Temecula Valley Astronomer

Temecula Valley Astronomers November 2022

Events: General Meeting, Monday, November 14, 2022, at the Ronald H. Roberts Temecula Library, Room B, 30600 Pauba Rd, and/or ZOOM, at 6:00 PM.

- **BOD Elections**
- **IFI & Gallery by Clark Williams**
- **"Astronomy on the High Seas" by Jonathon Ward**
- **Refreshments by Kathleen Hefley**
- **Star Parties at South Coast Winery every Friday evening in November.**
- **For upcoming school Star Parties check the Calendar on the web page.**

WHAT'S INSIDE THIS MONTH:

Send newsletter submissions to Paul Kreitz <pkreitz@sbcglobal.net> by the 20th of the month for the next month's issue.

A Space-X Falcon-9 rocket carrying 53 Starlink communications satellites was launched from Vandenburg Space Force Base on 10/27/2022, to generate streaks across astro photos for years to come.

General information:
Subscription to the TVA is included in the annual $25 membership (regular members) donation ($9 student; $35 family).

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Cosmic Comments – November 2022

By Mark Baker

It's at this time of year where I become retrospective of the last year of TVA activity in general…**knowing** that this will be my last year as Club President makes me even more pensive!!! I will, of course, continue to serve the Club, but after a decade plus at the helm, I'm sure I'll feel a little lost at first!!!!… And I would be remiss if I neglected to thank my Wonderful Wife, My Marvelous Malaysian, **Deborah C Baker**, for inspiring me these last several years… she has worked harder than anyone to keep us relevant in our communities and her growth in this field has been awesome!!!

This has been another great year… we resumed live meeting attendance while still supporting the virtual Zoom venue. TVA has become well known in our communities, both from an Outreach and Resource perspective. The ongoing Friday Nights Under Starlight events at South Coast Winery remain a huge hit for so many diverse demographics. Schools are starting to ramp up as well. We hope to always do more, always do better, and keep the focus on Looking Up…

I personally want to thank all of you that make these revolutions around the Sun so edifying and enjoyable…this "old dog" not only likes learning new "tricks", but actually does!!! Case in point is the Clubs acquisition of the Unistellar eVscope1… how fun has it been!!! All thanks to you…

So, as this November will bring change, it will also serve to reinforce the constant that TVA remains…and its contributions are ever increasing, ever improving, and ever inspiring.

Clear, Dark Skies my Friends

Looking Up Redux – November 2022

Compiled by Clark Williams
from these sources:
SeaSky.org
Wikipedia.com
in-the-sky.org
The American Meteor Society, Ltd.
cometwatch.co.uk
NASA.gov
TVA App (2.0.1296)
FullAndNewMoon App (2.0)
Starry Night Pro Plus 7 (7.6.3.1373)
SkySafari 6 Pro (6.1.1)
Stellarium (0.18.2)
timeanddate.com/astronomy
https://www.fourmilab.ch/earthview/pacalc.html

ALL TIMES ARE LOCAL PACIFIC TIME (PDT / PST) UNLESS NOTED OTHERWISE

Times are given in 24-hour time as: (hh is hours, mm minutes, ss seconds)
hh:mm:ss or hhmmss
hhmm+ (time of the next day)
hhmm− (time of the previous day)
hhmm (seconds not shown)
yyyymmddThhmmss (Full date as: year month day Time separator hours minutes seconds)

Moon Phases for the month by date:

Tuesday	**the 8th**	**@ 0303 FULL in ARIES**
Wednesday	**the 16th**	**@ 0528 THIRD QTR in LEO**
Wednesday	**the 23rd**	**@ 1458 NEW in SCORPIUS**
Wednesday	**the 30th**	**@0637 First QTR in AQUARIUS**

Apogee comes on 2022-10-17 @ **0322** **– 404,329 km (251,239 mi)**
Perigee comes on 2022-10-04 @ **1002** **– 369,334 km (229,494 mi)**
Perigee comes on 2022-10-29 @ **0749** **– 368,287 km (228,843 mi)**

2022 has: (13) new moons, (13) 1st Qtr moons, (12) Full moons, (12) 3rd Qtr moons
(0) Blue moon and (2) Black moons

Daylight Savings: Starts: 2022-Mar-13 : Ends: 2022-Nov-06

Luna: Luna is waxing gibbous on the first of the month, headed for Full on the 8th rising at **1428**, transiting at **1948** and setting by **0100+**. Luna by mid-month is again waxing gibbous at 56% illumination. Rising at 2153- and transiting at **0514** setting at 1229. By the-end-of-the-month Luna is at first quarter, rising at

1240 transiting at **1824** and setting by **0010+**.

Highlights: (distilled from**: SeaSky.org** and **Clark's planetary Orrey** program[s]**)**

November 4, 5 - Taurids Meteor Shower. The Taurids is a long-running minor meteor shower producing only about 5-10 meteors per hour. It is unusual in that it consists of two separate streams. The first is produced by dust grains left behind by Asteroid 2004 TG10. The second stream is produced by debris left behind by Comet 2P Encke. The shower runs annually from September 7 to December 10. It peaks this year on the night of November 4. This year the nearly full moon will block out all but the brightest meteors. But if you are patient, you may still be able to catch a few good ones. Best viewing will be just after midnight from a dark location far away from city lights. Meteors will radiate from the constellation Taurus, but can appear anywhere in the sky.

November 8 - Full Moon. The Moon will be located on the opposite side of the Earth as the Sun and its face will be fully illuminated. This phase occurs at 0303. This full moon was known by early Native American tribes as the Beaver Moon because this was the time of year to set the beaver traps before the swamps and rivers froze. It has also been known as the Frosty Moon and the Dark Moon.

November 8 - Total Lunar Eclipse. A total lunar eclipse occurs when the Moon passes completely through the Earth's dark shadow, or umbra. During this type of eclipse, the Moon will gradually get darker and then take on a rusty or blood red color. The eclipse will be visible throughout eastern Russia, Japan, Australia, the Pacific Ocean, and parts of western and central North America. (NASA Map and Eclipse Information)

November 9 - Uranus at Opposition. The blue-green planet will be at its closest approach to Earth and its face will be fully illuminated by the Sun. It will be brighter than any other time of the year and will be visible all night long. This is the best time to view Uranus. Due to its distance, it will only appear as a tiny blue-green dot in all but the most powerful telescopes.

November 17, 18 - Leonids Meteor Shower. The Leonids is an average shower, producing an average of up to 15 meteors per hour at its peak. This shower is unique in that it has a cyclonic peak about every 33 years where hundreds of meteors per hour can be seen. That last of these occurred in 2001. The Leonids is produced by dust grains left behind by comet Tempel-Tuttle, which was discovered in 1865. The shower runs annually from November 6-30. It peaks this year on the night of the 17th and morning of the 18th. The second quarter moon will block many of the fainter meteors this year. But the Leonids can be unpredictable so there is still potential for a good show. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Leo, but can appear anywhere in the sky.

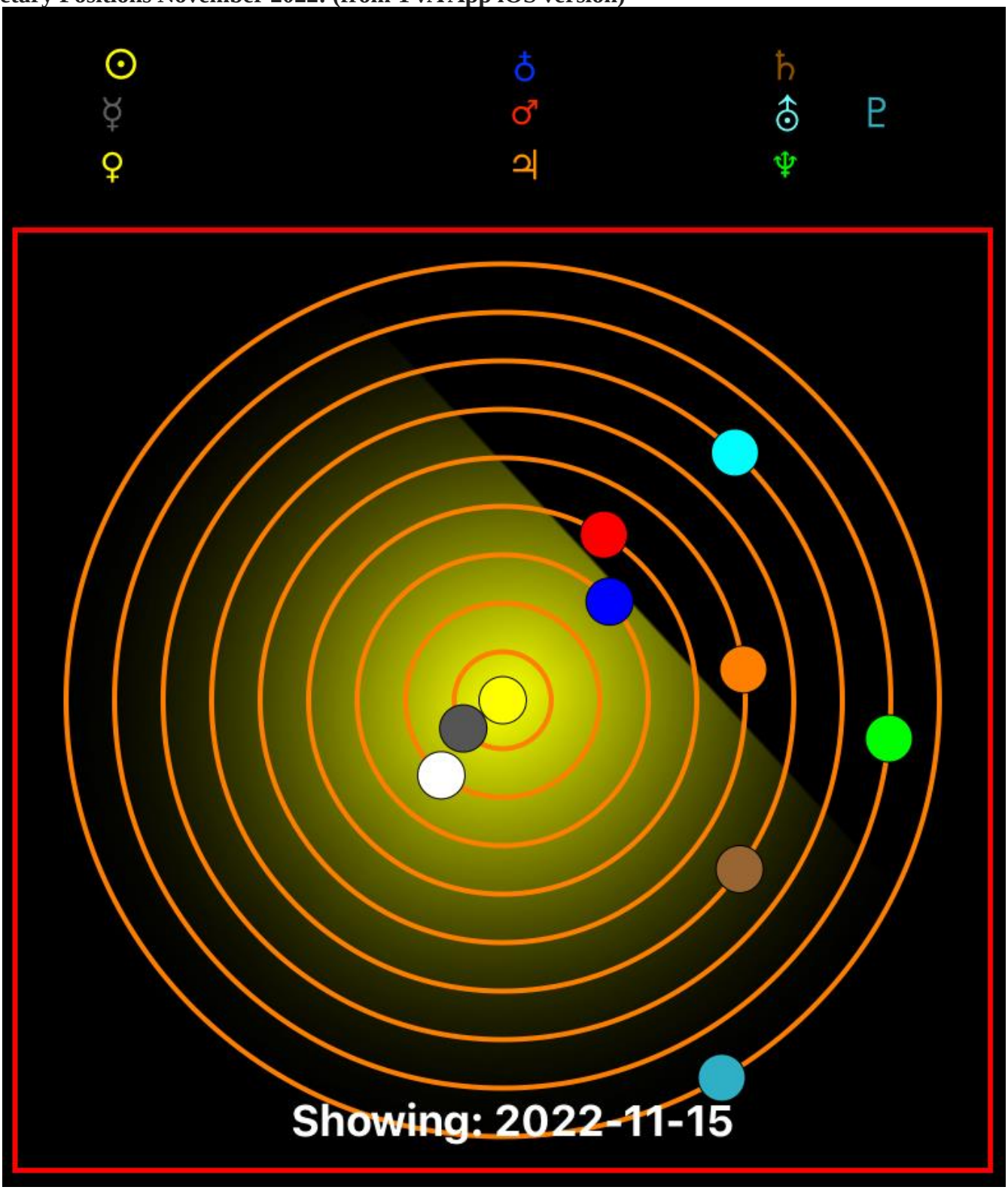
November 23 - New Moon. The Moon will be located on the same side of the Earth as the Sun and will not be visible in the night sky. This phase occurs at 1458. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

Algol minima: (All times Pacific Time)

11/02/2022	**0331**
11/05/2022	**1220**
11/08/2022	**0909**
11/11/2022	**0558**
11/14/2022	**0247**
11/16/2022	**2336**
11/19/2022	**2025**
11/22/2022	**1714**
11/25/2022	**1403**
11/28/2022	**1052**

Planets:

Planetary Positions November 2022: (from TVA App iOS version)



- **Mercury:** Mercury is a morning object in the beginning of the month. It is illuminated at 99% and -1.17 apparent magnitude. Mercury rises at **0645** with the sun following at **0706**. Mercury transits at **1216** and sets at **1747**. This is risky viewing of Mercury and you may want to wait for a better time to view this elusive planet. Mercury by mid-month has slipped behind the sun and become an evening object rising at **0641**, transiting at **1149** and setting at **1657**. Mercury is still very close to the sun and not worth the damage to your eyes or equipment. By the 30th Mercury rises at **0736** and sets at **1722**.
- **Venus:** Is the evening star on the first of the month, rising by **0718**, with sunrise at **0706**. Venus is pacing the sun. By mid-month Venus is rising at **0649.** Sunset is at **1647** and Venus sets at **1707**. By the 30th Venus is rising at **0720**. Sunset is at **1642** followed by Venus setting at **1717**.
- **Mars:** Mars is back in the sky and growing brighter as an evening object. On the first of the month Mars is rising at **2030** and setting at **1056+**. By mid-month Mars is perfect for practicing your imaging. Rising at **1824**, transiting at **0138+** and setting at **0852+**. End-of-month finds the Warrior rising at **1703** transiting at **0018+** and setting at **0733+**.
- **Jupiter:** Jupiter is an evening object on the first of the month rising at **1605**, transiting at **2204**. and setting at **0403+**. By mid-month Jove is rising at **1408**, transiting at **2006 and setting at 0204+**. Come the end-of-month Jupiter is peaking above the horizon by **1308**, transiting at **1907** and setting at **0105+**.
- **Saturn:** Saturn rises at **1411** on the 1st. Saturn transits at **1929** and doesn't set until **0047+**. Saturn by mid month rises at **1217** and transits at **1736** and sets at **2254**. By the end-of-the-month Saturn is easily visible by **1730**. Saturn sets at **2159**.
- **Uranus:** On the first of the month Uranus is an evening object rising at **1812**, transiting at **0102+**. By the ides Uranus is rising at **1616** and transiting at **2304**. End-of-month finds Uranus rising at **1515**. and transiting at 2203. This month is a good time to try your hand at imaging Uranus.
- **Neptune:** Neptune should be visible by **1900** in the beginning of the month. Neptune transits at **2139**. By the 15th Neptune should be visible by about **1830**. Neptune transits at **1943**. By the end of the month Neptune transits at **1844** and sets at **0036+**.
- **Pluto:** Pluto on the first of the month won't be truly visible until it is ready to set and by then it will be too low on the horizon. The first quarter moon will interfere with viewing as well. By mid-month nothing has changed and Pluto is virtually invisible. By the 30th Pluto is not visible because of the sun and the Last Quarter moon.

Asteroids:

- Still a dearth of asteroids. I searched for asteroids in 2022 with a reasonable magnitude; say less than or equal to +10 in November there is nothing except the regulars: Juno, Vesta. Hebe, Eros and Herculina. So consult your local planetarium software or try: **https://www.asteroids near.com/year?year=2022**
- There is one asteroid you might try finding and/or imaging this month: (216) Kleopatra asteroid in Pegasus Visual Magnitude is +9.9. Its size is only 0.1 arcsecond. It is 99.5% illuminated on the 15th at 2100. Rising 1727, transiting at 0003+ and not setting until 0634+.

Meteors:

- Taurids Meteor Shower. (see Highlights November 4, 5 above)
- Leonids Meteor Shower. (see Highlights November 17, 18 above)

Comets: come in various classifications:

- 1) Short Period comets – further broken down into:
  - Halley Type: The Halley Types are believed to come from the Kuiper Belt and have periods in

excess of 20-years.
- Jupiter Type: The Jupiter types have a period less than or equal to 20-years.
- Short period comets have a near circular orbit or an elliptical orbit. The latter being far more common.

◦ 2) Long Period comets – thought to originate from the Oort cloud these comets have periods of over 200 years and have random inclinations around the celestial sphere.

Two comets of interest this month.

1. Comet **C/2020 V2 (ZTF)**., a comet in **URSA MAJOR**, visual magnitude +11.7 on the 15th of November 2022 at **2100**. It does not rise and does not set. It reaches opposition on Saturday December 24th 2022
2. Comet C/2021 Y1 (ATLAS), a comet in **TAURUS** visual magnitude +12.8 on the 15th of November 2022 at **2100**. It rises at 1757, transits at 0056+ and sets at 0750+. It reaches opposition on Saturday November 26th at 1806.

Deep Sky:

Notes:

L/Z abbreviation for ALT/AZ
R/D abbreviation for Right Ascension/Declination
α is right ascension
δ is declination
In each case, unless otherwise noted, you should look for the following on or about the 15th Day of November 2022 at 2100 PDT and you will have about 20 minutes of viewing time total.

Let's take a look at some favorite objects (at least for me):

Illustration 1: By Hewholooks - Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=5060526

- Algol**:**

  Algol /ˈælgɒl/, designated Beta Persei (β Persei, abbreviated Beta Per, β Per), known colloquially as the Demon Star, is a bright multiple star in the constellation of Perseus and one of the first non-nova variable stars to be discovered.

  Algol is a three-star system, consisting of Beta Persei Aa1, Aa2, and Ab – in which the hot luminous primary β Persei Aa1 and the larger, but cooler and fainter, β Persei Aa2 regularly pass in front of each other, causing eclipses. Thus Algol's magnitude is usually near-constant at 2.1, but regularly dips to 3.4 every 2.86 days during the roughly 10-hour-long partial eclipses. The secondary eclipse when the brighter primary star occults the fainter secondary is very shallow and can only be detected photoelectrically.

Algol gives its name to its class of eclipsing variable, known as Algol variables. (Wikipedia)

- **The Ring Nebula:**

Illustration 2: By Judy Schmidt - Flickr: NGC 7662 "Blue Snowball", CC BY 2.0, https://commons.wikimedia.org/w/index.php?curid=31290182

NGC 7662 (also known as the Blue Snowball Nebula, Snowball Nebula, and Caldwell 22) is a planetary nebula located in the constellation Andromeda.

NGC 7662 is a popular planetary nebula for casual observers. A small telescope will reveal a star-like object with slight nebulosity. A 6" telescope with a magnification around 100x will reveal a slightly bluish disk, while telescopes with a primary mirror at least 16" in diameter may reveal slight color and brightness variations in the interior.

The central star of the planetary nebula is an O-type star with a spectral type of O(H). (Wikipedia)

November is great for both viewing and imaging. Spend some time outside with your scope. Fall is here.

For now – Keep looking up.

RANDOM THOUGHT

By Chuck Dyson

PRACTICAL OBSERVING

Before getting into this month's topic I need to take a little time out to tell you about an encounter that I just had with one of my neighbors. This neighbor apparently read online or in the paper, (yes us senior citizens still read newspapers), that Jupiter was at opposition and closer to Earth than it would be for another seventy years or so. Armed with this information my neighbor approached me and, breathlessly, asked "Did you get out your microscope last night and look at juniper?". Understanding the meaning of the question I opted not to correct the close but not entirely accurate choice of words and instead, with a grin, just said "Yes".

Sitting on top of a storage cabinet in my garage is a wonderful 91/4 inch Celestron scope. In my younger days that scope, a heavy mount, and a large container of accessories all observed from my backyard and once or twice a month we went everywhere to observe from dark sites. Now that I am older, I am loath to transport, setup, and calibrate such heavy equipment before observing. In addition, with TVA we did, before Covid, frequent observing sessions in school yards and by the time I set-up and had enough stars out to calibrate the equatorial mount the students were going home. With this set-up the students didn't actually get to see anything, but they learned how to calibrate a GOTO mount.

I made the decision to assemble one or two grab-and-go setups for my evolving astronomy lifestyle. My first decision was to rule out, completely, astrophotography. Not that astrophotography is a bad thing, but the ideal equipment required for good photos versus equipment needed for a good viewing experience are quite different. The human eye can process images at a rate of 30 to 60 frames per second and that's just how long your eye takes to grab the image, process it, and ship it out to the visual cortex in your brain. Replace the eyepiece with a CMOS camera and you can easily go to thirty minutes; however, if your lens does not focus all of the wavelengths to the exact same point or if the wind blows your mount or if your tracking drifts over time, instead of a great shot of a nebula you get something Hollywood would be tempted to use as the model for their next space monster. For visual observing I don't mind a little purple around the objects I am observing and if the mount shakes a bit, well, it will settle down within two to five seconds and when, not if, the object drifts I just recenter it and go on with my viewing.

The second decision I need to make is "What telescope should I get?" I breakdown my grab-and-go travels into three categories. First, to the back or front yard of my house. Second, transport by car to anywhere. The farthest I have transported optical equipment by car was to Omaha Nebraska to see an eclipse and it is surprising how much equipment you can get into the back of a SUV and still have plenty of room for your suitcases. Third, transport to observing location by boat or plane. Traveling by boat can be a lot like a SUV/hotel experience except that living in a small ship's cabin and tripping over telescopes and tripods can be an interesting/awkward/maddening experience. You choose.

Traveling by plane and assuming that you are like me, terrified of committing your telescope to the luggage compartment of the plane, you will need to know three numbers: 22-14-8, that is the maximum external length, height, and width of a case in inches for carry-on luggage in U.S. airlines. Sizes can vary with non-domestic carriers and, yes, getting optical equipment through security and back through customs can get interesting. If you decide to go big with your observing equipment it can get expensive, I paid

FedEx $400 one way to ship my favorite refractor to Hawaii. Assuming you want to go the carry-on route that limits you to a 5 inch Schmidt Cassegrain or a 4 inch short focus refractor as your biggest scope. These are actually not bad sizes for grab-and-go scopes for the other two scenarios. When scopes get much bigger than this I start calling them grab-and-groan because they and their associated equipment get heavy quickly.

80mm refractors, if we are to be honest, are the cockroaches of the refractors. They are not bad or disgusting scopes but rather just a darn good and practical scope to have and use and this means that manufacturers produce a variety of flavors of them in large numbers, just like cockroaches. At this time I have both a 80mm and a 90mm refractor that I use for my grab-and-go viewing. They are both good but the 90mm gets just a little more light and shows just a few more stars in the open clusters viewed from my back yard. Having both a 80mm and a 90mm scope is aperture fever at work but is held in check by the airline carry on rules and my personal need when viewing from my back yard to pick up the scope and move it to the optimum viewing spot. I have many neighbors with many lights. I also have a 114mm f5.3 refractor that is very nice for visual viewing but does not lend itself to pick up and reposition viewing in the backyard. So, there is a definite, sharp limit to the max size of a grab-and-go scope.

My 127mm and 152mm refractors are definitely setup and do not even think of moving scopes. Depending on how convenient you want your travel scope to be a 60mm to 76mm scope may be for you because the smaller the scope is the easier it is to transport. I also have a 127mm Schmidt-Cassegrain that is used from time to time as a grab-and -go scope and it does a wonderful job of showing off just about any object that you would want to look at. I do not own and have not looked through a 102mm Schmidt-Cassegrain but that also should be a reasonable grab-and-go scope.

I like Schmidt-Cassegrain scopes better than Maksutov because the Schmidt has just l little shorter focal length and lets me see just a little more of the sky. Whether in my back yard or traveling I tend to use my grab-and-go setups to view objects other than planets. This favors the Schmidt as the Mak tends to be a planet and, to be fair, globular cluster, viewing machine. I do most of my planetary viewing from my backyard and view the fainter extended objects out of town. This pattern of viewing puts a premium on scopes with the widest field of view. If your viewing pattern differs from this your scope design priority may differ from mine. Finally, Newtonians, great viewing machines not so great traveling machines. Short gentle car trips with Newtonians are reasonable but long bumpy trips almost always results in the need for recollimation. I have restored and traveled with an Odyssey 13.1 dob and two ten inch dobs and I must say that my attitude today is that I do not hate them I just do not want to travel with them and hold frequent collimation parties.

Now that we have some idea of the telescope or telescopes, we will be using, it's time to think about our mount. At this time I am using two different photo tripods. One is a three section tripod and the other is a four section tripod. Both reach a height of around 70 inches and can support an 11 pound load. The three section tripod is more stable than the four section one but the four section one will fit inside of my suitcase, with the video head on, where the three section one will not. Both tripods work with my fluid video head that has a quick release balance plate that allows me to balance either my telescope or my tripod mounted binoculars so that they do not want to look at the floor or zenith all of the time. Balancing your optical equipment on the tripod head is key to a happy versus a frustrating viewing experience. Because I use the tripod for binocular viewing as well as telescope viewing, I need tripods that, with a center post extension, will reach 70 inches or more. If you never intend to use your tripod setup for

binocular viewing, you can eliminate the center post extension and save some money and get a sturdier platform to use for viewing. The vast majority of video heads have friction clutches and a tiller handle to move them. Although this setup provides smooth motion really fine adjustments are not possible. Therefore, with this setup I limit my maximum magnification to 100 or110X because beyond this I have difficulty tracking the objects drift. If you simply must have more magnification than 100X from your grab-and-go rig, then you need to go to an altitude-azimuth (alt-az) mount on a regular astronomy tripod. Most of these alt-az mounts have slow motion controls and in my experience (I have owned two different alt-az mounts) perform well when the scope magnification is pushed to 140X. In my viewing experience few are the nights when the seeing permits magnification greater than 140X without the image becoming soft and mushy. My favorite alt-az mount was the Vixen Porta II mount but after "only" 25 years of constant use the head just gave out.

The final grab-and-go conundrum that we will look at is the age old questions "How many eyepieces should I take?" Personally, I have always felt, when it comes to eyepieces, that 300 is a nice round number and should give you a selection of eyepieces that will just about cover every conceivable viewing situation. 300 eyepieces do turn out to be a giant suitcase weighing in at well over one hundred pounds, it looks like we will need to do some judicious and difficult pruning of our traveling eyepiece set. In order to construct a reasonable eyepiece set we need to have a simple understanding of our eyes and do just a little math. Our telescope will be my 90mm diameter refractor with a focal length of 500mm. First the eyes; at over 75 years of age, I know my eyes do not dilate to more than 5mm under the darkest of skies. For my lowest magnification eyepiece I want one that presents a 5mm cone of light to my eye. You get the cone of light that comes to your eye from any optical instrument by dividing the magnification produced by the diameter of the telescope's main lens, or to get our minimum practical magnification we just divide the telescope lens diameter by our cone of light diameter. For our example that is 90÷5= 18; so 18X is the minimum practical magnification for this setup. Being math lazy I will go to a minimum magnification of 20X. To get the focal length of the eyepiece that will give me 20X I just divide the focal length of our telescope,500mm, by our magnification of 20X or 500÷20= 25mm. Our optimal low power eyepiece is a 25mm one. Next for our highest power eyepiece for normal viewing, for planets and double stars we can exceed this magnification. I know that if the cone of light is less than 1mm then I will have a very difficult time seeing anything. This one is easy because 90mm divided by 1mm is 90 and then we just divide 500 by 90 and we get, almost, 5.5 and I just happen to have an eyepiece that has a 5.5mm focal length. A word or two of caution: some types of eyepieces (Plossl and Kellner) can have very short eye relief, the distance from the eye lens your eye must be to see the object being viewed, and if you wear glasses you will need 14mm of eye relief.

Now that we have the lowest power and the highest power eyepieces all we need to do is fill in the middle. For me, I like to utilize five eyepieces in my grab-and-go setup and this gives me a high power, a medium high power, a medium power, a medium low power, and my low power selection. I find that this combination produces a satisfactory viewing experience on almost all objects and sky conditions. With my tripod, small scope, five eyepieces, a red light, and some star charts I am ready to view from home or down the road, assuming I can afford to put gas in the car, in minutes. Remember "Keep it simple, use it more".

CHEERS, CHUCK

Another Look November, 2022

By Dave Phelps

On November 8th, the full Beaver Moon with undergo the last eclipse of 2022. In the Pacific Time Zone, the eclipse will start for us (penumbral) at 0002 hrs. Totality is at 0259 hrs and eclipse end at 0556, almost 6 hours of eclipse.

Other names for the November moon are Digging/Scratching Moon, Freezing Moon, Frost Moon and Whitefish Moon. Celtic and Old English names are Mothers' Moon, Bright Moon, Hare Moon, and Grass Moon. New moons for November are Oct. 25 and Nov. 25.

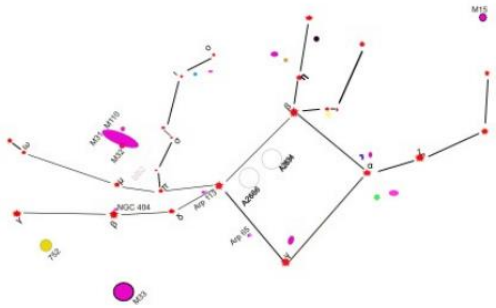
It has been my honor over my lifetime to have had associations with some astronomy Titans. Msgr. Ronald Royer has spent a lifetime developing new astrophoto techniques, chasing total solar eclipses and making thousands of variable star observations as a senior member of the AAVSO.

Leslie Peltier, the sine non qua, also contributed thousands of variable star observations from his famous “Merry-Go-Round” observatory. I have spent many nights at the 18” telescope at Ford Observatory of Mr. Peltier outside Wrightwood, now under the aegis of the Los Angeles club.

One of my proudest possessions is a little blue postcard with the picture of a slightly tubby man looking up through a telescope. Walter Scott Houston wrote a deep sky column for Sky and Telescope for 46 years. I met Twinky years ago at a meeting of the Riverside Astronomers. He was a delightful person. Why the postcard? He wrote me to tell me how much he enjoyed my column on Barnard’s ring that I wrote for the PVAA’S Nightwatch.

It was typical of Walter to challenge his readers in his “Deep Sky Wonders” column. Someone always responded and Walter would include them in later articles. Two of his challenges were about globular clusters around M31 and counting naked eye stars in the square of Pegasus.

“Within the area of this Square Argelander counted only about 30 naked-eye stars, but in the clearer sky of Athens Schmidt saw 102.” Star Names and their Meaning, 1899, **Richard H. Allen**



Pegasus

"The poetic steed With beamy mane, whose hoof struck out from earth” The fount of Hippocrene. **Bryant**

I have never taken up the challenge to count stars in the square of Pegasus. Houston cites several accounts from his correspondents. In one a correspondent reports 38 stars, in another, a correspondent took special care in his preparations and reported seeing down to magnitude 8.3. Perhaps even more stunning, he writes that there are 100 deep sky objects within reach of the larger amateur telescope within the square. Sadly, Scotty isn’t here for our revolution in astrophotography, but I am sure he would appreciate the instrumentation and techniques in use today.

An interesting place to start this month is two degrees south of Alpheratz, Alpha α Andromedae, is

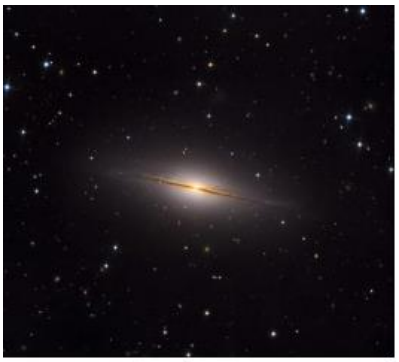
NGC 1. You will need a 12" or larger scope to see detail on N1; it is a face on 13th magnitude spiral. I've never looked for it, but the images show faint spiral arms and a brighter nucleus. NGC 7840, the last item in the NGC catalogue is just over the boundary into Pisces about 20 degrees further south. Houston, using the references he had at the day, decided that NGC 7840 was an error, and that NGC 7839 was a faint >15th galaxy. Current references name NGC 7839 as a double star.

We have one Messier, three Caldwell objects, one Arp object, and a couple of galaxies Burnham thought we should look at in Pegasus. We also have two Abell clusters and a slew of double and multiple stars in Pegasus.

Up near the top of the square are two Abell galaxy clusters: Abell 2666 and Abell 2634. The clusters are far flung and it's not easy to pick out individual members, though each has an anchor galaxy that we can find. Abell 2634 has NGC 7720. N7720 is a 12th magnitude elliptical with a very close background galaxy giving it a double appearance. Abell 2666 also has a large elliptical, NGC 7768, also 12th magnitude with a scattering of smaller galaxies around it. Images you can use as finders can be found on the internet. APOD has a particularly nice Abell 2666 in March, 2017 and Simbad has a terrific NGC 7720 with scattered galaxies all around.

George Abell has two catalogues named after him. He used the Palomar Sky Survey plates to identify galaxy clusters of a particular size and red shift. His later catalogue is of planetary nebula and was also compiled from the Palomar plates with additions from his own and other's observations.

NGC7814 is also number 43 on the Caldwell list. It looks like the Sombrero, though not as bright at 11th magnitude. You can find it in the left hand corner of the square about 2 degrees from Algenib, Gamma, γ, meaning a wing tip. It has decent dimensions, 5' across and half that thick.



Adam Block/Mount Lemmon SkyCenter/University of Arizona,

Move next to the other side of the square to Alpha, α, Markab, meaning Saddle. At 2.5 degrees, a medium Telrad circle from Markab, you will find NGC 7448, a rather small tilted spiral odd enough to find a itself #13 in Arp's catalogue. Its bright at 11th magnitude, but wonder of wonders it is right next to a cluster of galaxies, of 12th and 13th magnitude, dominated by NGC 7463. You may also be able to put NGC 7464 and NGC 7465 in the same field. N7463 was named a galaxy of the month. Go to the Webb Deep Sky page for a finder chart.

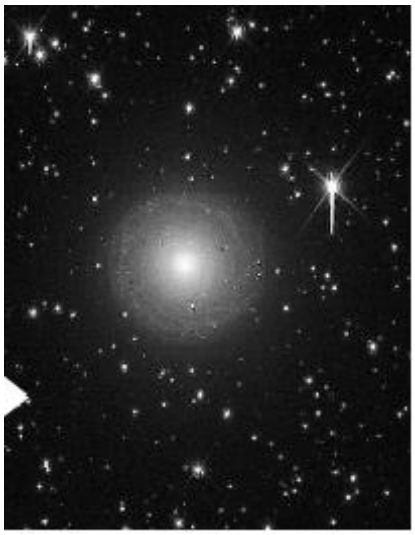
Sloan Digital Sky Survey

NGC 7479 is also number 44 on the Caldwell list. It's 11th, almost 12th magnitude with wild sweeping arms and a frenetic nucleus. It is also just a degree away from Palomar 13, 13th magnitude and a real ghost.

NGC 7448

Look up the APOD 2003 Christmas image of Pal 13. That bright star is 7th or 8th magnitude so it would be easily visible in your finder.

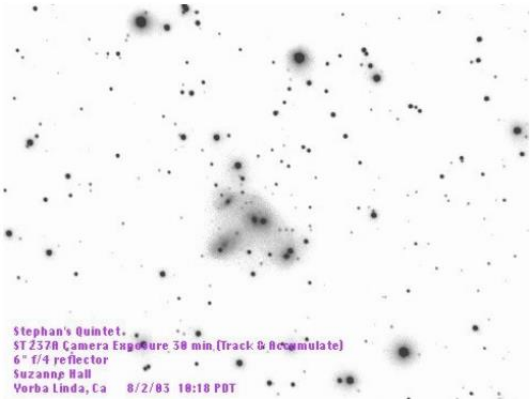
Up by the left knee of Pegasus are several deep sky objects made famous over the years. Start by finding Eta η Pegasi. Before you head up to NGC 7331 and Stephan's Quintet, move to your east and look for NGC 7217. It is at 11th magnitude, but it is such a tightly wound spiral you probably won't see a trace of the arms. Check out the image taken by OCA astronomer Chuck Edmonds back in 2005 as an example of what I mean.



https://ocastronomers.org/user_images/ngc-7217/

West of Chuck Edmonds's beautiful image of NGC 7217 is the NGC 7331 group including (probably) Stephan's Quintet consisting of NGC 7317 through NGC 7320. NGC 7318 is an A and B which brings the count up to 5.

This awesome image of Arp 213/Stephan's Quintet was taken by Suzanne Hall of the OCA back in 2003. I massaged the image slightly to bring out the nebulosity around the galaxies.



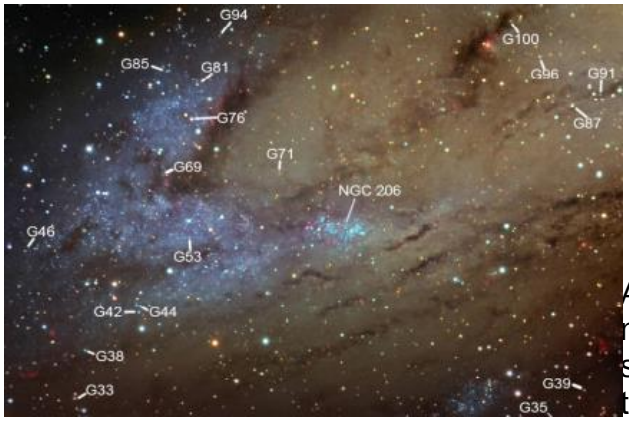
The image of NGC 7331 and its companion galaxies NGC's 7337, 7335 and 7340 can be found it the OCA gallery. It was taken on November 26, 2013 and is unattributed.

M15 is awesome. It is almost visible to the naked eye, it's 6th magnitude and a fuzzy star in your 7x50's, pretty decent in your 4" APO, and blows out in a13.1 Dob. Scientifically Its a beast. That bright nucleus is a collapsed core of thousands of stars. It has blue new stars, golden older stars and a planetary nebula. Checkout the Hubble link then go look at it in your eyepiece.

http://www.spacetelescope.org/images/heic1321a/

Sidney Hall - Urania's Mirror - Pegasus and Equuleus

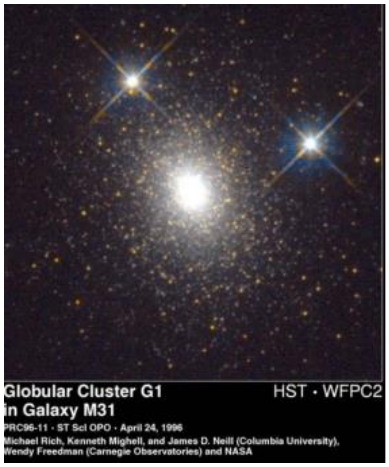
This image of M31, M32, m110 and NGC 206 was taken last month at the Dark Sky Festival in JoshuaTree by Rick (Speedy) Gonzalez. Rick is a member of the Temecula ValleyAstronomers and is, as you see, a very accomplished amateur astrophotographer.



https://skyandtelescope.org/online-gallery/globular-clusters-in-m31/

Another query that seemed to interest Scotty was the number of globular clusters around M31 that could be seen visually. He had correspondents who were able to identify a couple with instruments as small as a 6" Newtonian. One gentleman with a 12.5" homemade Newtonian was able to observe all 15 that had been cataloged at that time.

Early last century Edwin Hubble and Walter Baade compiled a catalog of 250 possible globular clusters around M31. The suspects were cataloged with HB numbers. Now the globulars are simply noted with a G(#) and a magnitude. There are plenty of web pages that will show the location of M31 globulars. A good one to start with is the link to: Imgur: The magic of the Internet. Also check out Cosmic Challenge: Globular clusters in M31 - Phil Harrington's Cosmic Challenge - Articles - Articles - Cloudy Nights.

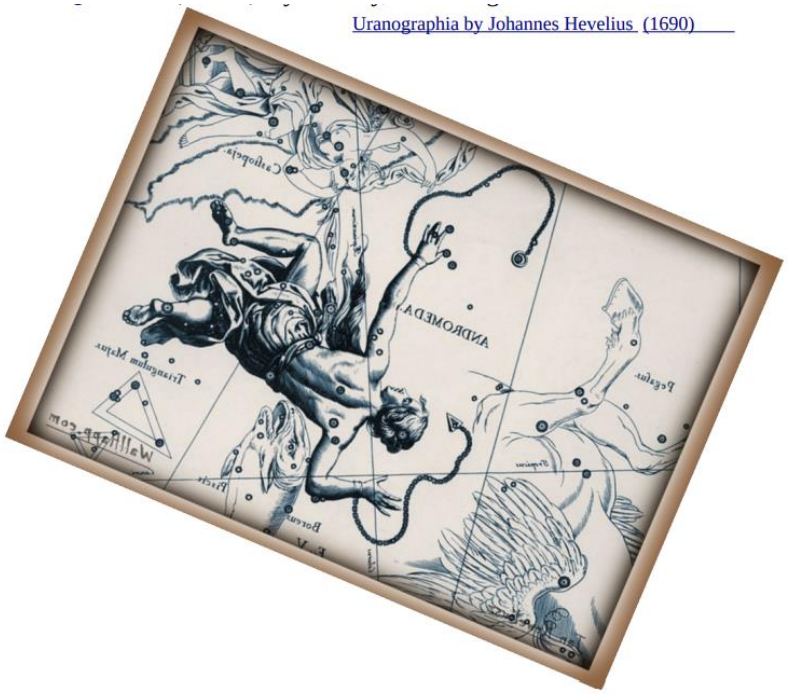


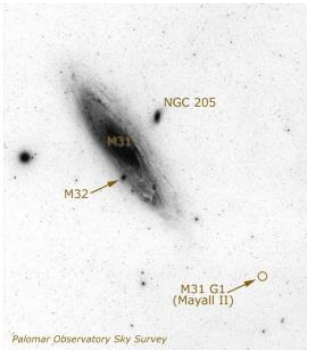
I don't know what list Scotty was using back in the 70's. I could not find any reference to a HB catalog. There are dozens of globulars that are a part of the M31 gravity sink, some dwarf galaxies are even as far as Cassiopeia; the most famous of which is M110. Two dwarf galaxies that are worth looking for are just across the boundary into Cassiopeia. NGC 147 Caldwell 17 and NGC 185 Caldwell 18 are two

10th magnitude dwarf galaxies orbiting M31. Another good reference to extra-galactic clusters is the Sky and Telescope link: https://skyandtelescope.org/sky-and-telescope-magazine/extragalactic-globular-clusters/

I have never looked for G1, NGC 224-G1, also known as Mayall II. It is the brightest of the extra-galactic clusters and the first found by Nicholas Mayall and O.J. Eggen in 1953 off of a plate from the Schmidt.

Your 8" can find it but probably as a fuzzy dot. The specs tell us that the 14" can resolve .33". G1 is .28" so your everyday 14" Schmidt-Cass should spread it out a bit. Steve Gottlieb of Sky and Tel has compiled an Excel spreadsheet of the 75 brightest M31 globulars. You will find it at M31GCBrightest75.xls (live.com), By the way, Gottlieb gives a dimension of 36" to G1.





(Hevelius' Andromedae has been manipulated to mimic correct sky orientation)

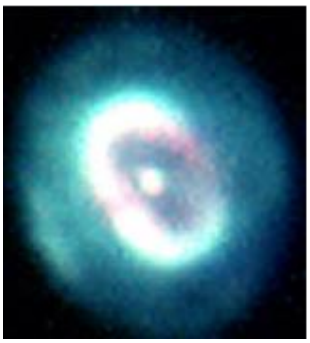
Sobiescianum hi-res stock photographand images - Alamy (1690)

Another astronomy hero of mine, a friend, is Joe Neu. Joe lives up in Idyllwild and has been an amateur astronomer his whole life. Joe worked for Coulter Instruments up until the founder, Jim Jacobson died. Joe's favorite galaxy is NGC 4565, a spectacular edge on galaxy in Coma Berenices. We have our own beautiful edge-on galaxy in Andromeda. Its NGC 891 and Caldwell 23. Its 10th magnitude and almost 14 minutes-of-arc long. Chuck Edmonds & Bill Hall have both produced excellent images of NGC 891. Control-Click on their name to be taken to the OCA website.

Our other Caldwell object is NGC 752, Caldwell 28. It is a big sprinkling of bright stars, some naked eye bright. It's an old cluster, easily seen with you 7x50's. Using your binoculars are good. When I pointed the 17 at it it blew right through it.

There is a fun galaxy to look for next in the same neighborhood. Go to second magnitude Beta β Andromedae, Mirach, which means the Girdle. Easily making the same field as β is NGC 404, an 11th magnitude face on spiral that can be difficult unless you move β out of your eyepiece. Its fairly big, almost 4x4 minutes. Take your time, I would like to see any image you take.

You are going to enjoy NGC's 752, 892 and 404. Starting at β and moving along the left to Gamma γ Andromedae, Almach, Arabian for desert lynx. γ is a beautiful, bright double star of golden and blue colors. It is not that far from Alberio, so you can check them out together. γB, the smaller, blue companion is also a multiple star system with a 5th and 6th companions and even a couple orbiting γC2. This is also interesting because Almach is your finder for NGC752 and NGC891. While in the area you can slip across the boundary line into Perseus and find M34, another open star cluster with interesting components. I remember two bright stars shining out of its middle.

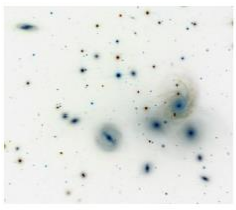


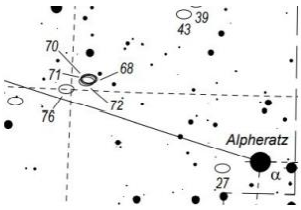
On the other hand, the left hand of the "Hevelius" Andromedae is defined by the naked eye stars ι Iota, κ Kappa, λ Lamba and, ο Omicron. Three of which can be seen on the Hevelius rendering. These stars are your finder for NGC 7662, Caldwell 22 and nicknamed the Blue Snowball, its 8th magnitude, but tiny in your smaller telescope, belying its nickname. This image was taken by another OCA astrophotographer, Arnie Roser. Copy and paste his address to find his image or just Ctrl-Click on the hyperlink. https://ocastronomers.org/wp-content/uploads/2019/01/n7662-01.jpg

While up near the hand of Andromeda, follow the line made by kappa and lamba to NGC 7686, another open cluster punctuated by a bright 6th magnitude star shining from the middle and several 9th(?) magnitude stars framing the cluster.

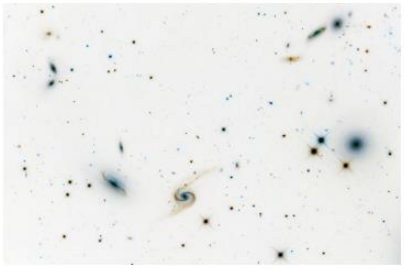
Harlan Arp (d. 2013) compiled the Atlas of Peculiar Galaxies, a catalog of unusual galaxies. He was trying to provide other astronomers with images that would help them study galaxies and their evolution. The atlas is especially useful when looking at odd and interacting galaxies, like the two examples in Andromeda.

Arp 113 is the NGC 68 group close to Alpheratz on the line to delta δ. NGC 68 is the anchor to Arp 113. It's 12th magnitude while N70 thru 76 fall into the 13th magnitude. NGC 68 is the elliptical at the bottom right of the group. NGC 70 is the spiral above it and the third member if the triangle is NGC 71.





Arp 65 is the NGC 90 group located in the Pisces, Pegasus, Andromeda corner south of Alpheratz. It is anchored by 13th magnitude NGC 90 and the companions range 13th magnitude and lower. NGC 90 is the spiral at the bottom of the image.

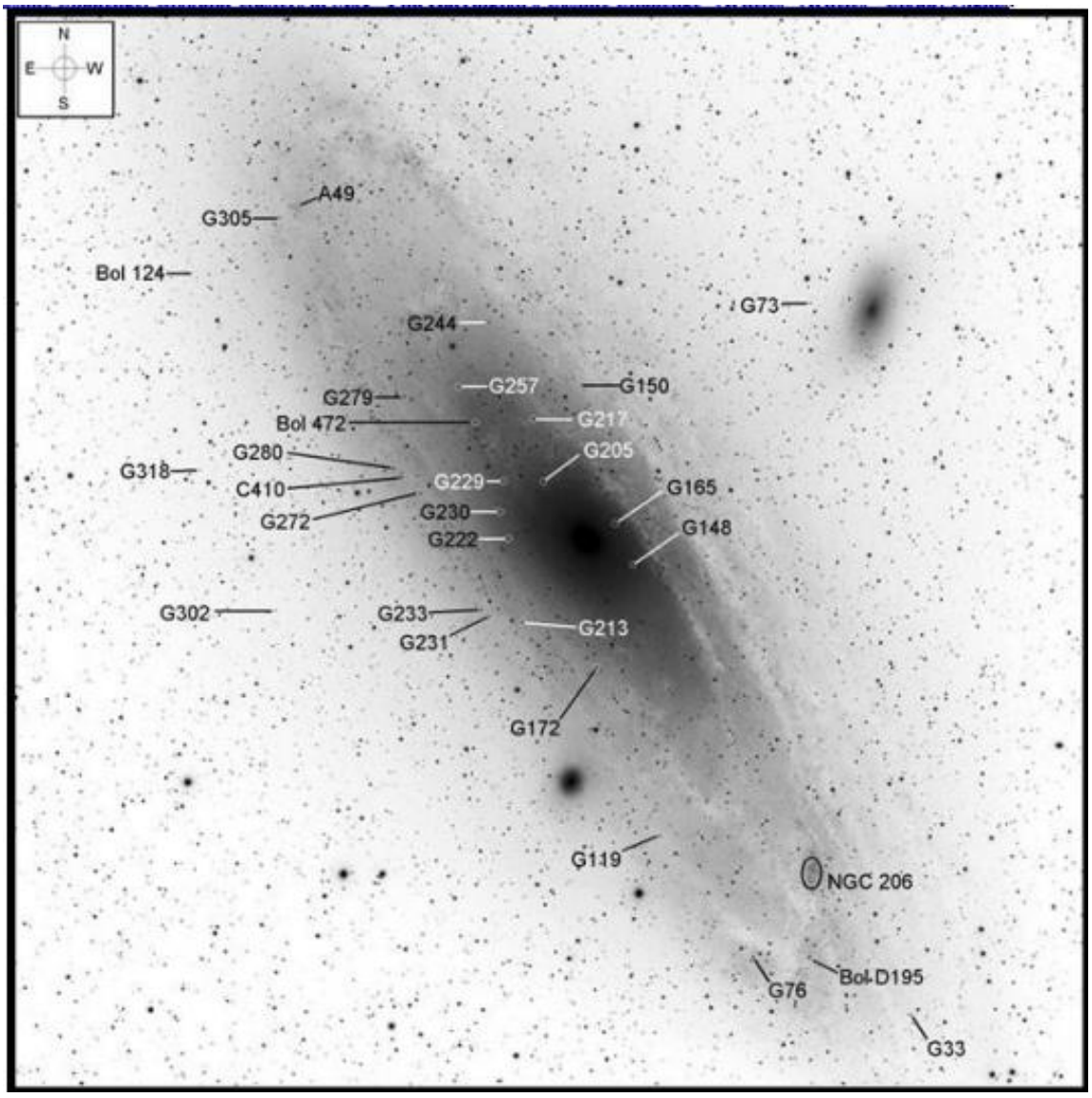


Both images credit: **Adam Block/Mount Lemmon SkyCenter/University of Arizona** - http://www.caelumobservatory.com

Dark Skies

Dave Phelps

Cosmic Challenge: Globular clusters in M31 - Phil Harrington's Cosmic Challenge - Articles - Articles - Cloudy Nights



Cepheus: A House Fit for a King

by David Prosper (NASA/JPL)

This article is distributed by NASA's Night Sky Network (NSN).

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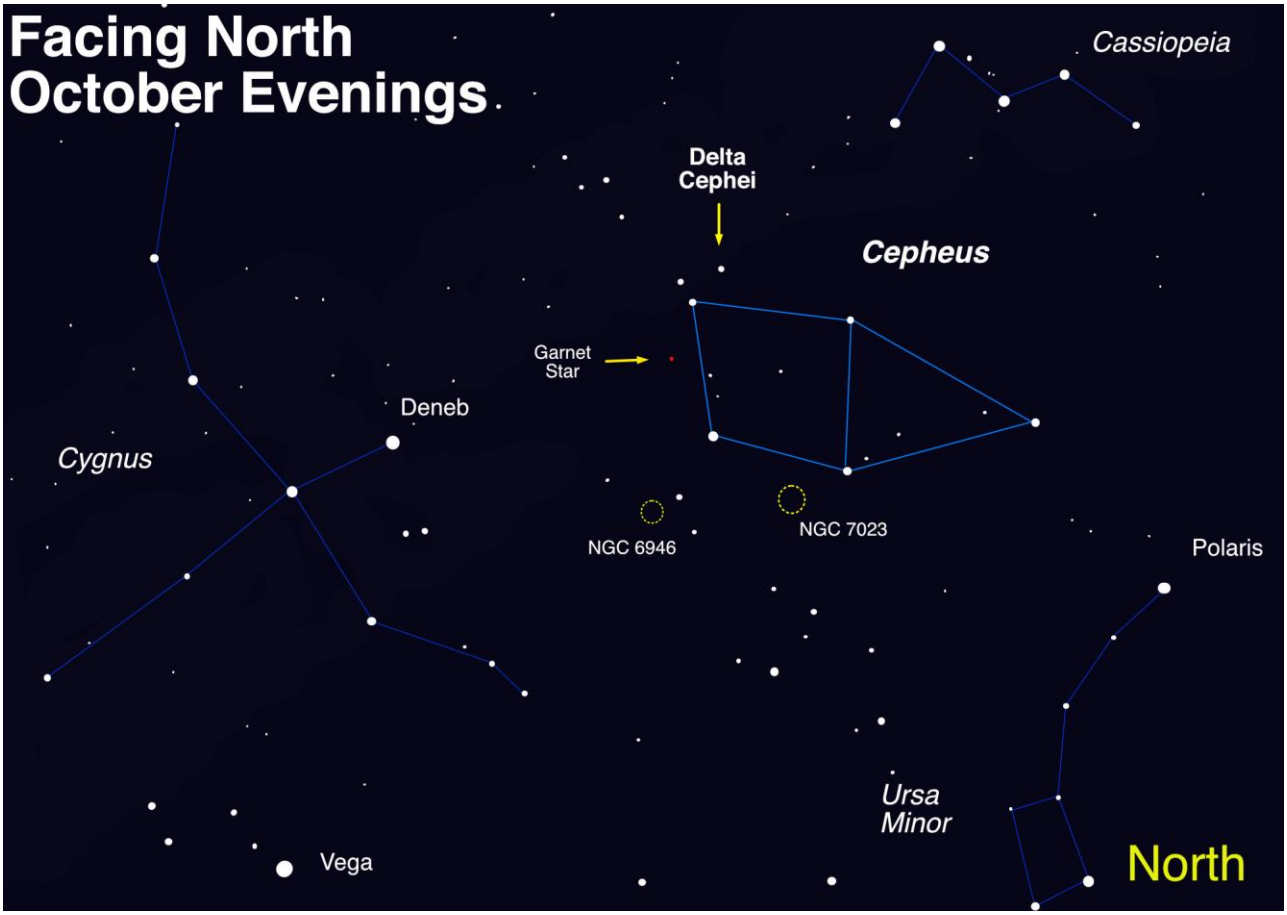
Sometimes constellations look like their namesake, and sometimes these starry patterns look like something else entirely. That's the case for many stargazers upon identifying the constellation of **Cepheus** for the first time. These stars represent Cepheus, the King of Ethiopia, sitting on his throne. However, many present-day observers see the outline of a simple house, complete with peaked roof, instead – quite a difference! Astronomers have another association with this northern constellation; inside its borders lies the namesake of one of the most important types of stars in modern astronomy: Delta Cephei, the original **Cepheid Variable**.

Cepheus is a circumpolar constellation for most observers located in mid-northern latitudes and above, meaning it does not set, or dip below the horizon. This means Cepheus is visible all night long and can be observed to swing around the northern celestial pole, anchored by Polaris, the current North Star. Other circumpolar constellations include Cassiopeia, Ursa Major, Ursa Minor, Draco, and Camelopardalis. Its all-night position for many stargazers brings with it some interesting objects to observe. Among them: the "Garnet Star" Mu Cephei, a supergiant star with an especially deep red hue; several binary stars; several nebulae, including the notable reflection nebula NGC 7023; and the "Fireworks Galaxy" NGC 6946, known for a surprising amount of supernovae.

Perhaps the most famous, and certainly the most notable object in Cepheus, is the star **Delta Cephei**. Its variable nature was first discovered by John Goodricke, whose observations of the star began in October 1784. Slightly more than a century later, Henrietta Leavitt studied the variable stars found in the Magellanic Clouds in 1908 and discovered that the type of variable stars represented by Delta Cephei possessed very consistent relationships between their luminosity (total amount of light emitted), and their pulsation period (generally, the length of time in which the star goes through a cycle of where it dims and then brightens). Once the period for a Cepheid Variable (or **Cepheid**) is known, its luminosity can be calculated by using the scale originally developed by Henrietta Leavitt, now called "Leavitt's Law.". So, if a star is found to be a Cepheid, its actual brightness can be calculated versus its observed brightness. From that difference, the Cepheid's distance can then be estimated with a great deal of precision. This revolutionary discovery unlocked a key to measuring vast distances across the cosmos, and in 1924 observations of Cepheids by Edwin Hubble in what was then called the Andromeda Nebula proved that this "nebula" was actually another galaxy outside of our own Milky Way! You may now know this object as the "Andromeda **Galaxy**" or M31. Further observations of Cepheids in other galaxies gave rise to another astounding discovery: that our universe is not static, but expanding!

Because of their importance as a “standard candle” in measuring cosmic distances, astronomers continue to study the nature of Cepheids. Their studies revealed that there are two distinct types of Cepheids: Classical and Type II. Delta Cephei is the second closest Cepheid to Earth after Polaris, and was even studied in detail by Edwin Hubble’s namesake telescope, NASA’s Hubble Space Telescope, in 2008. These studies, along with others performed by the ESA’s Hipparcos mission and other observatories, help to further refine the accuracy of distance measurements derived from observations of Cepheids. What will further observations of Delta Cephei and other Cepheids reveal about our universe? Follow NASA’s latest observations of stars and galaxies across our universe at nasa.gov.



The stars of Cepheus are visible all year round for many in the Northern Hemisphere, but fall months offer some of the best views of this circumpolar constellation to warmly-dressed observers. Just look northwards! Image created with assistance from Stellarium: stellarium.org.

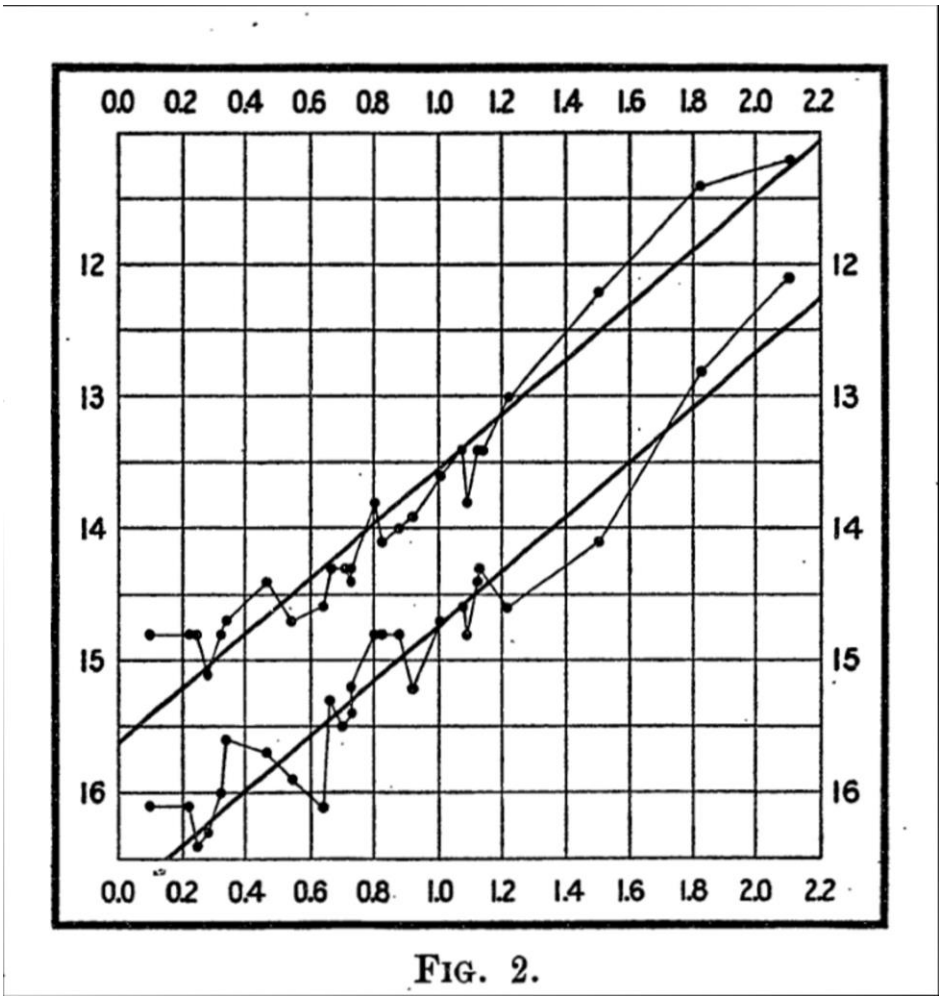


FIG. 2.

This historical diagram from Henrietta Leavitt's revolutionary publication shows the luminosity of a selection of Cepheid Variables on the vertical axis, and the log of their periods on the horizontal axis. The line drawn through these points shows how tight that relationship is between all the stars in the series. From Henrietta Leavitt and Edward Pickering's 1912 paper, "Periods of 25 Variable Stars in the Small Magellanic Cloud," a copy of which can be found at: https://ui.adsabs.harvard.edu/abs/1912HarCi.173....1L/abstract

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