

amateur ASTRONOMER



sharing the wonder and science of astronomy

The Elusive Comet Leonard



Mark Firary captured this beautiful image of Comet Leonard just before Astronomical Twilight on December 9th from the beach north of Brigantine, NJ. Mark used a Celestron 925 Edge HD SCT with the 0.7x reducer and the ZWO 2600 MC Pro camera. 27x60s frames, taken through a UVIR cut-off filter, were stacked to create the image. The telescope was mounted on an iOptron CEM70 EQ mount and an ASlair computer and software were used for image capture and auto-guiding.

Mark used PixInsight to stack the star & comet images separately, then combined the two stacks to eliminate the comet's actual motion among the stars

The comet has posed quite a challenge, both visually & photographically, for northern observers after entering the evening sky on December 14th.

PLAN ON IT!

January 2 New Moon Dark sky observing at various sites December 27th through January 5th. See the [DVAA groups.io](http://DVAA.groups.io) for more info.

January 21 (7:30 pm via Zoom) General Meeting (see p. 2 & 17).

February 1 New Moon Dark sky observing at various sites January 25th through February 5th. See the [DVAA groups.io](http://DVAA.groups.io) for more info.

February 18 (7:30 pm via Zoom) General Meeting

FOR ALL EVENTS, SEE THE DVAA WEBSITE www.dvaa.org FOR ADDITIONAL INFORMATION AND UPDATES.

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A link to Dave Mitsky's Celestial Calendar can be found at dvaa.org on the Home Page.

Welcome New DVAA Members!

Anthony Albence (Wilmington, DE)
Allathea Joniec (Philadelphia, PA)
Harriet Kauffman (Fort Washington, PA)
Victoria Latchford (Broomall, PA)
Johanna Plummer (Philadelphia, PA)

We welcome all new members to enjoy the most our club has to offer by participating in DVAA activities. You are encouraged to ask questions and pursue your interests in astronomy through the club.

We suggest that new members attend our observing events and special interest group meetings, or volunteer to help with an outreach event or committee. Participation can advance your skills and enjoyment of the hobby and help you get to know your fellow members. New members are entitled to all benefits of membership.

Brian Lee
Welcoming Committee Chair
welcoming@dvaa.org



DVAA Board & Committee Chairs

Title	Name	Email
President	Harold Goldner	president@dvaa.org
Vice-President	Jan Rush	veep@dvaa.org
Secretary	Mike Tucker	secretary@dvaa.org
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Website	Louis Berman	website@dvaa.org
Welcoming	Brian Lee	welcoming@dvaa.org
Women of DVAA	Jan Rush	women@dvaa.org

Election Results

At the 2021 Annual Business Meeting on December 19, election results were announced for DVAA Board Positions for 2022.

The following officers were elected:

President: Harold Goldner
Vice President: Jan Rush
Secretary: Mike Tucker
Treasurer: Lou Berman
Members-at-Large (3): Barry Johnson, Tracey Trapuzzano, and Scott Vanaman

Congratulations to all elected officers, and thank you to all who ran!

Upcoming Monthly Meetings

Friday, January 21, 2022: Featured Speaker: Dr. Jay Lockman, Principal Scientist for the Green Bank Telescope. "Discoveries in Radio Astronomy: Serendipity or Sweat?" (see page 17).

Due to an overwhelming member preference for virtual monthly meetings, we will continue with the Zoom/YouTube format at least through March. Watch your email for sign-on directions.

Upcoming Meeting Dates: (all Friday evenings): Jan. 21, Feb. 18, Mar. 18, Apr. 22, May 20, June 17, July 15, Aug. 12, Sept. 9, Oct. 14, Nov. 11, and Dec. 9.

2022 Public Star Parties

DVAA public star parties are held at Valley Forge National Historical Park on the Model Airplane Field. ([Google Maps](#)). **Weather Hotline: 484-367-5278.**

The March & April star parties will be in a presentation format. All attendees are asked to wear a mask.

Public Star Party dates for 2022 (all Saturday evenings):
Mar. 12 (6:00), Apr. 9 (7:30), May 7 (8:00), Jun. 4 (8:30), Jul. 9 (8:30), Aug 6 (8:00), Sep. 3 (7:30), Oct. 8 (8:30), Nov. 11 (5:00).

Note: Consistent with recommendations from Governor Wolf and the Centers for Disease Control, some live DVAA public events are following a modified format. Monthly meetings are being held via Zoom and livestreamed via YouTube. Check the website (www.dvaa.org) for updates.

Newsletter Editorial Committee: Jeremy Carlo, George Keigh-ton, Tom Nolasco, Dana Priesing, Jan Rush and Barclay Thorn.

If you would be interested in joining us on the Newsletter Committee, or serving as guest editor for one month, just drop us a line at newsletter@dvaa.org — we'd love to have you on board, regardless of your experience level! Online tutorials are available to get you quickly up to speed.

Thanks to Dana Priesing for being lead editor last month. This month's lead editor is Tom Nolasco.

Going Rogue

Harold Goldner [email](#)



Zirlon 7 looked at the thermometer again. He had not been crazy. The planet's surface temperature had been climbing slowly now for at least a decal. Star A32167 was definitely getting close enough to yield at least a slight amount of heat to the planet. He rubbed his forehead and thought about what could possibly come next.

The planet had been hurtling through the galaxy at high speed since well prior to the establishment of civilization there. Previous astronomers had measured the changes in the distances and arrangement of the stars in the sky as eons of recorded time had passed. The planet had never been tethered to any one star as seen in astronomers' observing equipment; had never revolved around any one star; had no fellow planets captured in a dance around a single, double or triple planetary and star system. What would it mean if suddenly, after all this time the planet was captured by a star? What would it mean to be the unwilling and passive receiver of all that flowed from a local star? Could the planet's ecosystem survive? Could life on the planet survive? Would they have to find another rogue planet ideal for migration?

These thoughts swirled around in Zirlon 7's mind as he gazed at the thermometer again. Definitely getting warmer. Definitely getting closer.

A piece just published in *Nature* identifies a rich population of free-floating planets in the Upper Scorpius young stellar association. Free-floating, or "rogue" planets are planetary-mass objects that are not bound to any host star. There are a variety of explanations for such objects including: (1) a potential dwarf that sustained core-collapse; (2) ejections from protoplanetary discs; (3) aborted stellar embryos ejected from stellar nurseries; and orbit erosion from nearby stars. The analysis by the authors revealed 70-170 such objects in an area around the constellation Scorpio.

Imagine, then, instead of a regular day and night, a measurable year, and multiples thereof, occupying a planet that is speeding through the galaxy, untethered, unconnected, and divorced from any solar system. It boggles the mind.

Sometimes studying deep space objects in my telescope produces the same musings. As I have written before, what must it be like on a planet inside the M13 cluster where the sky is never dark? What must it be like to be on a planet orbiting a star inside the Orion Nebula? What must it be like to be only 500 light years from the Milky Way's Active Galactic Nucleus instead of 10,000 or more light years away?

And for that matter, what if you could stand on the surface of Saturn (without having the winds tear your skin from your bones within seconds)? What if you could look up at the clouds on Jupiter? What if you could ski on the Nitrogen Ice Mountains of Pluto?

Science fiction can unboggle the mind (or boggle it further, as the case may be). Imagine a world rotating around a tri-solar system, such as in **The Three Body Problem** by Cixin Liu. Imagine a world in which some of the inhabitants have the capacity to control tectonic forces (such as in **The Fifth Season** by N.K. Jemison); or even a post-climate apocalyptic earth in Margaret Atwood's **Oryx and Crake**. Imagine what would happen if the moon were hit by an agent and split into pieces which ultimately rained down on earth rendering the surface uninhabitable for 5,000 years, such as in Neal Stephenson's **Seveneves**.

How many nights do we look to the skies and see clouds? How often is that just when there is something we are set up to observe that will only appear *that night*. On those occasions we have very few choices. We can bemoan the fact that we didn't choose to be cloud watchers, curse the skies, or turn to our libraries and travel well beyond those clouded skies to unimaginable places. Places like rogue planets, hurtling through space, origins unknown and destinations unknown.

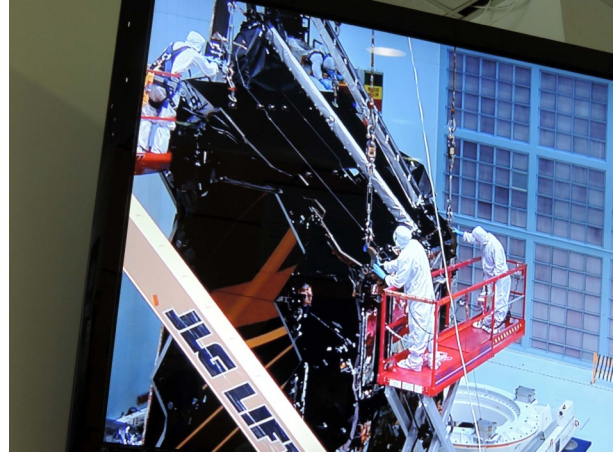
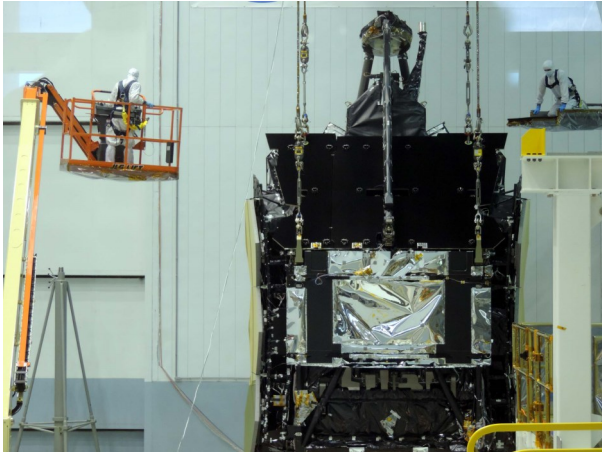
And contemplate what the civilization of Zirlon 7 will do when their rogue planet goes into orbit around Star A32167.

Astronomy compels the soul to look upwards and leads us from this world to another. **Plato**

Close Encounter with the James Webb Space Telescope

The mother of all time machines, the James Webb Space Telescope, on-board an Ariane 5 rocket successfully launched early Christmas morning from Europe's Spaceport located in French Guiana, beginning its 29 day flight to its destination at L2 a million miles from Earth. But you already know this.

What you don't probably know is that at the 2016 ALCON in Washington, DC there was an optional field trip to the Goddard Space Center in Maryland. On this excursion Al Lamperti got to see one of the mirror segments being installed ever so carefully, as if in slow motion. Talk about a cool experience. Two of Al's photos are shown below:



Photos by Al Lamperti

You can follow the James Webb Space Telescope deployment progress throughout January at: <https://webb.nasa.gov/content/webbLaunch/whereIsWebb.html>

State Level Lighting Guidance Petition

Love the Night Skies? Please sign our [petition](#)!

As many of you might be aware, recently Dark Sky Advocates scored a modest victory in Pittsburgh. The ordinance affects lighting policies within park areas of the city. This win caught the attention of Senator Carolyn Comitta's (Chester Co) office, which sought out additional information through the PA Chapter of the IDA, where members of both the PA Chapter of the IDA and the Pennsylvania Outdoor Lighting Council met with the Senator's team to plead their case for responsible lighting practices.

We look forward to utilizing this petition to showcase the level of support for determining adequate nighttime lighting guidance at a state level. It's our hope that each and every one of the members of this club can assist us in this cause! In addition to the petition, we're building a coalition of nighttime partners involved in health, environmental, and related fields. If you'd like to support our activities, please reach out to the following contacts below. Every little bit helps!

Thank you for your consideration.

Barry Johnson (johnsonb52@comcast.net), Pennsylvania Outdoor Lighting Council

Bill McGeeney (billmcgeeney@gmail.com), PA Chapter of the International Dark Sky Association



The December 5th Telescope Clinic

The clinic took place in Heebner Park, Collegeville PA (Worcester Township). There was a nice turnout with 14 attendees and 8 staff. Special thanks to Jan Rush who organized the event and set up tables of information and astronomical tools of the trade, not to mention hot coffee & cider. The sky did not cooperate for observing but much helpful information was exchanged between members on collimation, eyepieces, telescope magnification & field of view, etc. I think it's safe to say a fun and beneficial time was had by all.



Photos by Jan Rush & Al Lamperti



The December Monthly Meeting

Jeremy P. Carlo [email](#)



The DVAA December 2021 meeting was opened by President Harold Goldner. Harold started with an announcement about upcoming changes to military training programs, which would allow fighter jets to fly as low as 100 feet above the ground, over an area which includes Cherry Springs State Park. Harold said he will write a letter on behalf of the DVAA to express opposition to this proposed rule change. Harold reminded attendees of the upcoming Annual Business meeting on December 19, and expressed interest in having some outreach star parties in Delaware County.

Welcoming Chair Brian Lee announced that for the first time in quite a while, there were no new members this month! However, we've gained 65 new members over the past year (Welcome!), bringing our total to 215.

Treasurer Lou Berman reminded attendees that it's time to renew your membership for the year, and demonstrated how easy it is to renew using the website.

Outreach Chair Jan Rush gave an annual summary – 21 events in 2021 served 726 attendees. This is a bit down from the pre-COVID days, but up substantially from 2020, perhaps a sign of our gradual return to normalcy.

Publicity Chair Bill McGeeney talked about the new Pittsburgh light pollution ordinance, and some ongoing statewide efforts on the part of the Pennsylvania International Dark-Sky Association and the Pennsylvania Outdoor Lighting Commission, to attempt similar efforts elsewhere.

Finally, Scope Rentals Chair Joe Lamb announced that there would be some new rental equipment becoming available shortly – stay tuned for updates!

Before turning the meeting over to Jeremy for the main program, Harold announced that DVAA member, and Franklin Institute Planetarium director, Derrick Pitts, is featured in the February 2022 *Sky & Telescope* issue – check it out!

With the business meeting completed, Programs Chair Jeremy Carlo introduced the evening's invited speaker, DVAA Life Member, DVAA listserv moderator, and Founder of the Antique Telescope Society, Bart Fried, who spoke about "Who put that hole in the telescope?" This talk was originally given at the International Work-

shop on Astronomical Observatories and Chronometry, held in Switzerland earlier in December.

Bart started with a picture of a very unusual lens. It's a beautiful 8" lens made by legendary optician John Brashear, with a hole in the center. *Who put that there?* This lens was found by Bruce Holenstein in the home of Dr. Bob Koch, former chair of the astronomy department at the University of Pennsylvania.

Why would anyone drill a hole through a perfectly good lens? Bart reminded us that the stars were our original frame of reference, both for navigation (figuring out *where* you are), and timekeeping (figuring out *when* it is). That is, the position and motion of stars have been charted for centuries by observatories with high precision. Accurate position measurement is crucial for surveying, and accurate timekeeping is particularly crucial in navigation, as it is necessary to know the exact local time to know your longitude (how far east or west you are).

In 1728 James Bradley, who is most famous for having discovered the so-called aberration of starlight due to the earth's motion around the sun, also discovered a much smaller wobble in stellar positions, which he couldn't explain. Roughly, it corresponded to his observatory moving a few tens of meters relative to the North Pole, every 400 days or so (so, about a year, but not exactly). Was this an issue with his measuring instruments? Or was it due to some unknown physical phenomenon?

Over 100 years go by with no resolution. By this point, Sir George Airy (he of the "Airy disc") was appointed Astronomer Royal of the Royal Greenwich Observatory. By this time, a wide array of telescopes had been developed to accurately chart the positions and motion of stars, and Bradley's anomalous effect had been confirmed at numerous locations. Clearly it wasn't an issue with Bradley's telescope (like an unexplained vibration, or some site-specific issue), but something real, and global. Bart showed examples of the types of telescopes being used at the time for this purpose.

Clearly, an increase in precision was needed. In 1848, the reflex zenith tube was invented. This was a self-leveling telescope, utilizing reflection off of a pool of

(Continued on next page)

The December Monthly Meeting (continued)

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liquid mercury to ensure perfect vertical reflection, and imaging whatever passes through its field of view straight overhead. The first such instrument was installed at Greenwich in 1851, using a lens made in 1793 by Edward Troughton – already an antique by then! This instrument regularly measured the position of Gamma Draconis (the brightest star which passed directly overhead from their location), collecting decades of high-accuracy data, until being retired in 1882 without any answer to the underlying question: Why?

In 1892, Seth Carlo Chandler finally provided an explanation. The earth itself is wobbling. That is, the earth's rotational axis is slowly moving around relative to the earth's surface. It's a very small effect (tens of meters). It's unrelated to precession or any of the other astronomical effects caused by other celestial bodies. But Chandler could not answer in detail why this effect, now named after him, was occurring, except to note that it had something to do with the earth itself (and not, say, tidal effects by the moon, or precession caused by other astronomical bodies).

To address this question, in 1899 the International Latitude Service was established, using 6 observatories around the world, all located at latitude 30 degrees north. One issue with instruments to date was their limited aperture, which limited them to observing only the brightest stars. As many of us have discovered, the answer is to increase aperture! By this time, photography had become more commonplace, and the advantages to photographic (rather than visual) data collection were becoming increasingly apparent.

At this point Bart brings us back to Philadelphia, and the Flower Observatory at the University of Pennsylvania. Charles Leander Doolittle, who had worked on the so-called "latitude problem" since the 1880's, developed an improved version of the Airy reflex zenith tube in 1904. His version used a rotating 8" Brashear lens, along with two separate observing tubes. This design eliminated the "double pass" through the optical elements (which doubled the effect of aberrations in the lens) necessary in earlier instruments, by having the return pass go through a hole in the center of the lens. Hence was born the "holey lens" later found by Holenstein!

Doolittle's instrument remained in use until about 1910, when the optical tube was discarded, although the lens was rescued by Bob Cook, and later tested and found to be in excellent optical condition, eventually being donated to the Optical Science Museum at the University of Arizona. This instrument verified (again) the latitude variation caused by the Chandler Wobble, although a detailed explanation remained elusive.

The 20th century came and went without a firm resolution to the issue. Instruments sprung up around the United States, in Maryland, Washington DC, and Florida, among others. Photographic instruments detected the same wobble to increasing levels of precision, although in the process numerous advancements were made in improving the accuracy and reliability of measurements. By the 1970's, interest in using the stars for timekeeping waned as the world shifted to the cesium atomic clock standard. But the Chandler wobble remained elusive.

It was not until 2000 that Richard Gross finally produced an explanation. The earth is not as static as many of us would like to believe. The oceans slosh around. The rocks at the bottom of the ocean move up and down. The atmosphere sloshes around. The earth's landmasses gradually shift. The earth is a dynamic body, and its rotational inertia changes over time. Much as a figure skater can change their rotation speed by moving their arms in and out, the earth's rotation can vary in a similar way. (For the physicists in the audience, angular momentum remains constant unless acted upon by an external torque, but if the object's moment of inertia tensor changes, then the angular velocity (rotation rate) and rotation axis can shift.) It's a very complex effect, and one which may even be sensitive to climate change, which affects global ocean circulation and sea levels. (Bart humorously suggested that this could be called the "Fried effect," with some uncertainty as to how that first word should be pronounced.)

Many thanks to Bart Fried for an engaging presentation which led in a number of unexpected directions, but as usual with his presentations, showed how the Philadelphia area played an important role in solving an issue of worldwide importance!

Follow the DVAA on Facebook!



DVAA [Facebook](#) group
DVAA [Photo Enthusiasts](#)

Close Planetary Appulses in 2022

An Appulse is when two or more astronomical objects appear close together in the sky.

Below is a list of some interesting planetary appulses in 2022 where both objects will be visible in the same telescopic field of view at low to medium magnification:

- Apr 5 – Mars 0.4 of a degree below Saturn
- Apr 30 – Venus 0.5 of a degree to the right of Jupiter
- May 18 – Neptune 0.5 of a degree above Mars
- May 29 – Jupiter 0.6 of a degree to the upper left of Mars
- Aug 1 – Uranus 1.3 degrees above Mars
- Dec 7 – Moon & Mars close to less than 3 minutes of arc @ 11PM



Photo credit: Wayne Reed - Jupiter & Saturn
December 21, 2020

Opposition Dates of the Big 3 in 2022:

- Saturn – Aug 13, 2022 @ 18.8 arc seconds, the ring inclination will be 13 degrees to our line of sight
- Jupiter – Sep 26, 2022 @ 48.8 arc seconds
- Mars – Dec 7, 2022 @ 17.1 arc seconds. Closest to Earth Nov 28 thru Dec 5 @ 17.2 arc seconds

Lunar Eclipses in 2022:

- May 15-16 Total Lunar Eclipse: Eclipse begins @ 10:28pm; Total phase from 11:39pm - 12:53am; Eclipse ends @ 1:55am (EDT)
- Nov. 8 Total Lunar Eclipse: Eclipse begins @ 4:09am; Total phase from 5:17am - 6:41am; Moon sets @ 6:42am (EST)

Memorable Events That Occurred in January

412 Years Ago – 1610 January 7: Galileo first sees the Moons of Jupiter through his newly improved homemade refracting telescope. On January 30th he sends his manuscript “*Sidereus Nuncius*” to a printer in Venice. This document changes man’s view of the universe forever.

134 Years Ago – 1888 January 3: The 91-centimeter (36 inch) refracting telescope at Lick Observatory, the world’s largest telescope from 1888 to 1897, sees its first light. Some amateurs have scopes this size and larger today.

97 Years Ago – 1926 January: Astronomer Edwin Hubble formally presents his discovery of galaxies outside the Milky Way at a meeting of the American Astronomical Society. Hard to believe that less than 100 years ago such a discovery occurred.

73 Years Ago – 1949 January 26: The Hale 200 inch telescope, which introduced several innovations to telescope construction and was the world’s largest telescope for nearly 30 years, has its first light

30 Years Ago – 1992 January 22: First exoplanet discovered (PSR B1257+12 B). Today over 4600 exoplanets have been found

The Winking Star

Tom Nolasco [email](#)

For decades, in the celestial calendar section of *Sky & Telescope* magazine, there has been a small box showing the dates & times of the Minima of Algol, the second brightest star in the constellation of Perseus. Algol, which normally appears as a 2nd magnitude star, is an eclipsing variable. In the Algol star system two of the stars are orbiting around their center of gravity such that their orbital plane is in our the line of sight from Earth, so from our perspective, we can see one star pass in front of or behind the other.

Years ago, on the top public floor of the Franklin Institute, next to the observatory, there was a large model of the eclipsing variable Algol showing two stars of unequal brightness orbiting around their common gravitational center. As they orbited each other the larger but dimmer star passed in front of and behind the brighter smaller star.

This orbital motion causes two different dips in the stars' brightness as viewed from Earth. When the dimmer star passes behind the brighter one the drop in the stars' brightness is insignificant visually. But when the dimmer star passes in front of the brighter one, the brightness of the star drops dramatically. That, my friends, are referred to as the Minima of Algol.

So how often does this happen, how much is this dip in brightness and how long does it last? Well, Algol has a minimum about every 2.9 days where its brightness drops from a magnitude of 2.1 to 3.4 making Algol appear roughly a third as bright as it does normally. About two hours before and after the time of minima, Algol is noticeably dimmer. Algol's minimum brightness occurs for about 10 minutes on each side of the minima time.

If you have never witnessed this event you should make a point to do so, as it is really quite interesting to watch. It changes the look of the constellation Perseus noticeably. It's easy and no equipment is required.

Perseus is well placed for viewing, being nearly overhead, in January. Even though the minima occur every 2.9 days this doesn't always occur at a "convenient" observing time. Here are the best times in January & February to observe an Algol minimum from our location:

Jan 2 7:01 pm EST	Feb 11 10:31 pm EST
Jan 20 11:56 pm EST	Feb 15 7:21 pm EST
Jan 22 8:46 pm EST	

Here is a chart of where to find Algol along with some comparable magnitudes of nearby stars.



The star field was captured from Stellarium, the free planetarium software available for download at www.stellarium.org.

Hunting the Hunter: Observing Orion

David Prosper



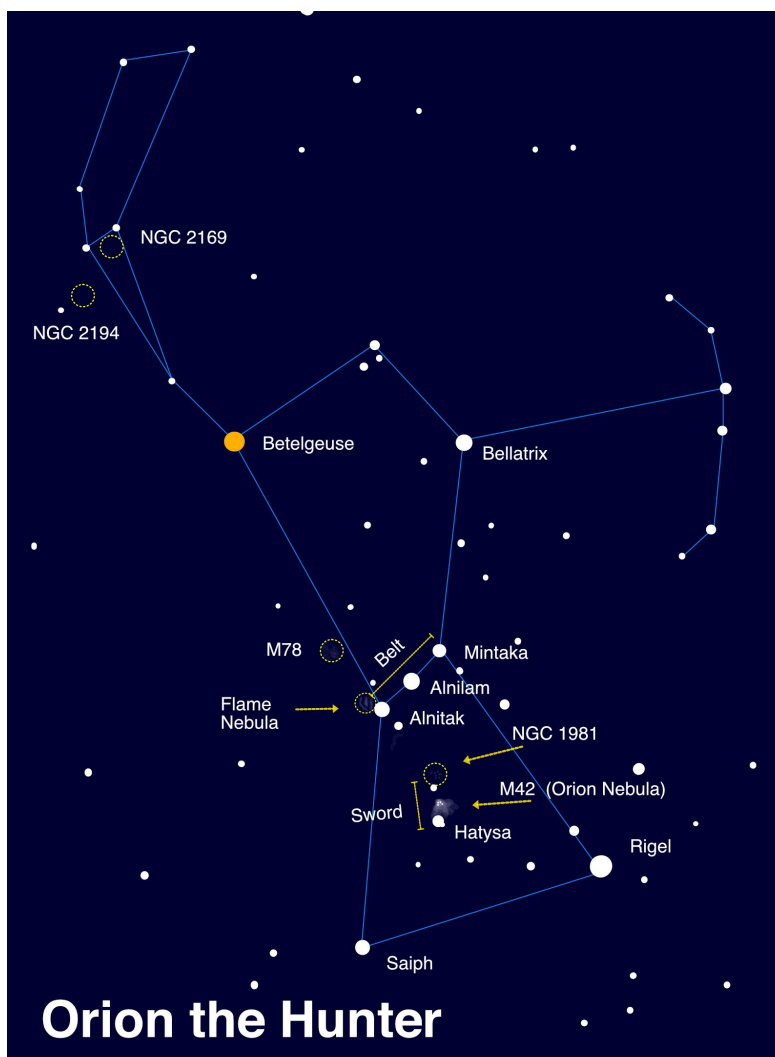
This article is distributed by NASA Night Sky Network

If you are outside on a clear January night, it's hard not to notice one distinctive star pattern above all: **Orion!** While we've covered Orion in earlier articles, we've never discussed observing the constellation as a whole. Perhaps you've received a new telescope, camera, or binoculars, and are eager to test it out. Orion, being large, prominent, and full of interesting, bright objects, is a perfect constellation to test out your new equipment and practice your observing skills - for beginners and seasoned stargazers alike.

In Greek mythology, Orion is a strong hunter, with numerous legends about his adventures. Being such a

striking group of stars, cultures from all around the world have many myths about this star pattern. There are so many that we can't list them all here, but you can find a wonderful interactive chart detailing many cultures' legends on the Figures in the Sky website at figure-sinthesky.visualcinnamon.com.

What sights can you see in Orion? Look above the variable orange-red supergiant "shoulder star" Betelgeuse to find the stars making up Orion's "club," then move across from Betelgeuse towards the bright star Bellatrix (Orion's other "shoulder") and the stars of his bow and arrow - both essential tools for the Hunter. Many interesting sights lie near Orion's "belt" and "sword." Orion's belt is made up of three bright giant stars forming an



Northern Hemisphere observers can find Orion during January evenings in the east/southeast skies. Can you spot the Orion nebula with your naked eye, in Orion's sword? How does it look via binoculars or a telescope? What other details can you discern? Please note that some deep sky objects aren't listed here for clarity's sake. For example, M43, a nebula located directly above M42 and separated by a dark dust lane, is not shown. Orion's Belt and Sword are crowded, since they're star-forming regions! You can read more in our November 2019 article Orion: Window Into a Stellar Nursery, at bit.ly/orionlight.

Image created with assistance from Stellarium.

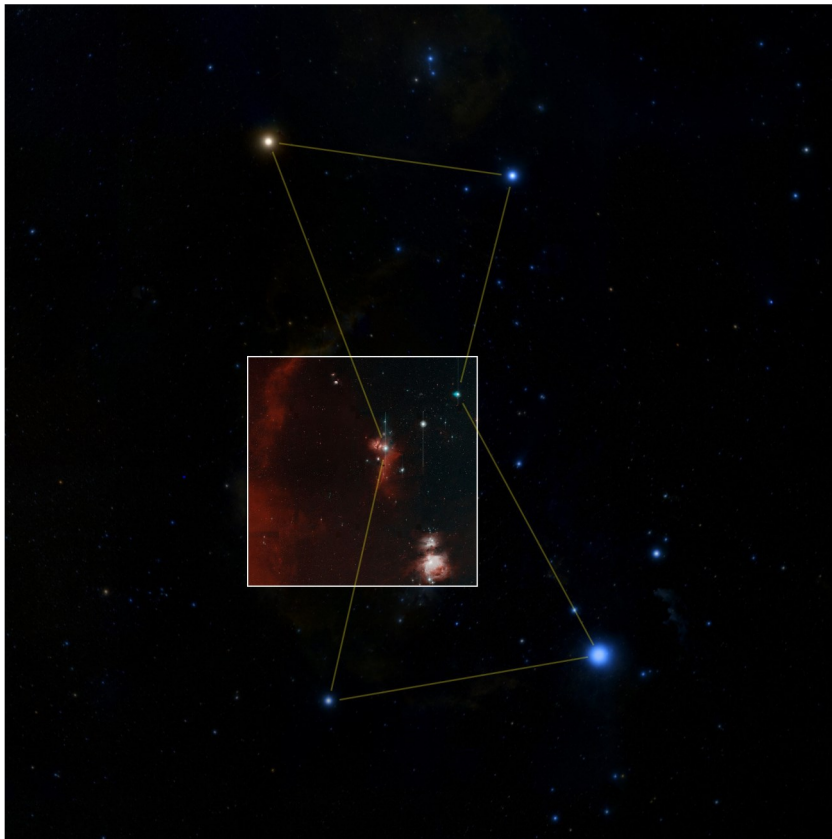
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evenly spaced line: Alnitak, Alnilam, and Mintaka. Move from the belt stars towards the stars Rigel and Saiph (Orion's "feet" or "knees") to arrive at Orion's distinctive Sword, parts of which may appear fuzzy to your unaided eyes. Binoculars reveal that fuzz to be the famed Orion Nebula (M42), perched right next to the star Hatysa! Diving in deeper with a telescope will show star clusters and more cloud detail around the Nebula, and additional magnification brings out further detail inside the nebula itself, including the "baby stars" of the Trapezium and the next-door neighbor nebula M43. Want to dive deeper? Dark skies and a telescope will help to bring out the reflection nebula M78, the Flame Nebula (NGC 2024), along with many star clusters and traces of dark nebula throughout the constellation. Very careful observers un-

der dark clear skies may be able to spot the dark nebula known as the Horsehead, tracing an equine outline below both the Belt and the Flame Nebula. Warning: the Horsehead can be a difficult challenge for many stargazers, but very rewarding.

This is just a taste of the riches found within Orion's star fields and dust clouds; you can study Orion for a lifetime and never feel done with your observations. To be fair, that applies for the sky as a whole, but Orion has a special place for many. New telescopes often focus on one of Orion's treasures for their first test images. You can discover more of NASA's research into Orion's stars - as well as the rest of the cosmos - online at nasa.gov.



The inset image is the "first light" photo from the Zwicky Transient Facility, a large survey telescope designed to detect changes in the entire night sky by detecting "transient objects" like comets, supernovae, gamma ray bursts, and asteroids. For many astronomers, amateur and pro alike, Orion is often the "first light" constellation of choice for new equipment!
Image Credit: Caltech Optical Observatories

The above article is distributed by the NASA Night Sky Network, a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach. Visit <https://nightsky.jpl.nasa.gov/> to find local clubs, events, stargazing info and more.

A Dozen Doubles for January

Tom Nolasco [email](#)



The beautiful double star Albireo
Photo credit: Dick Steinberg

On a cold January night you might not feel like packing the car and travelling to a dark sky site. Perhaps something closer to home, like your own backyard, might be a better choice. Double stars are fairly immune to light pollution or bright moonlight so they make for some great backyard viewing.

My goal for this article was to compile a list of a dozen interesting double stars that are well placed for January viewing. I created this list based on what I could glean from on-line resources, as well as, from the more classic sources such like Norton's Star Atlas, and Burnham's Celestial Handbook. The list contains a cross section of wide and close doubles, pairs of similar brightness and some with large brightness differences, as well as, plain white/white doubles mixed with some of the more colorful ones. The stars are listed in order of their right ascension from the West most to East most at sunset. Viewing them in this order will assure that the observer can view them all in a single night and not miss any that may have set.

So, after compiling my list, I went outside to see for myself how the descriptions of these stars compared with my own viewing experience. For my double star observing, I used my 6 inch F/9 reflector with four Plossl eyepieces providing magnifications of 43x, 80x, 105x and 170x. I observed these stars on December 13th under an 80% illuminated gibbous moon high overhead. Seeing was not particularly good and was rated as "below average" in the App "Atmospherics", but hey I'm on a deadline here. My observations can be found in the "Observations" column in the table that follows. So why not go out in your backyard and have some fun tracking down these stars and see if your observations match mine.

As a bonus, you will have completed 12% of the Astronomical League's Double Star Program, coordinated by DVAA member Jonathan Schuchardt. <https://www.astroleague.org/al/obsclubs/dblstar/dblstar1.html>

Name	Coordinates	Magnitudes	Separation	Commonly Listed Colors	Observations
Zeta Piscium (Revati)	01h 13.7m +07 35	5.2 6.3	23"	Pale Yellow Lilac	This is an easy one to get your feet wet. It is easily split with the lowest magnifications and was a pleasing light yellow & light blue pair.
Gamma Arietis (Mesarthim)	01h 53.5m +19 18	4.5 4.6	7.5"	White White	<i>Fun Fact: This was one of the earliest known double stars. Robert Hooke accidentally discovered it in 1664 while following a comet.</i> These two appeared almost identical in brightness and very close, but split, at 43x. This white-white pair reminded me of a fainter version of the famous double star Castor (found later in this list). Very pretty and comfortably split at 80x & 105x.
Lambda Arietis	01h 57.9m +23 36	4.8 6.7	37.1"	White Yellow Silver Blue	Wide pair that is easily split with very low magnification. Beautiful at 80x. I agree with the white-yellow & silver-blue colors
Gamma Andromedae (Almach)	02h 3.9m +42 20	2.3 5.0	9.8"	Yellow Orange Blue	This is one of the double star gems, absolutely beautiful color contrast of deep yellow & blue. At 80x nicely split.

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Name	Coordinates	Magnitudes	Separation	Commonly Listed Colors	Observations
Iota Trianguli	02h 12.4m +30 18	5.3 6.7	3.8"	Yellow Bluish Green	Notable color contrast. I saw the colors as deep yellow & pale blue. They looked a bit closer in brightness than the 5.3/6.7 listed. Clean split but very close at 105x.
Beta Orionis (Rigel)	05h 15m -08 12	0.1 6.7	9.4"	White Blue	This one was a real challenge because the companion hides in the glare of the brilliant primary that's over 400 times brighter. I didn't see it at first so I went to a high magnification. Once found I could see it at with as little as 43x. The colors were white & pale blue.
Delta Orionis (Mintaka) Westernmost star in Orion's belt.	05h 32.0m -00 18	2.2 6.8	52.6"	Yellow White Blue	The primary star is over 50 times brighter than the secondary but this wide double is easy to see and split at 80x. I saw the colors as white & deep blue.
Zeta Orionis (Alnitak) Easternmost star in Orion's belt.	05h 40.7m -01 57	1.8 3.7	2.3"	Yellow Yellow	With the below average seeing this one was more of a challenge and had to use my 13mm eyepiece with a barlow yielding 210x to cleanly split. Absolutely no hint at being a double star at 43x. I saw the color as white & white.
Gamma Leporis	05h 44.5m -22 27	3.6 6.3	95"	Light Yellow Pale Green	Very nice wide double at low magnification. Its low altitude may have influenced my color but I saw them as golden yellow & deep
Beta Monocerotis	06h 28.8m -07 02	4.6 5.0 5.4	A/B = 7.1" A/C = 9.7" B/C = 3.0"	White White White	<i>William Herschel described it as "one of the most beautiful sights in the heavens".</i> I feel that's a bit overstated however it might be the best triple star system in the sky. At low magnification it looks like a double star system but cranking up the magnification to 170x cleanly splits the B/C stars. All three appeared white. Quite nice.
h3945 Canis Majoris	07h 16.6m -23 19	5.0 5.8	26.4"	Yellow Blue	<i>Sometimes called the "Winter Albireo".</i> This very colorful pair appeared yellow orange & blue. Not as bright as our summer favorite Albireo but a very pleasing pair at 80x & 105x.
Alpha Geminorum (Castor)	07 35m +31 53	2.0 2.8	4.4"	White White	One of my favorite double stars in the sky. This one is really pretty. At 43x it was a contact double but at 80x it was a clean split. Looked really nice at 170x.

January Photo Gallery



Photo credit: Leon Rosen

This beautiful Geminid meteor was captured by Leon on the morning of December 14th. The exposure was approx. 3 seconds using his cropped DSLR with a 35mm F1.8 lens set at a high ISO and mounted on his iOptron sky tracker.

DVAA Team Work:

Joe Lamb provided image processing assistance using Nebulosity 4 software on Leon's original image.



Photo credit: Mark Firary

Mark took this dazzling image of Comet Leonard on the morning of December 9th from beach north of Brigantine NJ. He captured the comet using a 100mm f/2.8 Rokinnon camera lens and the ZWO 294 MC Pro camera. The image was created from a stack of 19 frames with an exposure time of 300s (19x300s total exposure).

Mark used PixInsight to stack the star & comet images separately then combined the two stacks to eliminate the comet's actual motion among the stars.



Photo credit: Tom Nolasco

In the early morning hours of December 3rd, Comet Leonard passed by Globular Cluster M3. Tom imaged this close encounter from his backyard in Huntingdon Valley, PA. using an eight inch F4 reflector & ZWO ASI174mm camera.

January Photo Gallery (continued)

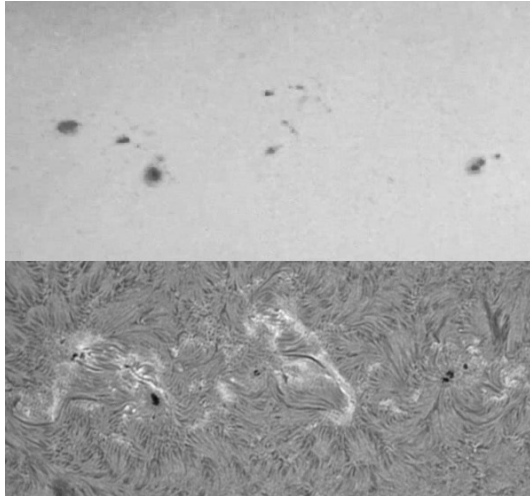


Photo Credit: Bart Fried & Tom Nolasco

The Sun on December 20th. Bart did a nice job capturing this very interesting sunspot group through his, properly filtered, undriven, 4.5-inch f/15 Brashear refractor. Bart used a Pixel 4A phone camera and a 20mm Televue plossl eyepiece (afocal) to take the image. Meanwhile, Tom was using his Lunt 60mm solar telescope and ZWO ASI174 camera to image the chromosphere approximately 200 to 1500 miles above the sunspot group.



Photo Credit: Tom Nolasco

These images of Venus were captured using a 6 inch f/9 reflector and a ZWO ASI462 camera. They were taken on Dec. 20th when Venus was 11.8% illuminated and 52.7 seconds of arc and on Dec. 26th when Venus was 6.5% illuminated and 57.3 seconds of arc.



Photo Credit: Gary Trapuzzano

On December 13th Gary got to test his new ZWO ASI485MC camera when he attached it to his Tele Vue TV101 telescope and aimed at the 76% illuminated waxing gibbous moon. Gary stacked 450, 3 millisecond frames to obtain this excellent image.

January Photo Gallery (continued)

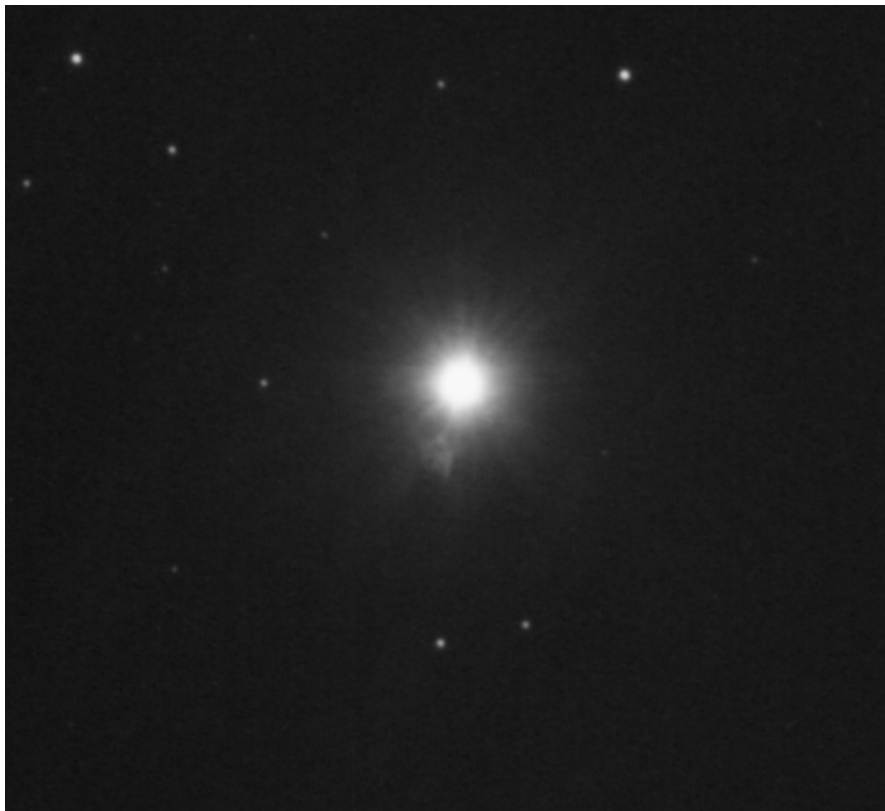


Photo Credit: Frank Colosimo

The Merope Nebula (NGC1435) is the most prominent nebula that can be seen in the Pleiades, but hidden within it is IC 349, a tiny 30" across reflection nebula, that was first detected by E.E. Bernard in 1890 using the Lick 36 inch refractor.

Frank did an excellent job capturing IC 349, found only 36" from bright star Merope, on Dec. 26th using his Edge 11 telescope from his Blue Mountain Vista Observatory. He used an ASI 1600mm camera and SharpCap software to stack 98 one second exposures to obtain this image.

Compare Frank's image with the one found on page 35 of the February *Sky & Telescope* magazine.



Photo Credit: Gary Trapuzzano

On December 12th, under bright moonlit skies, Gary captured this stunning portrait of M42, the Orion Nebula, using his ZWO ASI485MC camera and Tele Vue TV101 telescope. Gary captured 4 sets of data to obtain this high dynamic range image. Each dataset consisted of 20 frames and had sub exposure times of 30 secs, 15 secs, 7.5 secs and 2 secs. This final composite image is the dramatic result.

Don't Miss the January Monthly Meeting: January 21, 2022

"Discoveries in Radio Astronomy: Serendipity or Sweat?" Dr. Felix (Jay) Lockman, Principal Scientist for the Green Bank Telescope

"Discoveries in Radio Astronomy: Serendipity or Sweat?" Many famous discoveries in astronomy seem to have unexpectedly "fallen out of the sky" while others were clearly the product of years of hard, focused work. In this talk I'll examine a few discoveries in radio astronomy and ask: "Were they the result of lucky accidents (serendipity) or hard work (sweat)?" I'll discuss the early pioneers (Jansky, Reber), and some well-known discoveries (pulsars, the cosmic black-body radiation, the 21-cm line, fast radio bursts, dark matter ...) in light of this question.



Felix J. Lockman, Ph.D., is the Green Bank Telescope Principal Scientist at the Green Bank Observatory, a facility of the National Science Foundation. He did his undergraduate work at Drexel University and received his Ph.D. from the University of Massachusetts Amherst. Dr. Lockman's area of research is the structure and evolution of the Milky Way and nearby galaxies, with a special emphasis on radio observations of neutral hydrogen.

DVAA Virtual Meeting: January 21, 2021, 7:30 PM (sign-on starts at 7:00pm).

- DVAA Members via Zoom (check your email for the link)
- Members of the public can watch the livestream on [YouTube](#)

A New Item in DVAA Rentals



Own a DSLR camera with thoughts of astrophotography? We may be able to help. At DVAA Rentals, we now have an Ioptron Tracker in our inventory. As its name implies, this device allows your camera to track the stars as it takes long exposures; thereby eliminating star trailing. Trackers are light in weight, and compact; making them perfect for trips to dark sky locations.

The kit contains the tracker, a ball head, bracket to attach your camera, and tripod. Use of the tracker requires use of a free app for your cell phone.

All DVAA rentals are on a per month basis. For this item, and all other rentals; we request a \$10 donation to cover expenses. See Joe Lamb for details: rentals@dvaa.org

In Memoriam



Alan with the red Corvette that he loved

On November 27, 2021 at the age of 77 our dear friend and long time DVAA member Alan Daroff passed away losing his battle with Covid-19.

Everyone who had the pleasure of knowing Alan talks of how generous he was with his time and knowledge, always willing to help others. Alan was particularly interested in Solar astronomy and introduced and educated many in the club on the subject.

Whenever Alan stood up at a DVAA meeting you could be sure that he had something interesting to say.

Alan had a tremendous eye for details, and critiqued Bart Thorn's newsletter column "At Home With the Night Sky" along with *Sky and Telescope* magazine each month. He would often challenge the members to find the error on a particular page in *Sky and Telescope*. He will always be remembered for his astronomical brain-teasers which were always challenging, instructive and fun.

Alan was one of the good guys and will be dearly missed.

As a tribute to Alan, can you find any errors in the captions?



Alan and Jim Sweeney giving a presentation on Solar Astronomy during the DVAA Astronomy Fair meeting in July 2018. The event was organized by Jan Rush seen on the right.

Sic itur ad astra! ... thus one goes to the stars : such is the way to immortality.

DVAA Telescope Rentals

Celestron NexStar 5SE



Orion 6" Dossonian



DayStar 60mm Solar Scope



Ioptron Tracker



Orion 6" StarBlast Dobsonian



All scopes include tripod/base, eyepieces, manuals, power, etc. Rental is \$10/month with \$20 deposit. More info. at www.dvaa.org under the OBSERVING tab. To rent one of these scopes, contact Joe Lamb at rentals@dvaa.org.

The Delaware Valley Amateur Astronomers

Since 1976, the DVAA, a non-profit corporation, has **shared the wonder and science of astronomy** with thousands of amateur astronomers and the public in the Philadelphia area. Each month we host dark-sky and local star parties, telescope workshops, science & astronomy lectures, educational outreach sessions, and more. To learn more or to join DVAA, please visit www.dvaa.org.

Check the schedule for our **free monthly meetings open to the public**, usually held on Friday via Zoom.

get in on the fun:
JOIN the DVAA TODAY!

Dues are \$40 per year for an individual, \$60 for a Family Membership, or \$10 for a Junior or Student Membership. **Membership benefits** include our monthly newsletter, membership in the Astronomical League (including its publications), access to our dark-sky observing sites, and inexpensive rentals of fine telescopes. You can join or renew online at www.dvaa.org. If paying by mail, include a note stating what you are paying and membership category desired. Make checks payable to "DVAA" and send to our treasurer: Louis Berman, 477 Turner Avenue, Drexel Hill, PA 19026, or for more information contact treasurer@dvaa.org.

