short talk on recording your observations, including sketching, for future reference. He will feature recommendations from The Astronomical League and talk about how to be recognized for your efforts.

**Basic Astro-imaging**

By Terri Zitritsch

Terri will cover some of the equipment steps she took to start photographing the sky. Including astro-imaging with just an SLR (single lens reflex) camera on a tripod, Astro-imaging with DSLR (digital single lens reflex) piggy backed on a telescope, video imaging with a small web cam on an SCT and then graduating to an equatorial mount with small refractors and using a computer.



DSLR on a tracking device.

While Terri went the path of adding a computer fairly early on when she started imaging through a scope, you can do such imaging without a computer very successfully as some of our members have done and currently do.



The Milkyway taken with a DSLR with 18mm lens on a tracking device.

## Articles



This article is distributed by the NASA Night Sky Network, a coalition of hundreds of astronomy clubs across the US

dedicated to astronomy outreach. Visit [nightsky.jpl.nasa.gov](http://nightsky.jpl.nasa.gov) to find local clubs, events, stargazing info and more.

**The Orion Nebula: Window Into a Stellar Nursery**  
By David Prosper

Winter begins in December for observers in the Northern Hemisphere, bringing cold nights and the return of one of the most famous constellations to our early evening skies: Orion the Hunter!

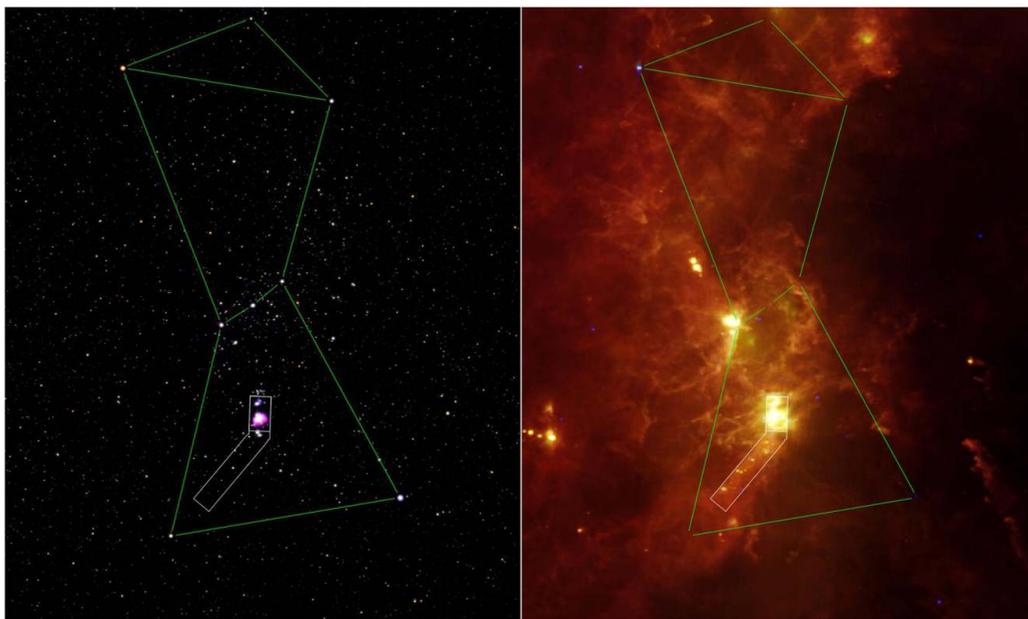
Orion is a striking pattern of stars and is one of the few constellations whose pattern is repeated almost unchanged in the star stories of cultures around the world. Below the three bright stars of Orion's Belt lies his sword, where you can find the famous Orion Nebula, also known as M42. The nebula is visible to our unaided eyes in even moderately light-polluted skies as a fuzzy "star" in the middle of Orion's Sword. M42 is about 20 light years across, which helps with its visibility since it's roughly 1,344 light years away! Baby stars, including the famous "Trapezium" cluster, are found inside the nebula's whirling gas clouds. These gas clouds also hide "protostars" from view: objects in the process of becoming stars, but that have not yet achieved fusion at their core.

The Orion Nebula is a small window into a vastly larger area of star formation centered around the constellation of Orion itself. NASA's Great Observatories, space telescopes like Hubble, Spitzer, Compton, and

whose stellar winds blew away their cocoons of gas after their "birth," the moment when they begin to fuse hydrogen into helium. Those gas clouds, which block visible light, were cleared away just enough to give us a peek inside at these young stars. The rest of the complex remains hidden to human eyes, but not to advanced space-based telescopes.

We put telescopes in orbit to get above the interference of our atmosphere, which absorbs many wavelengths of light. Infrared space telescopes, such as Spitzer and the upcoming James Webb Space Telescope, detect longer wavelengths of light that allow them to see through the dust clouds in Orion, revealing hidden stars and cloud structures. It's similar to the infrared goggles firefighters wear to see through smoke from burning buildings and wildfires.

Learn more about how astronomers combine observations made at different wavelengths with the Night Sky Network activity, "The Universe in a Different Light," downloadable from [bit.ly/different-light-nsn](http://bit.ly/different-light-nsn). You can find more stunning science and images from NASA's Great Observatories at [nasa.gov](http://nasa.gov).  
NASA Night Sky Notes December 2019



Chandra, studied this area in wavelengths we can't see with our earth-bound eyes, revealing the entire constellation alight with star birth, not just the comparatively tiny area of the nebula. Why then can we only see the nebula? M42 contains hot young stars

**Caption:** This image from NASA's Spitzer missions shows Orion in a different light – quite literally! Note the small outline of the Orion Nebula region in the visible light image on the left, versus the massive amount of activity shown in the infrared image of the

same region on the right. Image Credit: NASA/JPL-Caltech/IRAS /H. McCallon. From bit.ly/SpitzerOrion

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### Spot the Young Stars of the Hyades and Pleiades

David Prosper

Orion is the last of a trio of striking star patterns to rise during the late fall and early winter months, preceded by the diminutive Pleiades and larger Hyades in Taurus. All three are easily spotted rising in the east in early January evenings, and are textbook examples of stars in different stages of development.

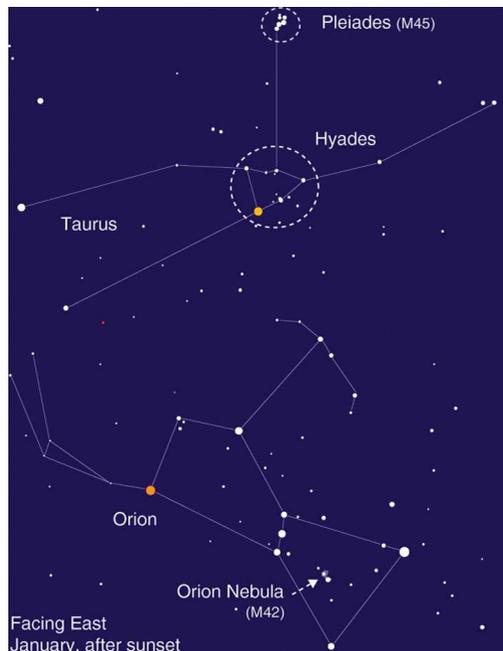
As discussed in last month's Notes, the famous Orion Nebula (M42), found in Orion's "Sword," is a celestial nursery full of newly-born "baby stars" and still-incubating "protostars," surrounded by the gas from which they were born. Next to Orion we find the Hyades, in Taurus, with their distinctive "V" shape. The Hyades are young but mature stars, hundreds of millions of years old and widely dispersed. Imagine them as "young adult" stars venturing out from their hometown into their new galactic apartments. Bright orange Aldebaran stands out in this group, but is not actually a member; it just happens to be in between us and the Hyades. Traveling from Orion to the Hyades we then find the small, almost dipper-shaped Pleiades star cluster (M45). These are "teenage stars," younger than the Hyades, but older than the newborn stars of the Orion Nebula. These bright young stars are still relatively close together, but have dispersed their birth cocoon of stellar gas, like teenagers venturing around the neighborhood with friends and wearing their own clothes, but still remaining close to home - for now. Astronomers have studied this trio in great detail in order to learn more about stellar evolution.

Figuring the exact distance of the Pleiades from Earth is an interesting problem in astrometry, the study of the exact positions of stars in space. Knowing their exact distance away is a necessary step in determining many other facts about the Pleiades. The European Space Agency's Hipparcos satellite determined their distance to about 392

light years away, around 43 light years closer than previous estimates. However, subsequent measurements by NASA's Hubble Space Telescope indicated a distance of 440 light years, much closer to pre-Hipparcos estimates. Then, using a powerful technique called Very Long Baseline Interferometry (VLBI), which combines the power of radio telescopes from around the world, the distance of the Pleiades was calculated to 443 light years. The ESA's Gaia satellite, a successor to Hipparcos, recently released its first two sets of data, which among other findings show the distance close to the values found by Hubble and VLBI, possibly settling the long-running "Pleiades Controversy" and helping firm up the foundation for follow-up studies about the nature of the stars of the Pleiades.

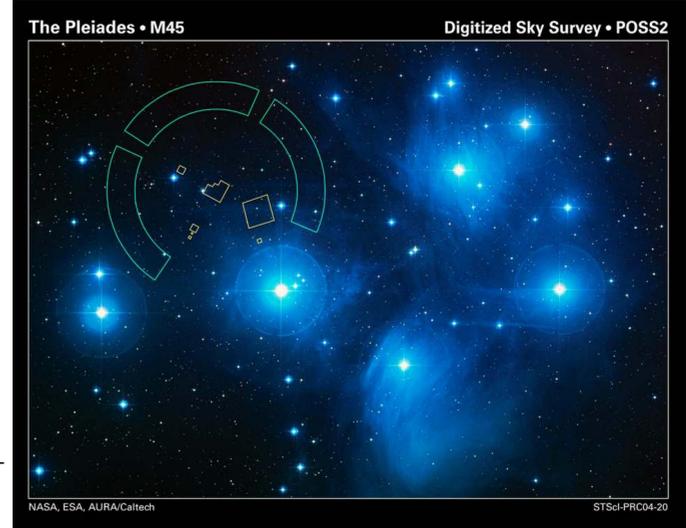
You can learn more about the Pleiades in the Universe Discovery Guide at bit.ly/UDGMarch, and find out about missions helping to measure our universe at nasa.gov.

NASA Night Sky Notes January 2020



**Caption:** Locate Orion rising in the east after sunset to find the Orion Nebula in the "Sword," below the famous "Belt" of three bright stars. Then, look above Orion to find both the Hyades and the Pleiades. Binoculars will bring out lots of extra stars and details in all

three objects, but you can even spot them with your unaided eye!



**Caption:** Close-up of the Pleiades, with the field of view of Hubble's Fine Guidance Sensors overlaid in the top left, which helped refine the distance to the cluster. The circumference of the field of view of these sensors is roughly the size of the full Moon. (Credit: NASA, ESA and AURA/Caltech)

## Board & Committee Meetings

### Board Meetings

#### October

No Meeting.

#### November

Jack opened the meeting. A person who has a scope that Russell Chmela helped build has been donated to the club. It is a 5" f/12 Newtonian, tube assembly only. Jack has bought a small propane heater to the site for Bob's Warming Hut. It has 2 settings, 4,000 and 9,000 BTU's. He also picked up a 20-lb. propane tank for it and a hose. We are not sure the hose has the proper connection for attaching it to the heater (the heater is designed to use small propane canisters).

Jack would like to see the club to do more workshops because many things are best learned hands-on and the monthly meetings do not work well for that. We can hold them at the library on available Saturdays. Workshops would likely start at 9AM. Joe

may be able to help with a basic telescope operation workshop. We are also planning to do 1 or more astro-imaging workshops at the library. Such workshops will be open to the public.

We still have 2 openings for Board Member at Large. We will continue to encourage members to consider filling these positions.

We will be doing a public stargazing event at the Waterbury Library as part of the Waterbury Winterfest. The date is January 29 with the 30th as a rain (or snow) date. Joe will do a presentation on the 29th if the weather looks bad for both dates.

Keith reported that we have placed 12 Library Loaner Scopes in area libraries to date. He asked if we should buy 2 more scopes for the program. The Board members present said yes.

Doug reported our bank account balance. He reported the Chmela Observatory fund has some funds left. Doug suggests that we close out the fund. If there are any more expenditures relating to the new observatory (such as eyepieces specifically for the Chmela scope) the Board can approve them as needed. The other Board members concurred.

**MOTIONS:**

Doug Williamson made the motion that we close out the Russell Chmela Observatory Project at the end of the year. Joe Comeau seconded the motion. All present voted in favor.

**December**

No Meeting.

\*\*\*\*\*

**VAS Membership Committee**

No meetings.

**Observatory Site Committee**

No meetings

**Site Survey Analysis Committee**

This committee has completed its task.

Committee members - Paul Walker (chair), Jack St. Louis, Bill Wooden, Maura Kelley and Terri Zittritsch

The full 2018 Site Survey results are available as a PDF file on request (contact Paul Walker)

**Results:**

A Site Survey was conducted in 2018 to determine how much the HOS site is being used, for what purposes, and issues that may be limiting its use by VAS members. The goal of the survey is to develop actions to increase the usage of the HOS site by our members, and improve the quality of that experience.

**Summary of Survey Results**

Prepared by Maura Kelley

**Current Site Usage**

**(as of the date of the survey)-**

The survey showed that just over 80% of folks who completed survey are interested in using the site. Prior to the new building structures, 50% of members did not use the site at all, while approx. 28% of members only used it 1-3 times per year. Of those that used it, most were satisfied.

About 77% of people come only when others are there. Safety does not appear to be an issue. Only 8 people indicated they would likely use the site in the winter if plowed. Over half the folks would use the site more frequently if we had a warming hut.

**Site conditions -**

Most people felt sky darkness was above average, with a slight issue of local ground lighting interference. Nearly 83% feel we should work with the Town of Hinesburg to try and mitigate or reduce the effects of local lighting on HOS skies. 11 folks indicated they would be interested in working in a committee.

Onsite parking is satisfactory.

**Equipment use -**

80% of site users never use the club's 6" f/5 telescope, and only 20% sometimes use the 18" f/4.5 telescope. Roughly half of those coming to the site bring their own equipment to use and allow others to view through their

scopes. Most found deep sky views positive.

About 59% of folks feel they are likely to use concrete pads if installed. Only 2 people have used the existing rubber pad.

Most people do not do astro-imaging at the site.

**'Obstacles' -**

Over 20% of people are not aware of the email alert system that notifies those on the list when someone will be there to open open the site. About 53% of the folks do not know the process or criteria to obtain a gate key, and nearly 59% do not know the process or criteria for obtaining an observatory key.

Just under 20% of those who used the 18" telescope found it difficult to use.

**'Comments' section -**

People are interested in using the club's telescopes, but people desire more training (education) and shared information regarding the site's equipment and its availability when someone else is there. Additionally, more time is needed - on an individual basis - for folks to spend on viewing through the club's telescopes.

The committee developed a list of action items based on the survey results and some items not necessarily directly related to the survey.

**Actions Taken**

In the newsletter the club info was moved from the last to the 1st page.

We opened the Hinesburg Observing Site (HOS) several time in the Fall of 2018 to provide members the opportunity to go to the site.

This Fall we opened the Hinesburg Observing Site (HOS) on a more regular basis to provide members the more opportunities to go to the site. (Going forward we hope to get the involvement of more full member who have full HOS access) (we could also look into involvement of Associate Members for "site only" access nights. We would have to be clear in any emails that there would be no access to the telescopes on those nights) The Membership Committee

was involved in making this happen this Fall.

More frequently send to the membership information/reminder about HOS access and how to get it. (Paul has started doing this)

More frequently send the membership information/reminder about the VAS email that is set up for members to announce to other members that they are going to the HOS and to inquire whether anyone is going to the HOS. (Paul is doing this) (FYI- currently there is only 1 or 2 members who periodically go to the site on their own)

Create a 'member's handbook' with info for those who do not necessarily 'do Internet'. (This one of items not directly related to the survey) (Maura has done a draft. This will be made available at monthly meeting and sent to new members. It can also be used as the starting point for a "new member" package that the Membership Committee would put together)

### Actions Suggested

Send all Associate members who have been members for 3 months or more an reminder/invitation to get access to the Hinesburg Observing Site (HOS) and the information on how to obtain this access. (Paul has sent a reminder to all members but not one just to Associate members to let them they have been a member for 3 or more months and therefore can request access) (This year we have had 3 Associate members request HOS access. Paul has trained 2, 1 has opted to wait until the Spring.)

Send all Full members an invitation to get access to the Hinesburg Observing Site (HOS) and the information on how to obtain this access. (2 Full members have requested access this year, been trained by Paul have access.)

NOTE: The intent of the 2 above items is to encourage and get more members to the site. We will likely need more Full members with access to better provide telescope access and training for Associate Members.

Have some Full Members sign up to provide site and observatory training to members interested in getting site and scope access. (This has not happened yet but Terri and Jack have

offered/requested to get trained as trainers, this is planned to happen in the Spring.)

Use a closed group on Facebook for members to ask questions and get answers. (This one of items not directly related to the survey) (Maura looked into this. We are currently going with and working on a suggestion Terri made to set up forum on our web site. Scott Turnbull, our webmaster to look into this with feedback from Terri and Paul.)

Have training sessions at the site for people to get help using their scopes.

(This is a task more appropriate for the Membership Committee which will work.)

Insulate the Warming Hut and add a heat source. (Jack has purchased a small propane heater. Insulation will wait to see what the demand and need is.)

## Observers Page

### Camera comparison

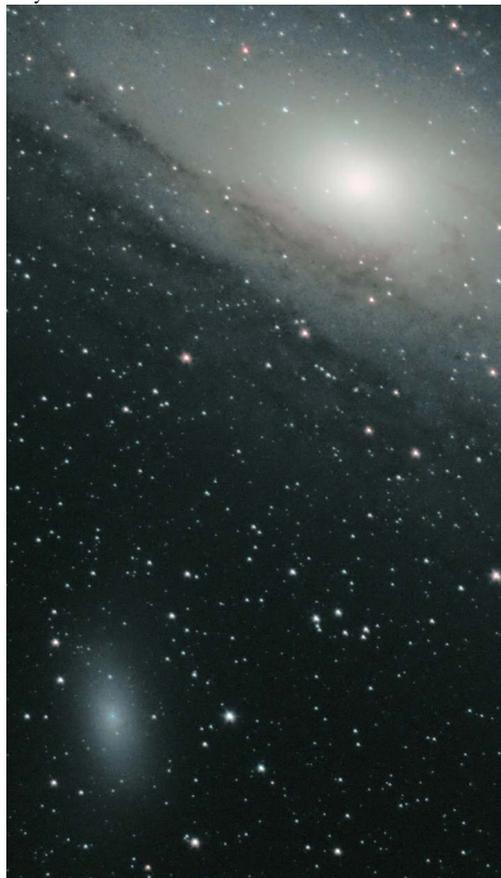
By Paul Walker

In case you didn't notice the observing was not very good in November and December of last year and maybe still bad. Well that's because I bought new camera for astro-imaging. My old astro-camera was a Canon Rebel XT

which came first out in 2005 and which I purchased in 2009. The new camera is a Canon Rebel T7i that was introduced in 2017. They both have APS-C size sensors (22.2 x 14.8 mm). The old camera is 8 Mp, the new 24 Mp with pixels 57% the width and 32% the area of the old. Both are modified for astro-imaging.

Below is a comparison of the old (right) and new (left) cameras (crops from original images). At first glance they look pretty comparable. If you look more carefully, you can see the background in the old is mottled. The new is as well but the scale is much smaller and therefore less visible.

The same scope was used, a 4.25" f/3.9 Newtonian. Notable differences are - The older image has 2 hours total time, new one only 1 hour. The sky conditions were better for the earlier image. I did not use a light pollution (nebula filter) for the earlier one. I had not perfected techniques (such as dithering my frames) for mitigating the effects of hot pixels at the time of the older image, hence a lot of "black holes". From what I have seen, I don't think the new one needs such techniques. Overall I am very pleased with the 12 year jump in technology.



Here are a couple pictures taken by Maura Kelley. Both taken with Explore Scientific 80mm f/6 air-spaced triplet

ED apochromatic refractor with carbon fiber tube, Explore Scientific EXOS2-GT equatorial mount with PMC-Eight

GoTo System and Olympus OM-D E-M1 Mark II Mirrorless Micro Four Thirds DSLR camera.



**The Iris Nebula (NGC 7023)**

Subs taken on 10/20/19 and 11/1/19 with a total integration time of 2.75 hours.



**The Pleiades or Seven Sister (M45)**

Subs taken on 9/5/18, 9/6/18, 9/13/18, 9/14/18, 10/5/18, 11/1/19 with a total integration time of 2.5 hours .

The next 3 pictures were taken by Paul Walker using his new modified Canon Rebel T7i. (APS-C size sensor) All were taken through a 4.25" f/3.9 Newtonian (1.9 x 2.9 deg field) on a SkyWatcher EQ-6 German Equatorial

Mount with Orion Atlas EQ-G Goto Electronic & Motor Upgrade Kit. Used a Baader Coma Corrector, Orion Broadband Light Pollution Filter. Guiding was done with a Celestron NexGuide on a 90mm f/13.3 1200mm fl Maksu-

tov-Cassegrain. The sky was relatively bright when I took these images. Typically I don't do imaging if the sky measures more than 20.50 mag./Sq. Arc sec. on my Sky Quality Meter, these nights were 20.5, 20.35 and 19.95 respectively.



**Soul Nebula (IC 1848, also known as the Embryo Nebula) in Cassiopeia**  
Taken 2019-11-23, 5 minutes x 15 (1hr 15m total), ISO 3200, north is down.



**California Nebula (NGC 1499)**  
Taken 2019-12-19, 4 minutes x 48 (3 hr 12 min total), ISO 800, north is up.



### Andromeda Galaxy (M31) in Andromeda

Taken 2019-12-16, 4 minutes x 14 (56 min. Total), ISO 800, North is down. Also in the image is M32 (dwarf galaxy to upper left of center), M110 (dwarf galaxy below center) and NGC 206 (the brightest bluish star cluster in the left end of Andromeda).



### 61 Cygnus Continues its Trek

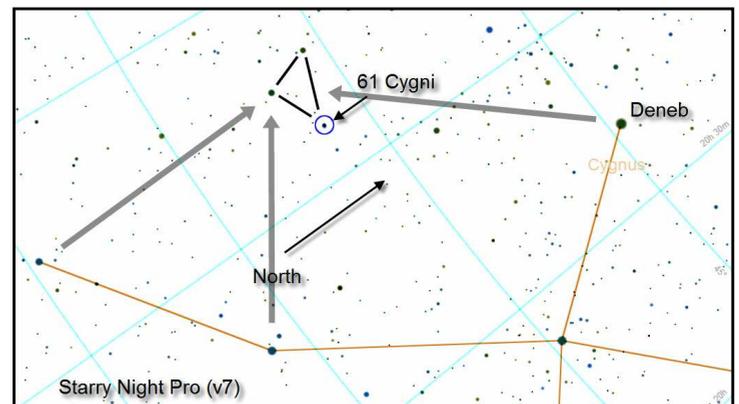
By Paul Walker

The double star 61 Cygnus is one of a handful of stars that amateur astronomers can detect the proper motion of visually. It has the highest proper motion for stars visible to the unaided eye. The 2 stars are magnitude 5.2 and 6.05.

Note however that each year it will get harder to detect this motion as they move away from a 10.7 magnitude background star (in center of image above).

It will be 80 years before the pair approach any other stars bright enough for this visual detection of motion. Photographically it will still be fairly easy.

For visual detection one only has to make a careful drawing using a telescope of 6 inches or more. An experienced amateur could likely use a smaller scope. They have moved far enough away from the 10.7 mag. star that it would likely take 2 or 3 years to confirm the movement visually.



The magnitudes of the background stars visible in the image (electronic version anyway) are 9.9, 12.3, 10.7, 13.3 and 13.6.

The image covers 6 years, from 2014 to 2019. It is starting to look like a comic caterpillar! I missed the closest “approach” because I didn’t read about it in *Sky & Telescope* until after the fact.

Each image of this composite is 15 to 40 subs at 5 sec. and ISO 1600. A 10” Newtonian was used, Barlowed to 3,730 mm f.l. at f/14.8.



### **Andromeda Galaxy (M31) in Andromeda**

This image was taken by Terri Zittritsch.

Taken 2019-, about 170 subs at 1 minute and 170 at 1.5 minutes (about 7 hr 30 min. Total) some subs were not used, North is down. Processed to bring out the blue color of young stars in the spiral arms, the yellow of the old stars in the central bulge and the brown of the dust lanes.

#### **The Andromeda Galaxy -**

one of the most distant celestial objects visible to an unaided eye.

By Terri Zittritsch

The Andromeda galaxy can be seen in northern latitudes at some time each night throughout the year, but most people associate seeing it in the autumn and winter when it's high in the sky in the early evening. Andromeda is visible on moonless nights in even moderately light polluted surroundings to the naked eye, appearing as a small fuzzy patch. Even though Andromeda is approximately 3 degrees by 1 degree in size, a full six times the diameter of a full moon, only the concentrated central bulge is visible by naked eye.

The Persian astronomer Abd Al-Rahman Al-Sufi first documented Adromeda in 964 B.C. Al-Sufi described it as the "Little Cloud" in his book of fixed stars.

Simon Marius did the first telescopic description of Andromeda in 1612. In 1764 Charles Messier catalogued the object as M31, but unaware of Al-Sufi's earlier discovery credited Marius as its discoverer.

Andromeda was thought to be a part of our own Milky Way Galaxy until Edwin Hubble, in 1925, found the first Cepheid variable in Andromeda, and was able to prove that Andromeda was much farther away than the boundary of our own galaxy. Even in 1925, Hubble was unable to accurately determine Andromeda's distance and was off by a factor of 2X. It wasn't until 1953, with the discovery of a second type of Cepheid variable in M31, observed with the 200 inch Palomar telescope, that an accurate distance was known, and Andromeda determined to be separate and distinct from our Milky Way. That distance puts Andromeda 2.5 million light years from our own Galaxy.

Andromeda, like the Milky Way galaxy, is a large Spiral of approximately 1 trillion solar masses and 140,000 light years in diameter. Andromeda is approaching the Milky Way at about 100 km/sec and expected to collide with our galaxy in approximately 2.5 billion years, potentially forming a giant elliptical galaxy.

Andromeda was first photographed in 1887 by Isaac Roberts in Sussex England and thought to be a solar system, within our galaxy, and its satellite galaxies M32 and M110, assumed to be planets in formation.

My image of Andromeda was taken through a SkyWatcher 400mm f5 astrograph refractor with an ASI071MC cooled color camera at an under-sampled resolution of 2.5 arc seconds/pixel. I took several hours of 60s images over a couple of semi-clear nights. I processed the images with pixinsight.



**The Pleiade (Seven Sisters) also known by the designation M45  
By Terri Zittritsch**

My image of M45 was taken through a SkyWatcher 400mm f5 astrograph refractor with an ASI071MC cooled color camera at an under-sampled resolution of 2.5 arc seconds/pixel. This image is the result of approximately 100 minutes of exposure on one evening. Image processing was done in Pixinsight and photoshop.



**The Pleiade Star Cluster  
By Paul Walker**

Canon Rebel T7i. 4.25" f/3.9 Newtonian. Exp 5 min X 35 (2 hr 55 min total), ISO 800.  
Note the similarities and differences of the 3 nice Pleiades images in this issue.



### Don't Forget to Visit the Moon

Its kind of like that museum the other side of town you never seem to visit. You drive by often but it just never seems to be a good time to stop in, there's always something else to do.

Maybe now's the time to set a date to visit. With the Moon it's even easier, just step out in you yard with your scope, doesn't have to be a large scope, and take look.

Like a museum, every time you visit you will see details you didn't see the last time. In addition, with the Moon details will change by the hour as the Sun slowly rises across the landscape. Like that museum across town you will wonder why you waited so long to visit.

Both images, 12.4 day old Moon, effective magnification 690x. Bottom image is Gassindi Crater on West side of Mare Humorum (West is down). Lots of neat rilles (narrow valleys) in this area. Top image, caught at a good time is Schickard, Nasmyth and Phocylides craters (right to left) a little South of Mare Humorum. Note the interesting linear features on upper left side of Schickard (West is up).

### Observing While Imaging

By Paul Walker

While I was imaging the Pleiades and the Horsehead Nebula on December 28, 2019 I was able to fit in some visual astronomy. This is not uncommon for me but not something I do every time.

It was warm enough, about mid 20's, for me to stay out of an extended period without getting cold. For imaging I was shooting sets of 6, 5 minute subs which gave me plenty of time to find and observe visual targets.

It's real handy have permanent set-ups. I don't have my scopes on concrete footings but they do stay outside in sheds that roll out of the way. This is the case for both my deep sky imaging setup and visual/planetary imaging set up. The visual/planetary scope is a 10" f/5.6 Newtonian on a large wooden and motorized horseshoe mount. I recently had the mirrors recoated.

My first target was the Pleiades (M45) the same object I was imaging at the time. The sky was not super dark, but good for my site, the SQM (Sky Quality Meter) reading at the Pleiades

was 20.75. Still is was dark enough to detect some of the dust the cluster is passing through, especially around Merope. I could definitely see a faint plume of dust extending to the south of Merope fading off into the background.

The Orion Nebula (M42) is always a delight to view with some parts bright and packed with detail and others parts on the edge of visibility fading into the background. I have had the 10" scope since the early 1980's but I don't remember noticing until a few years ago the wealth of detail visible in the core of the M42. My guess is in the earlier days I never upped the magnification enough to see this detail. A while back there was an article in Sky & Telescope about the details visible. This prompted me to look for them every time I observe the Great Nebula. I mostly used a 24 to 8mm zoom eyepiece. Though this may not be ideal because of the amount glass inside, I find being able to easily optimize the magnification to the object and detail I'm trying to see typically offsets this minor downside. On the 10" it gives me 59x with a 40 degree apparent field and up to 176x with a 50 deg. field.

Viewing the Trapezium at 176x I could make out the E component fairly readily. At first couldn't spot the a harder to see F component. As I continued to observe I think it was occasionally visible. E and F are each 4" of arc from bright Trapezium stars but A, the star next to E is magnitude 6.7 while D, next to F is 5.1, more than 1.5 magnitudes brighter. After getting my 12.5" f/4.8 Dobsonian out of the garage I used it see if I could spot the F component better. The view was worse. At first I thought maybe the collimation needed tweaking but on closer examination of the stars I realized even though the scope had been in an unheated garage the mirror was slightly warmer than the outside air and causing air currents inside the telescope.

Viewing though the 12.5" at 60x with an Orion UltraBlock nebula filter I could trace out a faint loop of nebulosity going from the West side of M42 around to the South and ending near the open cluster NGC 1980 South of M42. I could not see this loop in the 10" though I have seen it in pictures.

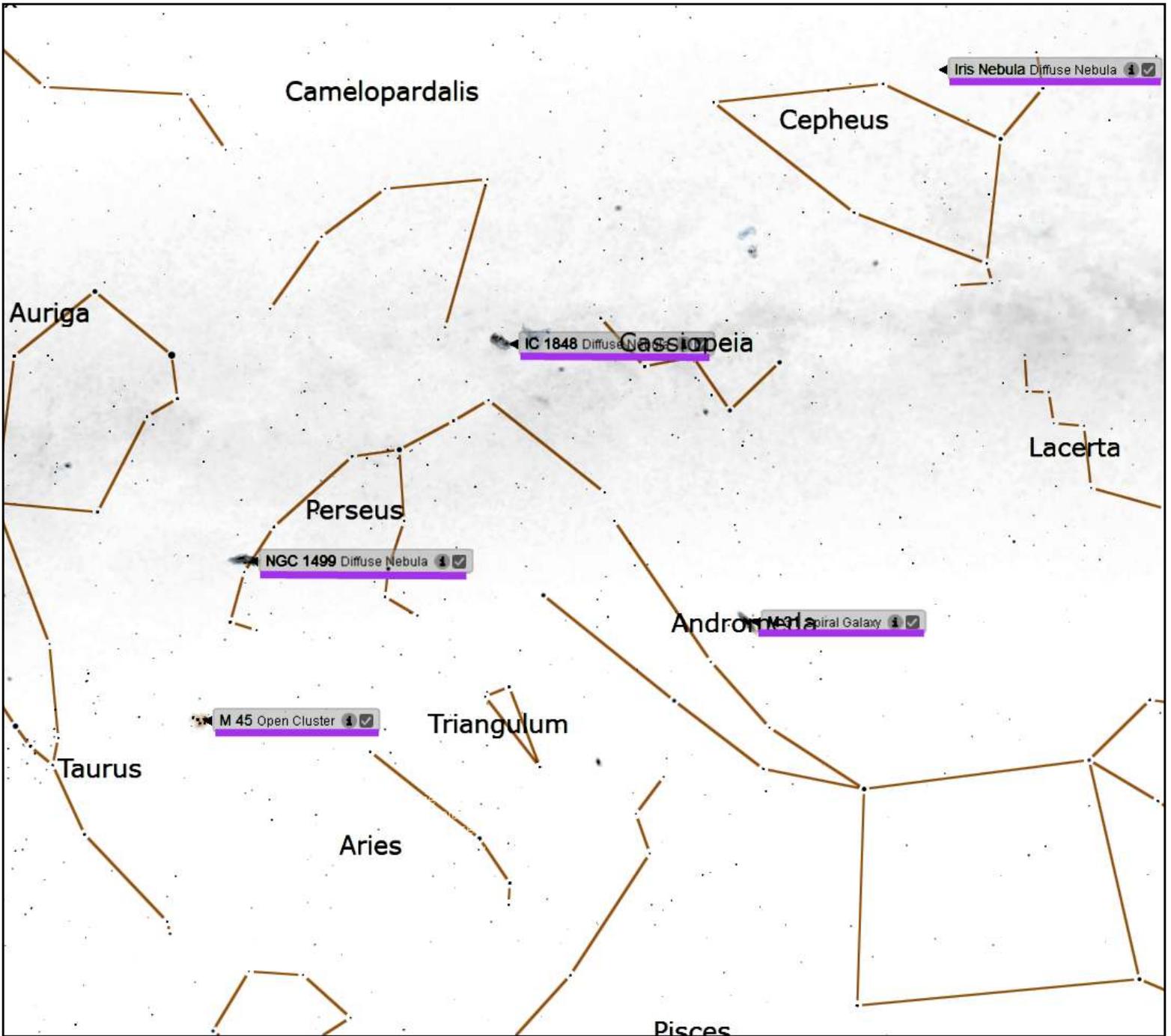
Image by Paul Walker

Image by Paul Walker

## Location Charts for the deep sky object images in this issue.

Created using Starry Night Pro 8 & Picture Window Pro 7.

**Map:** Iris Nebula (NGC 7023), Soul Nebula (IC 1848), California Nebula (NGC 1499),  
The Pleiades (M45), Andromeda Galaxy (M31)



I looked for the "Running Man", dark dust in front of the brighter nebulosity in NGC 1975, a little north of M42. I could detect the darker dust in both the 10" and 12.5" but it didn't look like a running man.

Believe it or not the Horsehead Nebula (IC 434) can be spotted from less than ideal locations. With an Orion UltraBlock nebula filter on a Konig 24 mm eyepiece (60x) I was able to detect the Horsehead in my 10" scope. I had to double check it's location in my Uranometria Star Atlas to be sure I spotted it. It showed as a very slightly darker patch of sky. At 90x (with the filter) it was a little easier to detect. Later I viewed it though my 12.5 expecting it to be a little easier to see but I can't say as it was. While in the neighborhood I also took a look at the small reflection nebula NGC 2023 to the Northeast in the same field and the Flame nebula (NGC 2024) a little to the North. I am always surprised at how faint the Flame is as it shows so well in images.

The Crab Nebula (M1) doesn't give up details easily but with the 12.5" and a nebula filter I was able to detect some faint mottling.

M81 and M82 have become a couple of my favorites. It gets easier to locate them every time I visit. It is surprising the detail visible in M82 (the Cigar Galaxy) at moderately high magnification though the 12.5". It helps that these galaxies, though not part of the local group are neighbors of ours just down the road a piece, only 12 million light-years away. That is half as far away as the well known Whirlpool Galaxy, M51. I used the 24 - 8 mm zoom eyepiece. At the high end of the magnification range I could see a dust lane cutting across the middle. M81 is less visually impressive. It's star-like core is readily visible but only the inner part of the disk is visible in a telescope. M81 is a spiral galaxy which is nearly face-on to us. M82 is edge-on and a starburst galaxy, both of which help to boost it's apparent brightness. At only about 150,000 ly apart our own Milky-way galaxy would fill space between them. So these are actually only modestly sized galaxies.

## For Sale

**Meade 6" LXD55 telescope** with the following: 26mm eyepiece, Finder Scope, Anniversary eye piece kit with 15mm; 6.4mm; 9.7mm; 12.4mm; 40mm; 32mm; and 20mm. Solar filter, Dew cap, Autostar Instruction Manual, Martin Preston users guide  
**Asking \$350** with the accessories listed.

Contact [Bruce Harmon, 802-876-7535](mailto:Bruce.Harmon@802-876-7535) or [bdhinv@yaho.com](mailto:bdhinv@yaho.com).

**Meade model 4500 OTA only 4.5 inch F/8 newtonian reflector OTA,**

1.25 inch rack and pinion focuser  
2- 4.5 inch tube rings  
MA 25mm and MA 9mm eyepieces  
Meade 2X telenegeative barlow

**Asking \$70**

Contact [Bob Peacock \(802\) 658-2131](mailto:Bob.Peacock@802-658-2131)  
[bcpeacock@outlook.com](mailto:bcpeacock@outlook.com)

**Telescope mirrors and a couple mounting cells**

**3.5" f/10** with 3/4" diagonal.

**6", probably f/8.**

**8", probably f/8,** in nice **cast aluminum cell.**

**10" f/9, 1/10 wave** (measured by Bob several years ago), Beral coating that is in good condition though the edge has several chips (edge not beveled) and a note from the coater says there are a few scratches and it is not fully polished (may be saying that because of the scratches). From St. Michael's College.

(Sold to Jack for \$50)**12", probably f/8, plate glass mirror in nice 18 point mirror cell.** The cell is worth more than the mirror. This came from St. Michael's College, from the old scope they had in their observatory.

Other than the 10" f/9 I cannot vouch for the figure of the mirrors.

The only one that may be Pyrex is the 8" mirror, I'd have to pull it out of the cell and look again. The rest have a slight greenish-yellow tint.

**Make an offer on any of the items.**

[Paul Walker 802-388-4220](mailto:Paul.Walker@802-388-4220) or [paulwaav@together.net](mailto:paulwaav@together.net)

**Celestron SLT mount w/handset and Talentcell Lithium-Ion battery pack-- \$100**

**ETX-125 OTA only--**This one has the USA made optics. Just too heavy for my needs. Needs some TLC but gives the images you expect out of this model. Contact me for more details if interested. **\$125**

**Orion Tri-mag 3x Barlow** in very good condition - **\$30**

**Celstron Omni 2x Barlow** in excellent condition - **\$25**

Contact [Paul Marino, paulmarino@gmavt.net](mailto:Paul.Marino@802-482-5128) or call (802) 482-5128

**4 inch, 550mm f.l. brass Televue Renaissance scope** with carrying case

Equatorial mount with oak tripod

2", 20mm Nagler type 2

2" 45deg. righting prism

2" Big Barlow

2", 4.8mm Nagler

1-1/4", 26mm Plossl

2", 45deg. Prism camera adapter

**New Price \$1850 - will negotiate.**

Contact [Richard Cummings at Rick@vsbmetal.com](mailto:Richard.Cummings@802-658-2131)

Or you can contact [Ron Anstey anstey@myfairpoint.net](mailto:Ron.Anstey@802-482-5128)

## Books

**The Night Sky Observer's Guide,** Volumes 1-3, like new, **\$100**

**Burnham's Celestial Handbook,** Volumes 1-3, used but very good condition, **\$50**

**Abell's Exploration of the Universe** seventh edition, textbook in used condition, **\$10**

**Celestial Objects for Common Telescopes,** Volumes 1-2, used but good condition, **\$10**

[Cheryl Rayner](mailto:Cheryl.Rayner@802-482-5128)

[cheryll.rayner@gmail.com](mailto:cheryll.rayner@gmail.com)

**Copies of "Mirror Mirror" - A History of the Human Love Affair with Reflection** by Mark Pendergrast of Colchester, Vt. available for **\$25.**

Mark will split the profits with VAS.

Contact Mark at

[markp508@gmail.com](mailto:markp508@gmail.com) or see Jack St. Louis at any monthly meeting.

**10" Telescope Kit**

**Parts for a 10" Newtonian Telescope (used)**, these were in a home-made Dobsonian scope that was build many years ago. The tube assbly and base were in bad shape so we discarded them.

**Includes:**

10 inch f/5.5, lightweight (1") mirror, Pyrex glass.  
Heavy duty 9 point floatation Mirror mount (Kenneth Novak & Co.)  
Diagonal mirror (2.5" minor axis)  
Diagonal mirror mount  
1.25 inch rack and pinion focuser  
Mirrors are usable as-is though could use re-coating.

The mirror mount was purchased from: Quality Optical Support Systems  
Kenneth Novak & Co.

**Asking \$75 or best offer**

This was given to the club and is being sold by the club. It is located at Paul Walker's house.

Contact [info@vtastro.org](mailto:info@vtastro.org)

**Light duty machining and custom hardware for astronomy. Simple adapter plates and other custom made or custom modified hardware for VAS members.**

I have a moderate amount of scrap aluminum, mostly flat stock. **For a nominal fee (~\$10 - \$50 depending on size and complexity)** I will consider making custom mounting brackets and adapters. I can also do some custom modifications to existing brackets and hardware. Dependant on availability of material and my time.

I have a 2-way cross vise on a heavy duty drill press (allows for light milling and precision drilling, +/- 0.005"). And a light duty mini-lathe (for round stock).

Paul Walker 802-388-4220 or [paulwaav@together.net](mailto:paulwaav@together.net)

**6" Telescope Kit**

**Parts for a 6" Newtonian Telescope (unused)**, these were purchased new a number of years ago. The previous owner never made them into a telescope

**Includes:**

6 inch f/5, full thickness (1") mirror, Pyrex glass.  
3 point cast aluminum mirror mount  
Diagonal mirror (1 7/8" minor axis)  
Diagonal mirror mount  
1.25 inch rack and pinion focuser  
Mirror coating are in like new condition.  
Equatorial head (1" shafts)  
115vac synchronous RA motor

**Asking \$60 for everything, or \$40 for the telescope parts, \$30 for the equatorial head and motor or best offers.**

This was given to the club and is being sold by the club. It is located at Paul Walker's house.

Contact [info@vtastro.org](mailto:info@vtastro.org)

**Modified Orion XT10 10 Inch Dobsonian Telescope**

For Sale: One Orion XT10 Dobsonian telescope with accessories. This scope has been flocked and sits on a mount I modified. Four adjustable legs attach to the bottom plate to keep the 'scope out of dewy grass or snow. The bottom plate is hexagonal and has a 360 degree compass rose attached. The rocker box has a cutout so you can read the azimuth. I lost the little paper clip pointer. You'll have to make your own.

**This sale is in two packages.****The first package is the telescope and mount, \$450 :**

- (1) Modified, flocked Orion XT10 Dobsonian Telescope
- (1) Orion padded zippered carry bag with shoulder strap
- (1) Tube cap
- (1) Rocker box
- (1) Hexagonal base with compass rose
- (4) Adjustable legs
- (1) Orion 2" Crayford style focuser
- (1) Set Orion Crayford Focuser hex keys

CONTINUED IN NEXT COLUMN

**CONTINUED FROM PREVIOUS COLUMN****The second package is the telescope accessories, \$250 :**

- (1) Large plastic toolbox with sliding tray
- (1) Orion stock rack and pinion 2" focuser
- (6) Homebrew foamcore Hartmann Masks and (3) blanks
- (1) Plastic engineer's magnetic compass
- (1) Zhumell 26mm wide field lens
- (1) Olympus CLA-10 Lens Adapter
- (1) Sirius Plossl 10mm lens
- (1) Sirius Plossl 25mm lens
- (1) Orion Shorty 2x Barlow lens
- (1) Large to small lens diameter adapter
- (1) Orion 13% moon filter
- (1) Camera adapter
- (1) 9 in 1 Hex key set
- (1) 7 in 1 Hex Key set (metric)
- (1) Crescent wrench
- (7) Various bubble levels
- (2) Spare lens caps
- (14) Small round magnets
- (1) 2 in 1 pocket screwdriver
- (1) Bag milk jug spacers
- (2) Mirror end dust covers
- (1) Orion 9x50 90 degree finder scope
- (1) Orion 9x50 straight thru finder scope
- (1) Magnetic base inclinometer
- (1) 12v hair dryer
- (1) Tie down strap
- (1) 360 degree protractor
- (6) Orion rocker box screws with hex keys
- (3) Collimation screws
- (1) Orion LaserMate Deluxe collimator
- (1) Telrad reflex sight

This sale is AS IS. I've homebrewed some features but I also cared for it. The mirror is clean and was collimated the last time I put it away. I added the nice smooth Orion Crayford focuser.

Gene Harriman  
Middleboro, Massachusetts  
[Bigwingboy@verizondot.net](mailto:Bigwingboy@verizondot.net)

**Wanted**

For selling & buying also check out:  
[www.marketplace.skyandtelescope.com](http://www.marketplace.skyandtelescope.com)