# AOH OBSERVER Fall 2018



## The Newsletter of the Astronomers of Humboldt

### **Astronomers of Humboldt Announcements**

#### **Astronomical League**

The Astronomers of Humboldt is pleased to announce our affiliation with the Astronomical League (AL or Astroleague) as a "Member Society". Representing the AOH are Brent Howatt who is the AL Correspondent (AlCor), and Ken Yanosko, the Officer-Representative.

The AL is a non-profit national organization that dates back to 1941. The League's primary mission is to "promote the science of astronomy" by encouraging and providing incentives for (1) astronomy education, (2) astronomy research and observation, and (3) communication between amateur astronomy clubs. More about the Astroleague and its programs can be found at <u>https://www.astroleague.org</u>.

AOH members can join the Astroleague through our AOH affiliation. Yearly membership fees are \$7.50 which includes a subscription to the "Reflector" (the quarterly newsletter of the Astroleague), discounts at the Astroleague online store, and advance registration and discounts to Astroleague events. If you are interested in a membership, contact Ken Yanosko.

#### **General Membership Meeting**

The AOH General Membership meeting will be held in November. We will be (1) reviewing the finances of the club, (2) discussing club business, and (3) approving the nominees for the 2019 Board of Directors (BOD). In accordance with the AOH bylaws, if we have a quorum at the meeting (7 or more active members), we will be able to hold elections for the BOD. Ken Yanosko will be sending out notices about our BOD nominations, and also the date and time of the General Meeting. If you are interested in serving on the Board or would like to nominate a club member, contact Mark Mueller at president@astrohum.org or Ken Yanosko at secretary@astrohum.org.

#### **Cafepress Store**

With the holidays coming up, we encourage you to visit our AOH Cafepress store: <u>https://www.cafepress.com/astrohum</u>. We have clothing, coffee cups, stationary, and other items bearing our AOH logo. A portion of the sales goes towards supporting our outreach programs and the maintenance of the Kneeland Observatory.

#### Announcements (p. 1)

AOH Summer Events (p. 2-8)

Lassen Dark Sky Festival (p. 9-13)

Astronomical League Observing Programs (p. 14)

Ask an Astronomer (p.15)

The Perseus Family of Constellations (p.16-19)

Unearthed Comics (p.19)

Heavenly Bodies (p. 20)

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#### Summer Outreach 2018

#### by Grace Wheeler

In this issue of the AOH Newsletter, we report on our summer outreach activities of 2018. Summertime is our busiest time of year with star parties and astronomy programs with day camps and youth groups. We also do our biggest community event of the summer which is "Get Out and Play Day" at Sequoia Park. As the Outreach Chair, it is gratifying whenever members of the club get involved with our outreach program. Thank you all for the distances that you drive, the personal time that you take to volunteer, and for sharing your knowledge and enthusiasm.

We live in a rural area, and many members of our community do not have the opportunity to travel to big science museums. The AOH partially fills this need by providing astronomy programs to our community. The AOH is always looking for volunteers, and if you would like to get involved, contact me at <u>grace@astrohum.org</u>. Even if you are uncomfortable about presenting in public, we need volunteers to work on activities like taking pictures during events, writing up outreach reports, setting up displays, and developing new demonstrations. If you are new to outreach, we can work with you on how to do a presentation, or how to curate a display. Anyone who has volunteered at one of our outreach events will tell you that it is not only a lot of fun, it is also rewarding.

I want to thank the following volunteers for their help over the summer: Ken Yanosko, Brent Howatt, Catrina Howatt, Russ Owsley, Mark Mueller, Jeff Goodman, Becky Chambers, Bea Asmundardottir, Eva Laevastu, Kathy Blume, Mary Kaufman, Anastasia Caballero, Greg Deja, Sharon Seagraves, Frank Simpson, Don Wheeler, and Joey D'Ambra.

The entries below were written by Grace Wheeler unless otherwise stated.

#### AOH Star Party at Kneeland School June 16, 2018 (Report by Ken Yanosko)

The first star party of the summer was held at Kneeland School under clear skies. The volunteers for the evening were Brent (C8), Kathy and Eva (C-8), Don (apo-refractor), Grace (C-8), Russ (Newtonian), Ken (C-8), and Mark M. (C-14 in the observatory). In attendance were the Thomas family (John, Ceci, and Stormy); Sharon; new members Ruth, Jennifer, and Jamie, and their friend Amy; and guests Austin and Loren. We observed the Moon; Venus; Jupiter with its Galilean Moons; a number of Messier objects (galaxies, open clusters, globular clusters), and stars Zubenelgenubi (a double) and Zubeneschamali (reputed to be green!)



Setting up telescopes at dusk in the courtyard. (photo: GDW)



Mark M. setting up the C-14. (photo: J. Thomas)



Observing through the C-14. (photo: GDW)



Brent at Kathy and Eva's telescope. (photo: GDW)



Stormy viewing Jupiter through Brent's C-8. (photo: GDW)

#### McKinleyville Kids' Camp June 20, 2018

AOH volunteers Ken, Russ, and Grace did a daytime astronomy event at McKinleyville Kids' Camp on the eve of the first day of summer. We were hoping for a warm afternoon and clear skies, but we were met with typical Humboldt June gloom. The clouds made us shelve our original program of telescope viewing of the sun, moon, and Venus. We instead did a cloudy day program--something we are used to doing. We used a scale model of the solar system to show the relative size of the sun and planets (Ken), and a planet walk from the Sun to Saturn to show relative distances (Grace). The campers used a gravity well to learn about the force of gravity and escape velocity (Ken). Russ showed the campers how to use the telescopes to view distant terrestrial objects. It was a spirited group of campers--all 80 of them!



Russ and campers observing through the C-6. (photo: GDW)



Using the gravity well to study escape velocity. (photo: GDW)



The planet walk. (photo: GDW)



Ken comparing the size of the sun to some of the planets. (photo: GDW)

## Pal Camp—Discovery Museum June 27, 2018

AOH volunteers traveled to the Pal Camp in Freshwater to do an astronomy program for the Camp's "Earth and Space Week." Cloudy skies threatened to derail our telescope viewing, but we were lucky that the sun broke out about 40 minutes into our program. We had 60 campers ranging in age from five to twelve years old. There were five stations of activities: size and distances of planets and sun (Ken), gravity and escape velocity (Mary), craters on the moon and Earth (Grace), and telescope viewing of the sun (Russ). The counselors ran the fifth station which was the construction of sun clocks (materials provided by the AOH). The camp director, Francisca Crutchfield, was impressed by how well organized we were and by the diversity of topics. **Note: All photos were taken by Francisca Crutchfield**.



Ken giving the introduction.



Russ and the campers lined up to viewing distant objects through the Astroscan.



Grace and campers model crater formation using marbles dropped into pans of flour and cocoa.



Mary using the gravity well to explain the orbits of planets in our solar system.



Campers learning about the sizes and distances of planets in our solar system.

#### AOH Star Party at Kneeland Airport July 14, 2018

After a ten month hiatus, we finally returned to Kneeland Airport in time for our July star party. We had a large turnout of members: Ken, Russ, Don, Grace, Eva, Kathy, Mark M., Dan, Greg, Brent, Catrina, John M., Ceci, Stormy, Jeff. We only had one visitor for the night, Mark's friend José. All five of the visible planets were in the sky, and we enjoyed the unobstructed view of the Milky Way and some southern constellations. We viewed several deep sky objects. Frank worked with John Thomas on using the 17 inch Coulter Dob, while Grace helped Jeff Goodman learn how to operate a Schmidt-Cassegrain GoTo telescope. This was a training session for Jeff as he was learning to run the SCT for the upcoming Albee Creek Star Party.



Photo Collage of our members: Top (L to R): John, Ken, and Frank; Brent; Kathy and Eva. Bottom (L to R): Russ; Mark M; Ken. (photos: Catrina Howatt)



That night, we viewed the moon, the planets, and several deep sky objects. (photos: GDW)

#### 4-H Maple Creek Star Party July 17, 2018

Brent, Catrina, and I spent a relatively cool and almost mosquito-free evening introducing 26 campers, 7 teen counselors, and 6 adults to the night sky. The viewing list included Venus, Jupiter with its Galilean moons, Saturn, the crescent Moon, the double stars Albireo and Mizar, globular clusters (M5 and M13), and a star nursery (Lagoon Nebula). Brent, Catrina, and I covered a variety of topics such as seeing in the dark, the constellations, the motion of the moon and planets, ancient stars, the four bright planets in the summer sky, and the upcoming Martian opposition. We had a great time, and we have already signed up for a return appearance in 2019. We want to thank Jessalyn Kunkler and the 4-H campers and staff for being such great hosts.



Setting up in the meadow. (photo: Catrina Howatt)



Brent and his C-8. (photo: GDW)



Catrina's first time running the C-6. (photo: GDW)



4-H campers viewing Jupiter. (photo: J. Kunkler)

## HRSP Albee Creek Campground Star Party July 21, 2018

The theme for our second AOH stargazing party at Albee Creek (HRSP) was "The Moon and the Planets." The participants for this event were AOH members Brent, Catrina, Jeff, and Grace, HRSP Ranger Mary Kaufman, and five HRSP volunteers. As a pre-star party activity, we set up a scale model planet walk to show the relative size and distances of the planets (Mercury to Jupiter) from the Sun. Brent also gave a talk on the location of the planets along the ecliptic, seeing in the dark, and telescope etiquette. At sunset, a crowd of 60+ visitors convened to the meadow where telescopes were set up to view Venus (Grace), Jupiter (Catrina and Jeff), and the Moon (Brent). The "star" of the party was Saturn, and visitors took "seconds and thirds" when it came to observing the ringed giant. Towards the end of the evening, we redirected the telescopes to some deep sky objects: Lagoon Nebula (star nursery in Sagittarius), M13 (globular cluster in Hercules), planetary nebula M27 (aka Dumbbell Nebula in Vulpecula), the Owl Cluster (open cluster in Cassiopeia), and the double stars Mizar and Alcor in the handle of the Big Dipper. An unexpected treat was a long flyover of the International Space Station. We ended the night with Mary swearing in the new "Sky Jr. Rangers." Congratulations to Brent, Catrina, and Jeff. Thank you to Mary Kaufman for organizing the star party and to the HRSP for hosting us.



Images from July Star Party at Albee Creek. (photos: Catrina Howatt and Grace Wheeler).

Get Out and Play Day July 28, 2018

For the 2018 Eureka Get Out and Play Day, the AOH brought astronomy to Sequoia Park. We had about 100 visitors to our AOH tent who learned about the planets, sun, gravity, and telescopes. The kids (and a few adults) were excited to pick up space-themed stickers, a DIY solar system map, word puzzles, a moon map, and a star chart. We gave away some children's astronomy books and NASA posters as prizes. We even had one family who joined the AOH (welcome the Morey Family). Thank you to our volunteers Ken, Russ, Mark W., Mark M., and Lisa for making this a fun event for all. We are grateful to NASA SpacePlace for providing us with stickers, bookmarks, and posters, and to Susie Christian (and her friend Barbara Ann) who provided astronomy books.



Astronomy is fun. Attendees and volunteers get out and play at Sequoia Park. (Photos: Mark Mueller and Grace Wheeler)

#### AOH Monthly Meeting at Kneeland August 11, 2018 (report by Ken Yanosko)

We convened at Kneeland Airport for planet viewing, deep space viewing, and Perseid Meteor viewing. Regulars in attendance were Russ, Ken (with Susan), Jeff, Bea, Becky, Mark M (with Lisa), Brent, Catrina, John (with Stormy), Sean, and Catherine. We greeted new members Cassandra and Joey. And we had scores of guests (nobody counted but estimates ranged from 40 to 60 people altogether.) Catrina set up a planet walk for the Girl Scouts (and their leaders and families) of Eureka Troop 202. And Russ gave a constellation tour for all those assembled. Several telescopes were set up for shared views of: planets Venus, Jupiter (Galilean Moons), Saturn (Titan), and Mars; Messier objects 4, 8, 13, 15, 16, 20, 31, 32, 81, 82, 110; and the Double Cluster in Perseus. We also saw several other naked-eye objects: one UFO (high-altitude balloon), the ISS, and "lots" of meteors.



Gathering at sunset. (photo: C. Howatt)



Illuminated Girl Scouts. (photo: J. Thomas)



Telescopes and the Milky Way. (photo: Kenneth Tinkham)

#### HRSP Albee Creek Campground Star Party August 11, 2018

The theme for the third Albee Creek Star Party was the "Perseid Meteor Shower." AOH volunteers Kathy, Eva, Sharon, Anastasia, and Grace set up telescopes to view the planets and deep sky objects. Because of a reservation snafu, Albee Creek Campground was only half-full. However several visitors drove in from other campgrounds because they heard about the star party. We had a crowd of about 70 visitors. The pre-star party activities included a planet walk, and making a comet from dry ice, water, and other ingredients. For two hours we gave tours of the planets and stars through our telescopes. The real "star" of the show was the meteor shower, and we saw quite a few streak across the sky. Thank you to Mary Kaufman and the HRSP volunteers for their help during the evening, and to Supervisor John Hardcastle for providing us with campsites.



The Planet Walk. (photo: GDW)



Making a comet. (photo: Mary Kaufman)



Kathy and Eva outstanding in a field. (photo: GDW)



Anastasia adjusting her Dob. (photo: GDW)

#### AOH Star Party at Kneeland Airport Sept. 8, 2018

We had an excellent turnout to September's monthly Star Party at Kneeland Airport. The members who attended were Ken, Greg, Kathy, Eva, Jeff, Grace, Don, Joey, John and Stormy. Joining us for the first time were new members Gretchen Rist and her daughters Kaliece, Deedee, Miley; and the Hague Family. Joey brought his friends Caitlin and Alyssa to stargaze with us too. The evening was cold and breezy, but the sky was transparent and perfect for viewing the planets, constellations, the Milky Way, satellites, and various deep sky objects. Gretchen and her daughters are learning astronomy, and we made a point of finding different types of deep sky objects: globular clusters (M13, M5, M15), open clusters (NGC 457 aka the Owl cluster), galaxies (M81, M82, M31, M51), and a star nursery (Lagoon Nebula).



Stormy viewing Saturn through Joey's Dob. (photo: GDW)



Kaliece, Miley, Gretchen, and Deedee with Grace. (photo: DW)



Deedee looking at Venus through the C-8. (photo: GDW)



Jeff operating the C-8. He's getting really good at this. (photo: GDW)

#### Creekside Learning Center, Willow Creek Sept. 13, 2018

Our September 8<sup>th</sup> star party with Creekside Learning Center coincided with the school's first week of school. For three hours the students, parents, and teachers observed planets (Venus, Jupiter, Saturn, Mars), constellations, and deep sky objects (globular clusters, open clusters, star nurseries, and galaxies). Creekside coordinator Michaela Saliba said it was an inspiring way to start the school year (and for us volunteers, an exciting end to our summer outreach season). A big thank you to AOH volunteers Brent, Catrina, Greg, Ken, and Becky who made this a successful evening and left a big impression on some future astronomers.



Catrina and Brent. (photo: GDW)



Becky leading the observation. (photo: GDW)



Ken and the students. (photo: C. Howatt)



Answering questions. (photo: C. Howatt)



Looking at the moon. (photo: GDW)



Learning to see through a telescope. (photo: GDW)



Greg's telescope. (photo: GDW)



Students at Ken's Dob. (photo: GDW)

#### Lassen Volcanic National Park Dark Sky Festival August 3-4, 2018

#### Lassen Volcanic National Park

Lassen Volcanic National Park (LVNP) is located about 195 miles east of Eureka, and depending on who is driving, about a 4-hour drive along Hwy 36. The Park is named for the famed Mt. Lassen, the southernmost volcano in the Cascade Volcanic Arc, and the largest plug dome volcano in the world. Mt. Lassen along with Mt. St. Helens are the only volcanoes of the Cascades to have erupted during the last century. For Mt. Lassen, these eruptions occurred between 1914 and 1917, with the most explosive eruption occurring on May 22, 1915. The May 1915 eruption caused massive volcanic mudflows and ash clouds that devastated areas near the volcano. LVNP was created in 1916 to preserve the volcanic history of the region for future observation and research. On my first visit to the Park in 2014, I was expecting to find a harsh and desolate landscape as the term "volcanic" might imply. Indeed there were volcanic peaks, cinder domes, boiling hot springs, and steaming fumaroles evident throughout Park. But amidst these volcanic features were forests, glacier-carved landscapes, abundant flora and fauna, meadows, and pristine mountain lakes. What really made me a fan of the Park were the spectacular dark skies. The Park's relative isolation along with its high altitude and dry summertime conditions make this a stargazer's paradise.



Mt Lassen. (photo: GDW)



Upper Meadow with Mt. Lassen in the background. (photo: GDW)



Milky Way over Mt. Lassen. (image: Alison Taggart-Barron, Lassen NPS.

#### Lassen Dark Sky Festival

We planned our 2018 outing to Lassen to coincide with the annual Lassen Dark Sky Festival. The Festival started in 2012 with the theme "Half the Park is After Dark." The Dark Sky Festival at Lassen Volcanic National Park (LVNP) is primarily underwritten by the National Park Service, NASA, and the International Dark Sky Association. The two-day festival usually takes place at the end of July or early August. This year's events included solar viewing, an artwork tent, an astrobiology display near the Park's famed Sulfur Works, a planetary geology hike through the Park's "Devastated Area," and various talks on astrobiology, observing the night sky, and ecological implications of light pollution. After dark, the night sky takes center stage, and volunteers and the LVNP rangers set up telescopes for public viewing.



Kohm Yah-mah-nee Visitor Center (KYVC) is at the southwest entrance to the Park. (photo: GDW).

#### Stop 1: Loomis Museum

While my first priority was to experience the Park at night, as someone who is involved in developing outreach activities for the AOH, I was also interested in visiting the NASA tents and hearing the astrobiology talks. Our first stop was at the Loomis Museum at the north entrance of the Park. The three tents set up at Loomis appeared to have the study of light as a common theme. At the "solar viewing tent," we looked through a hydrogen-alpha solar telescope at prominences on the Sun (and complained about the lack of sunspots). The solar viewing tent had spectroscopes set up to look at different light sources: fluorescent, incandescent, and LED. In the same tent, one of the scientists was working with some kids on an experiment called "Life: how do we find it." The kids were asked to analyze the bubbling activity of cups containing yeast (biological) and Alka-Seltzer (non-living), and to look at the similarities and differences between the two.



The solar-viewing tent. (photo: GDW)



Using spectroscopes to analyze different light sources. (photo: GDW)



The "Life: How do we find it" experiment. (photo: GDW)

The "Sofia" tent was manned by NASA scientist Sachin Shenoy who talked about the <u>Sofia Mission</u>, an airborne observatory in a Boeing 747 with instrumentation (telescopes, spectrophotometers) designed to study in the mid- to far-infrared wavelengths. One of the primary mission of Sofia is to study planetary atmospheres and surfaces, as well as the interstellar medium, comets, asteroids, galaxies, and stars.



The Sofia Tent. (photo: GDW)

The third tent at the Loomis Museum belonged to the International Dark Sky Association (IDA). The IDA representative was Jack Sales, Chapter leader of IDA California. Sales, the author of "<u>Can</u> <u>Salmon Help Save the Night Sky?</u>" talked about his Chapter's effort to show that the lights from Sundial Bridge in Redding were detrimental to Chinook Salmon spawning in the Sacramento River. The IDA advocacy led to the installation of new "fish-friendly" LED lights which have less biological effects on fish migration.



The IDA tent. (photo: GDW)

#### Stop 2: The Sulfur Works and Astrobiology

The second stop of the day, and probably my favorite, was to the Astrobiology Tent at the Sulfur Works. The Sulfur Works is the Park's most easily accessible hydrothermal area as a sidewalk runs alongside fumaroles and pools of boiling mud. The <u>NASA</u> <u>connection to LVNP</u> stems from their interest in the Park's hydrothermal system. Early Mars is thought to have been volcanically active, and the minerals found on the surface of Mars suggests hydrothermal activity in the form of hot springs. Scientists believe that the hydrothermal alteration of rocks could have created conditions that might have sustained life. Astrobiologists from NASA Ames study the extremophiles living in the Park's hot springs to understand how life could have arisen in the early Martian landscape.



Boiling mudpot at the Sulfur Works. (photo: GDW)

The analyzer known as "<u>CheMin</u>" or "Chemistry and Mineral X-ray Diffraction" instrument was on display at the tent. This instrument is being used by the rover Curiosity to identify minerals in rocks found on the surface of Mars. Scientists use CheMin to also look for evidence of flowing water by detecting hydrated minerals.



The CheMin instrument uses x-ray diffraction to determine the mineral composition of rock. (photo: GDW)



LVNP Sulfur Works and NASA Astrobiology. (photo: GDW)



Volcanism and Hydrothermal Activity on Early Mars. (photo: GDW)

The meteorite collection at the tent was a popular draw and was curated by Dr. David Des Marais. On display were the



Meteorites. (photo: GDW)

different types of meteorites including iron meteorites, a stony-iron meteorite known as a pallasite, a Martian meteorite originating from Mars' crust, and a primitive carbonaceous chondrite (Allende).

#### Stop 2: The Sulfur Works and Astrobiology (Cont.)

Dr. Des Marais, who is a principal investigator for the 2003 Mars Exploration Rovers (Spirit and Opportunity), also answered questions about Mars, and what the different Martian missions have uncovered about geological processes found on Mars (i.e., plate tectonics, volcanism, planetary structure, evidence of magnetism). When asked about the current global dust storm, he believes that the current storm is as extensive as <u>the dust storm</u> <u>that Mariner 9 encountered in 1971</u> during its orbit around Mars.



NASA astrobiologist David Des Marais with the Mars display. (photo: GDW)

The last demo that we saw at the astrobiology tent was with Dr. Andro Rios who talked about carbonaceous chondrites and how these primitive meteorites could have delivered bioorganic compounds (amino acids, nucleotide bases, and sugars) to pre-biotic Earth. Dr. Rios is specifically interested in the <u>meteoritic</u> <u>origins of enantiomers of organic compounds</u>. <u>Enantiomers</u>, he explained, are paired molecules that are mirror images of each other. Even though these are structurally similar, a compound that is "right-handed" (D-form) can have different chemical properties than its "left-handed" (L-form) counterpart. He noted that even though both the L- and D-forms of amino acids and sugars occur in nature, biological systems prefer one form: cells preferentially use L-form of amino acids and D-forms of sugars. *How does this relate to astrobiology and carbonaceous chondrites*? If carbonaceous chondrites delivered both the D- and L-forms of amino acids to early Earth, how did biological systems evolve to prefer the L-amino acids? (The same question can be applied to D- and L- sugars found in

chondrites). To illustrate how "handedness" affects the chemical nature of a compound, he used limonene, a simple terpene that is found in nature in the D- and L- forms. D-limonene had a sweet citrus odor while the L-limonene smelled like lemony turpentine.



Enantiomers of Limonene



Dr. Rios used ball-and-stick chemistry models to show right- and left-handedness (chirality) of simple organic compounds. Visitors were invited to smell the difference between the enantiomers D- and L-limonene. (photo: GDW)

We heard more about <u>Dr. Rios' research</u> during the evening talk he gave at the KYVC Amphitheatre entitled "The Ingredients of Life – Clues from Meteorites." It was an enlightening take on how small organic molecules originating from carbonaceous chondrites may have provided the raw material that jump-started the development of metabolic pathways on early Earth.



The outreach "giveaway" table had posters and graphic novels about astrobiology. (photo: GDW)

I'll end this part of the tour by saying that I enjoyed being on the other side of the outreach table, i.e., being part of the audience instead of a presenter. Everyone that we met from NASA was friendly and accessible, especially with the kids. We spoke to one of the outreach volunteers who said that the scientists from NASA Ames are given the week off to attend the Lassen Dark Sky Festival. She added that they all look forward to spending time in a beautiful place and talking to the public about their research.

#### Stop 3: Half the Park is after Dark

The stargazing part of the Dark Sky Festival started at 9:30 p.m. Public observing was held at three locations: Manzanita Campground at the north entrance of the Park, Kohm Yah-mah-nee Visitor Center (KYVC) at the south entrance, and the Bumpass Hell parking area about 6 miles north of KYVC. Don and I opted to attend a star party at KYVC since we were attending a talk at the Amphitheatre next door. KYVC also had two different telescope viewing options: (1) traditional viewing through telescopes, and (2) viewing celestial objects on a monitor through "computer-assisted astronomy."



The Rangers set up telescopes in the KYVC parking lot. (photo: GDW)

For the traditional telescope viewing, the rangers set up three telescopes in the parking lot. A curtain of black tarp was set up in front of the telescopes to minimize the lights from the cars in the parking lot. After speaking with a couple of the rangers, we found out that the telescopes were purchased by the National Park Service to be used for the LVNP's stargazing program. Of the three rangers who were operating telescopes that night, only one was an experienced user while the other two were learning on the job. It was quite crowded at the parking lot with long lines of people cued up to use the telescopes. The rangers did a good job of running the scopes (they viewed the planets) and kept the lines of people moving. It was refreshing to see rangers using the telescopes (and I made a point of telling this to Mary Kaufman at HRSP).

The computer-assisted astronomy part of the program was at the KYVC patio. The two presenters were Dr. Norm Nassise of Star Chasrz and Mike Ryan, a former staff member at the Morrison Planetarium in San Francisco. Their program, entitled "A Guided Illustration of the Night Sky," featured images of deep sky objects acquired by Dr. Nassise's 14-inch Schmidt-Cassegrain telescope. The images were captured on a CCD camera attached to the telescope, stacked and processed by a computer, and then transmitted to a 40-inch monitor for viewing. The entire process took about 10 minutes per object. While Dr. Nassise aimed the telescope and acquired images, Mike Ryan used a laser pointer to show where in the sky the telescope was pointed at, and gave the story behind the deep sky object being viewed on the monitor. During the 30 minutes we were there, we saw the Hercules Cluster, M82, and the Whirlpool Galaxy.



Dr. Nassise's 14 inch SCT in the back of a GMC Envoy. (picture: GDW).

As someone who regularly uses "computer-assisted astronomy" at star parties, I was interested in seeing how this technology would translate to a large crowd. The reaction was mixed. While some audience members were impressed, others were expecting a full planetarium show with images of deep sky objects projected overhead accompanied by music. Instead what they got was a monitor about 50 feet away with images of deep sky objects that only took up 30% of the screen. I overheard one person complain that it was like looking at objects on the internet. I think most people did not understand that they were looking at a high resolution image of a deep sky object in real time. I thought Dr. Nassise and Mike Ryan did an excellent job with the star show, and I'm glad that we attended.

#### Making Plans for 2019

I highly recommend the LVNP Dark Sky Festival for anyone who is an astronomy enthusiast. The emphasis of the festival is on outreach and science. This is an excellent opportunity to meet and talk with some NASA scientists, attend some great talks, learn some astrobiology and geology, and enjoy the night sky. Here are some suggestions for your visit:

- 1. Make reservations as early as possible as campgrounds and hotels sell out during the Festival. Campground reservations can be made online from 6 months to a year in advance at <u>www.recreation.gov</u>.
- 2. The Park's concessions close at 5 p.m. Plan on bringing food, drinks, and a picnic dinner if you will be at the Park in the evening.
- 3. Bring extra clothes if you plan to be outside stargazing.
- 4. Set aside some time to <u>hike to Bumpass Hell</u>, the largest hydrothermal area in the Park. The trail was closed in 2018 for improvements, but hopefully it will reopen in 2019. This is a strenuous hike.
- 5. Don't be afraid to change your plans and skip part of the Festival. <u>There is a lot of fun stuff to do in the Park</u>.
- 6. Don't get hung up on seeing pristine dark skies during the Festival. There are too many people and cars.
- 7. A good side trip is to the <u>Hat Creek Radiotelescope Observatory</u>. It is open M-F for self-guided tours.

# Find an Observing Program for You with the Astronomical League!

Reprinted from the NASA Night Sky Network <u>https://nightsky.jpl.nasa.org</u>



Pins and logos from the Astronomical League's many excellent observing programsthere are even more than are shown here! *Image Credit: <u>The Astronomical League</u>* 

Looking for something to jump-start your stargazing? Maybe need a bit of direction? Or possibly you are tired of looking at the same set of objects every time you observe? If so you should definitely check out one of the <u>Astronomical League's observing programs</u>!

The League has run their excellent observing programs for <u>the past 50 years</u>. Since 1967, the Astronomical League's observing programs have awarded over 10,000 observing certificates to skilled amateurs in recognition of their stargazing achievements - along with some great pins, too! These programs have helped amateur astronomers shore up their observing legs as well. Many folks might eventually observe all of the Messier objects, for example; but the League's requirements for their Messier program will make that observer carefully take into consideration the factors around their observation, such as the time and observing conditions present that night, as part of their needed documentation. Some harder to spot objects may even go unnoticed but for the need to complete the observing list - helping to sharpen those eyes and starhopping skills, with a cool pin and certificate as a reward - although the true reward is the boost in confidence and knowledge gleaned from working towards these observations for the participating observers.

There are programs for <u>observers of all levels</u> and <u>interests</u>. Beginners can start with programs like the <u>Binocular Messier</u> or <u>Constellation</u> <u>Hunter</u> programs. The <u>Caldwell Observing Program</u>, <u>Two in the View</u>, or <u>Asteroid Observing</u> programs are great programs for stargazers who have gotten a few observations under their belt and want to further sharpen their skills! Experts can test their mettle and go deep with programs like the <u>Binocular Variable Star Observing Program</u>, <u>Herschel 400</u>, or <u>Master Observing Program</u>. Even stargazers who are surrounded by light pollution in urban areas can participate in programs like the <u>Urban Observers Program</u> or <u>Lunar Observing Program</u> - or help fight light pollution and attain the <u>Dark Sky Advocate</u> award. Fans of astronomy outreach, like many members of Night Sky Network clubs, can pursue the <u>Outreach Observing Program</u>: there are programs for naked-eye observations and binocular-wielding observers. Participants aren't even necessarily restricted by observing in visible light, as there is even a <u>Radio Astronomy Observing Program</u>.

There are many, many more programs you can find on their program list. <u>Find one today</u> and take up the challenge. Keep it up and one day you too will become recognized as a master observer!

http://curious.astro.cornell.edu/about-us/120-observational-astronomy/stargazing/how-themotion-of-the-earth-affects-our-view/734-why-do-different-stars-appear-with-seasons-beginner

## Why do different stars appear with seasons? (Beginner)

by Jagadheep D. Pandian

There are two major motions affecting the Earth: its rotation around its axis, and its rotation around the Sun (which we call 'revolution'). While the rotation of the Earth on its axis causes the nightly movement of the stars across the sky, the revolution is responsible for the fact that we can see different parts of the sky at different parts of the year.



Take a look at the image above. On a given day (meaning on a given position on the orbit), you will only be able to see the stars that are in the opposite direction to the Sun. All the stars that are 'behind' the Sun won't be visible during that day, because they are above the horizon during the day (and we can see stars only during night)! Now if you wait 6 months, the Earth will be at the opposite on its orbit, and you will now be able to see those stars that you couldn't see 6 months earlier because they were blocked by the Sun. This is why over the course of one year, we end up being able to see all the stars that are possible to observe from our latitude on Earth.

# Fall Constellations: The Perseus Family

by Grace Wheeler

The Perseus Family is made up of the constellations Cassiopeia (Queen of Ethiopia), Cepheus (King of Ethiopia), Andromeda (daughter of Cassiopeia and Cepheus), Perseus (the Hero), Pegasus (the Winged Horse), and Cetus (the Sea Monster). These constellations are characters in the <u>Greek myth of Perseus</u>. The nearby constellations Auriga and Triangulum are often included in this grouping.



Star Chart for October 30 at 10:30 p.m. PDT. The chart was generated in Starry Night Pro and shows the Perseus Family of Constellations: Auriga, Perseus, Cassiopeia, Andromeda, Pegasus, Triangulum, and Cetus; Cepheus is not shown.

Included on the star chart are Taurus, Aries, Cygnus, Lyra, Aquila, and Vulpecula. (Starry Night Chart modified by GDW).

**Cassiopeia** is also known as the "Seated Queen" or the "Lady in the Chair". The five bright stars of Cassiopeia make a "W" or "M" asterism. In Greek mythology, the stars represent Cassiopeia who is tied to a chair and placed in the sky by Poseidon. As punishment she revolves around the night sky half of the year upside down.

Cassiopeia lies at the northern end of the center of the Milky Way and is rich in open clusters and nebulae. At mid-northern latitudes (between 23 and 66 degrees N), Cassiopeia is circumpolar and does not set. The constellation is best seen in the fall and winter months when it is well above the horizon. The two brightest stars are Schedar and Caph. Cassiopeia contains two Messier objects that are both open clusters: M103 and M52. M103 can be viewed with binoculars and is located below the star Ruchbach (the bottom left star making up the "W"). The brightest open cluster in Cassiopeia is NGC 457, also known as the Owl Cluster.

Andromeda is known as the "Chained Woman." The constellation lies between Cassiopeia and Pegasus. Its brightest star, Alpha Andromedae or Alpharatz, makes up one the four corners of the Great Square of Pegasus, and marks the place where Andromeda and Pegasus meet.

The most notable Messier object in Andromeda is the Andromeda Galaxy, M31. At 2.5 million light years from Earth, M31 is the closest spiral galaxy to the Milky Way. It is on a collision course with our galaxy (but that won't happen for another 4 billion years). M31 has an apparent magnitude of 3.4 and can be seen with the unaided eye on very clear dark nights. M31 is six times as wide as the moon and the full size can only be seen with large telescopes. With small telescopes, only the bright central core is seen. The stars Alpharatz, Mirach, and Mu can be used to star hop to M31.

There are 14 dwarf galaxies orbiting M31.The brightest and largest is M32 followed by M110. Both are dwarf elliptical galaxies, and it is possible to find these two galaxies alongside M31 in the same telescope field of view.

**Triangulum** (the Triangle) is a small constellation that lies between Andromeda and the constellation Aries. The three brightest stars ( $\alpha$ -,  $\beta$ -, and  $\gamma$ -Trianguli) form the triangle asterism. Triangulum contains the spiral galaxy M33, also known as the Pinwheel Galaxy (not to be confused with M101 in Ursa Major, which is also called the Pinwheel Galaxy).



The Owl Cluster NGC 457 image credit: <u>Henryk Kowalewski</u>



The Andromeda Galaxy (M31) with the satellite galaxies M32 and M110 (image modified by G. Wheeler) image credit: <u>Torben Hansen</u>



The Pinwheel Galaxy (M33). image credit: <u>Kanwar Singh</u>

Perseus (The Hero) lies to the north of Andromeda, and is most famous for the August Perseid meteor shower. The brightest star in Perseus is Mirfak which is Arabic for the "elbow of Pleiades". The Pleiades lie due south of Mirfak. The second brightest, and most notable star is Algol, also known as the Demon Star. Algol is a three star system, which contains an eclipsing binary which dims and brightens with precise regularity. Algol is associated with the Gorgon Medusa of the myth of Perseus.

Perseus contains three notable deep sky objects: the open cluster M34, the planetary nebula M76 (Little Dumbbell), and the Double Cluster, NGC 869 and 884. The Double Cluster has a combined magnitude of 4.3, and can be seen with the unaided eye or binoculars under dark skies. A telescope is needed to order to resolve the smudge of light into the two clusters. To find the Double Cluster, use the stars Navi and Ruchbach of Cassiopeia to star hop to the Cluster.



The Little Dumbbell (M27). image credit: <u>Robert Vanderbei,</u>



The Double Cluster of Perseus (NGC 869 and 884). image credit: <u>ItFrightensMe</u>

**Pegasus** (the Winged Horse) is best known for its asterism "the Great Square of Pegasus." It is one of the largest constellations in the northern skies. The stars Alpharatz, Algenib, Markab, and Scheat make up the corners of the square. As noted earlier, Alpharatz actually belongs to the constellation Andromeda and is where Pegasus and Andromeda meet.

Notable objects in Pegasus are M15 and Stephan's Quintet. M15, also known as the Great Pegasus Cluster is one of the densest clusters in the Milky Way Galaxy. Its estimated age is 13.2 billion years making it one of the oldest known globular clusters. A large telescope is needed to view Stephan's Quintet, a visual grouping of five galaxies. Four of the galaxies were the first to be identified as a compact galaxy group and appear to be in the process of merging. Nearby Stephan's Quintet lies the Deer Lick Galaxy (NGC 7331) with its "fleas" of galaxies.



The Great Pegasus Cluster (M15). image credit: <u>Hewholooks</u>



Stephan's Quintet and the nearby Deer Lick Galaxy Group. image credit: <u>Gianluca Masi (Virtual</u> <u>Telescope Project and Michael</u> <u>Schwartz (Tenagra Observatories).</u>

Auriga is Latin for charioteer and its name is derived from the stars forming a polygonal asterism that resembles the pointed helmet of a charioteer. The brightest star in Auriga is Capella which is composed of two pairs of binary stars. Capella is the sixth brightest star in the sky. Notable deep sky objects are the open clusters M36, M37, and M38. The open clusters are bright and large enough to be seen with binoculars.

**Cetus** (the Sea Monster or the Whale) lies in the portion of the sky known at "The Water." Constellations in this region include Pisces, Aquarius, and Eridanus (the River). Deneb Kaitos, an orange giant, is the brightest star of Cetus. Cetus contains M77, a barred spiral galaxy located just to the south of the 4<sup>th</sup> magnitude star  $\delta$ -Ceti. M77 is about 60 million light years away, but it has a bright central core (active galactic nucleus) so it is visible with binoculars or small telescopes under dark sky conditions.



M37 is the brightest of the three Messier open clusters in Auriga. image credit: <u>https://en.wikipedia.org/wiki/</u> <u>Messier 37#/media/File:M37a.jpg</u>



M77 in Cetus was imaged with an 8-inch telescope. image credit: <u>Virtual</u> <u>Telescope.eu</u>



**Unearthed Comics by Sara Zimmerman** 

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### **Editor's Note**

We'll be back at the beginning of next year with the 2019 Winter Edition of the AOH Observer. On behalf of the Observer's staff (Ken, Don, and Susie), and the Officers and Board of Directors of the AOH, we wish everyone a Happy Fall Season. Clear Skies!

Grace Wheeler, Editor, AOH Observer



Heavenly Bodies by Susie Christian