## AOH Newsletter

## Winter 2022

## News and Notes

Fall Activities: AOH has continued its monthly Zoom meetings, and has been able to fit in two Kneeland observing sessions.


Clockwise from top left: Zoom Meetings of September 18, October 9, and November 13; Kneeland Observing Sessions of October 9 and December 4. Bottom right photo by Catrina Howatt, bottom left by Ken Yanosko.


More from December 4 at Kneeland: Above, photo by Johnny Thomas; right, photos by Ken Yanosko.

See some astropix from the December 4 meeting on page 2.


Changes: At the November 2021 General Membership Meeting, Grace Wheeler announced her retirement from the Board of Directors, and Rick Gustafson was newly elected to the Board. Thank you, Grace; and welcome aboard, Rick.



Top row: M13, a globular cluster in Hercules; M57, the Ring Nebula, a planetary nebula in Lyra; M42, the Orion Nebula, a star-forming region
in Orion.

Bottom row left: M82, the Cigar Galaxy, an active galaxy in Ursa Major.
All were taken at the December 4 meeting at Kneeland by Grace Wheeler using an Atik Infinity camera attached to a C6 telescope and processed in real time by Infinity stacking software.

Bottom row right: the computer screen showing the M82 photo being captured, This photo by Ken.


Above: IOMN photo of the Moon taken by Ken from Arcata with a cellphone through binoculars.


The Moon: In addition, club members spent some time either looking at or looking for the Moon. On International Observe the Moon Night, October 16, there was a fair amount of success with clear skies locally.

But that was not the case for the near-total lunar eclipse of November 1819. Locally, it was overcast, with a few holes opening up right at the end, at 2:30 am. Grace writes: "The lunar eclipse from Santa Rosa at about 12:14 a.m.-the moon was coming in and out of the clouds. Taken with an iPhone shakycam. :) There was $10 \mathrm{~min}-$ utes of partial clearing and it is now socked in again."

## Middle: Grace's picture from Santa Rosa.

Bottom: Ken's Screen capture of the livestream from the San Diego Astronomy association.

Top right: Ken's collage of screenshots of the Antarctic eclipse.


The Sun: The only solar eclipse of 2021 was visible only from Antarctica, on December 3 (Pacific Time). NASA did a live video stream from Union Glacier.

Outreach: Kneeland School held a "Trunk or Treat" event on October 30. Mark M and Lisa represented AOH. Mark reports: "It was super pleasant with all the kids around, having a great time! We gave away planet packets and ran out of the favorite, planet Earth! Uranus was popular with the boys too. Averaging Lisa's and my estimates we think we interacted with 50 people. The costumes were fantastic, and we did our part dressing up as Astronomers!"

TV News: In case you missed it, here's a clip from Channel 23's Evening News about Club member Rick Gustafson's astrophotos: https://www.astrohum.org/newsletters/links/Winter2022Ch23clip. mp4.

Reminder: Dues are due for 2022. We'll take $\$ 25$ in cash (hand deliver it to any officer), a check (mail it to AOH, PO Box 351, Eureka, CA 95502), or go to https://www.astrohum.org/membership.html (where you can use either Paypal or Plastic).

The Golden Handle: Once every lunation, about four days before the moon is full, the peaks of the Jura Mountains are bathed in sunlight, while the Bay of Rainbows below is still in darkness. The effect, as seen from Earth in binoculars or a small scope, gives the appearance of a handle affixed to the lighted area of the Moon. See the details in the Winter, 2020 Newsletter. Here is a list of dates and times in 2022 when the Golden Handle is visible from Humboldt County.


The Jura Mountains at sun rise, March 4, 2020. Grace Wheeler.

| Golden Handle Apparitions for 2022 |  |  |
| :--- | :---: | :---: |
| date | time of <br> appearance | time of <br> disappearance |
| Wed Jan 12 | $17: 30$ | $01: 30$ |
| Fri Feb 11 | $13: 15^{\star}$ | $17: 00$ |
| Sat Mar 12 | $23: 00$ | $05: 15^{\star \star}$ |
| Mon Apr 11 | $14: 30^{\star}$ | $20: 30$ |
| Tue May 10 | $22: 00$ | $03: 50{ }^{\star \star}$ |
| Thu Jun 9 | $15: 30^{\star}$ | $16: 30$ |
| Fri Jul 8 | $17: 00$ | $01: 00$ |
| Mon Sep 5 | $17: 30$ | $01: 30$ |
| Thu Nov 3 | $21: 30$ | $03: 30$ |
| Sat Dec 3 | $14: 30^{\star}$ | $19: 30$ |
|  | ${ }^{\star}$ at moonrise | ${ }^{\star \star}$ at moonset |

Online Activities: Cloudy skies getting you down? The Night Sky Network is putting on a webinar on January 10 entitled "When Clouds Take over the Sky." The description is:

What to do when clouds fill the view of your sky? Turn this into a citizen science opportunity! Join the GLOBE Cloud Challenge: Clouds in a Changing Climate from January 15 -February 15, 2022. Your observations documenting what's in the sky are helpful to scientists. Participants are encouraged to download the GLOBE Observer app to start contributing to this volunteer science community.

AOH members who are registered with the Night Sky Network can get more information as well as a link to register for the webinar at https:// nightsky.jpl.nasa.gov/download-view.cfm?Doc ID=703 (NSN login required).

Online Course: The Kalamazoo Astronomical Society is offering a free online course entitled "Introduction to Amateur Astronomy." It will run on every other Saturday from January 15 through March 12. Topics for the five-part lecture series are 1: Our Place Among the Infinities; 2: Discovering the Night Sky; 3: Binocular Basics; 4: Telescope Tutorial; and 5: The Art of Astrophotography. The course descriptions and a registration form can be found at https://www.kasonline.org/ amastro.html. Note that the times listed there are Eastern Standard Times. For us the lectures will run from 10:00am to noon.

Calendar: The AOH Calendar, with historical astronomical events, special astronomical events for 2022, and of course photos of celestial objects as well as photos of celestial observers is now available. AOH members can download it from https:// www.astro-hum.org/members only/calendar.php. You can print out copies for yourself and for your friends.


Upcoming Meetings: We will have Zoom Meetings on January 15, February 19, and March 19; and observing at Kneeland on January 29, March 5 (Messier Marathon), and April 2 (Messier Marathon makeup). All Kneeland meetings are subject to the weather. Watch https:// www.astrohum.org/upcoming.html.

Thanks: To Grace, Rick, Catrina, Johnny, and Mark P for contributing photos for the Newsletter and the Calendar; to Susie for her great cartoon; to Yoon for consulting on Asian Astronomy; and to Grace and Susan for proofreading help.

Ken

## New Technology

You may have read about The Unistellar eVscope, a goto scope with a built-in camera that finds and tracks astronomical objects and downloads photos to your smartphone or tablet quickly and practically automatically.

Well, Grace Wheeler has the eQuinox model and has been trying it out from her backyard. It's a 4.5 inch reflector with a 450 mm focal length and with a Sony IMX224 sensor. Here and on the following page are some of her first results.

All images were live-stacked in the eVscope enhanced detection program. Additional processing was done in Photoshop.

Grace promises to write a review for us and provide details and more photos for the Spring Newsletter.
(R) Bubble Nebula (NGC 7635) -an emission nebula in Cassiopeia. It is actually a huge bubble being blown into space by the stellar winds of a superhot massive star. Exposure 10 min .

(L) Helix Nebula (NGC 7293) -a planetary nebula in
Aquarius. It is located about 650 light years from Earth. Exposure 9 min.
(R) M15-a globular cluster in Pegasus. It is located about 34,000 light years away and can be viewed with binoculars. Exposure 4 min.



## Hare-Brained

## by Ken Yanosko

Look south on a winter's evening; what do you see? Of course The Hunter dominates the sky, with his Big Dog at his heels. But just below Orion, being stomped on, as it were, and perpetually being chased across the sky by Canis Major, is the small dim constellation Lepus, the Hare. Hares are the slightly larger, longer-legged and longer-eared cousins of our cuddly bunny rabbits. In the U.S. we are more likely to call them jackrabbits.

Lepus is one of Ptolemy's original Greek constellations, but doesn't seem to feature in any heroic myths-no one got turned into a hare as a reward for some special feat. Even Aesop's hare was a loser.

But when you're out observing try to tear yourself away from the first and second magnitude splendors of Orion and Canis Major and


Lepus, at the feet of Orion. John Flamsteed, Atlas Coelestis, 1719. (Public Domain)
give Lepus a look. The Alpha and Beta stars, magnitudes 2.7 and 3, respectively, have their own proper names"Arneb" which is Arabic for "Hare," and "Nihal," whose Arabic meaning is "Thirst-Quenching." The latter is inherited from a middle-eastern asterism which depicts some drinking camels. Surrounding Alpha and Beta is the outline of the entire hare, made up of mostly third and fourth magnitude stars.

In the Far East, Lepus wasn't even recognized as a single constellation. The Chinese saw a collection of distinct asterisms. What we see as the ears was a "Military Well" (there was a civilian well nearby); the line from Mu to Epsilon was a folding screen (perhaps to pro-


A modern map of Lepus. The stars' Bayer designations are "Alpha Leporis," "Beta Leporis," etc. Adapted from Stellarium.


Chinese asterisms making up Lepus. Top: "Military Well." Right: "Folding Screen." Bottom: "Outhouse." Adapted from Stellarium, with help from Yoon Kim. vide privacy for what follows); and the Alpha-Beta-Gamma-Delta quadrilateral (the Arabs' camels) formed an outhouse.

In and around the Hare are some other interesting sights. The star R Leporis, otherwise known as "Hind's Crimson Star," is a long-period Mira-like variable that ranges between magnitudes 5.5 and 10.5 . At its dimmest it has the reputation of being the reddest-looking star


Adapted from Stellarium. The outer Telrad circles are 4 degrees in diameter.
we can see with amateur telescopes. It's a carbon star-supposedly the carbon in its atmosphere absorbs blue light letting us see mostly red.
The globular cluster M79 seems to be totally out of place. Most globulars are found around the center of the Galaxy in Sagittarius, and for us they are summertime objects. This leads some astronomers to believe that M79 is not really our globular at all but belongs to the Canis Major Dwarf Galaxy, which is currently being tidally disrupted and absorbed by the Milky Way. I suppose in a couple hundred million years M79 will really be ours, possession being nine points of the law.

Finally there's the planetary nebula IC418, dubbed "The Spiro-


IC 418, The Spirograph Nebula. Hubble Space Telescope photo. (Public Domain) graph Nebula" because of the interesting patterns that show up in the Hubble image. Visual observers don't see these patterns but see the central star as bluish and the outer fringes (perhaps in contrast to the blue) as somewhat reddish-so much so that its pre-Hubble nickname was the "Raspberry Nebula."

So whether you're a deep space fan or just an appreciator of hare-brained (i.e. dim or not very bright) constellations (like me) add Lepus to your wintertime list.

This article is republished from The Conversation under a Creative Commons license. You can read the original article at https://theconversation.com/the-worlds-oldest-story-astronomers-say-global-myths-about-seven-sisters-stars-may-reach-back-100-000-years-151568

# The world's oldest story? Astronomers say global myths about 'seven sisters' stars may reach back $\mathbf{1 0 0 , 0 0 0}$ years 

by Ray Norris

In the [December sky] is a beautiful cluster of stars known as the Pleiades, or the "seven sisters." Look carefully and you will probably count six stars. So why do we say there are seven of them? Many cultures around the world refer to the Pleiades as "seven sisters," and also tell quite similar stories about them. After studying the motion of the stars very closely, we believe these stories may date back 100,000 years to a time when the constellation looked quite different.

## The sisters and the hunter

In Greek mythology, the Pleiades were the seven daughters of the Titan Atlas. He was forced to hold up the sky for eternity, and was therefore unable to protect his daughters. To save the sisters from being raped by the hunter Orion, Zeus transformed them into stars. But the story says one sister fell in love with a mortal and went into hiding, which is why we only see six stars.

A similar story is found among Aboriginal groups across Australia. In many Australian Aboriginal cultures, the Pleiades are a group of young girls, and are often associated with sacred women's ceremonies and stories. The Pleiades are also important as an element of Aboriginal calendars and astronomy, and for several groups their first rising at dawn marks the start of [southern hemisphere] winter.

Close to the Seven Sisters in the sky is the constellation of Orion, which is often called "the saucepan" in Australia. In Greek

mythology Orion is a hunter. This constellation is also often a hunter in Aboriginal cultures, or a group of lusty young men. The writer and anthropologist Daisy Bates reported people in central Australia regarded Orion as a "hunter of women," and specifically of the women in the Pleiades. Many Aboriginal stories say the boys, or man, in Orion are chasing the seven sisters-and one of the sisters has died, or is hiding, or is too young, or has been abducted, so again only six are visible.

## The lost sister

Similar "lost Pleiad" sto-

An Australian Aboriginal interpretation of the constellation of Orion from the Yolngu people of Northern Australia. The three stars of Orion's belt are three young men who went fishing in a canoe, and caught a forbidden king-fish, represented by the Orion Nebula. Drawing by Ray Norris based on Yolngu oral and written accounts. ries are found in European, African, Asian, Indonesian, Native American and Aboriginal Australian cultures. Many cultures regard the cluster as having seven stars, but acknowledge only six are normally visible, and then have a story to explain why the seventh is invisible.

How come the Australian Aboriginal stories are so similar to the Greek ones? Anthropologists used to think Europeans might have brought the Greek story to Australia, where it was adapted by Aboriginal people for their own purposes. But the Aboriginal stories seem to be much, much older than European contact. And there was little contact between most Australian Aboriginal cultures and the rest of the world for at least 50,000 years. So why do they share the same stories?

Barnaby Norris and I suggest an answer in a paper to be published by Springer early next year in a book titled Advancing Cultural Astronomy, a preprint for which is available here. All modern humans are descended from people who lived in Africa before they began their long
migrations to the far corners of the globe about 100,000 years ago. Could these stories of the seven sisters be so old? Did all humans carry these stories with them as they travelled to Australia, Europe, and Asia?


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## Moving stars

Careful measurements with the Gaia space telescope and others show the stars of the Pleiades are slowly moving in the sky. One star, Pleione, is now so close to the star Atlas they look like a single star to the naked eye. But if we take what we know about the movement of the stars and rewind 100,000 years, Pleione was further from Atlas and would have been easily visible to the naked eye. So 100,000 years ago, most people really would have seen seven stars in the cluster. We believe this movement of the stars can help to explain two puzzles: the similarity of Greek and Aboriginal stories about these stars, and the fact so many cultures call the cluster "seven sisters" even though we only see six stars today.

Is it possible the stories of the Seven Sisters and Orion are so old our ancestors were telling these stories to each other around campfires in Africa, 100,000 years ago? Could this be the oldest story in the world?

## Acknowledgement

We acknowledge and pay our respects to the traditional owners and elders, both past and present, of all the Indigenous groups mentioned in this paper. All Indigenous material has been found in the public domain.

Ray Norris is a Professor in the School of Science at Western Sydney University

This article is distributed by the NASA Night Sky Network a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach.


# Check Your Sky's Quality with Orion! 

by David Prosper

Have you ever wondered how many stars you can see at night? From a perfect dark sky location, free from any light pollution, a person with excellent vision may observe a few thousand stars in the sky at one time! Sadly, most people don't enjoy pristine dark skies - and knowing your sky's brightness will help you navigate the night sky.

The brightness of planets and stars is measured in terms of apparent magnitude, or how bright they appear from Earth. Most visible stars range in brightness from 1st to 6th magnitude, with the lower number being brighter. A star at magnitude 1 appears 100 times brighter than a star at magnitude 6 . A few stars and planets shine even brighter than first magnitude, like brilliant Sirius at -1.46 magnitude, or Venus, which can shine brighter than -4 magnitude! Very bright planets and stars can still be seen from bright cities with lots of light pollution. Given perfect skies, an observer may be able to see stars as dim as 6.5 magnitude, but such fantastic conditions are very rare; in much of the world, human-made light pollution drastically limits what people can see at night.

Your sky's limiting magnitude is, simply enough, the measure of the dimmest stars you can see when looking straight up. So, if the dimmest star you can see from your backyard is magnitude 5 , then your limiting magnitude is 5 . Easy, right? But why would you want to know your limiting magnitude? It can help you plan your observing! For example, if you have a bright sky and your limiting magnitude is at 3 , watching a meteor shower or looking for dimmer stars and objects may be a wasted effort. But if your sky is dark and the limit is 5, you should
be able to see meteors and the Milky Way. Knowing this figure can help you measure light pollution in your area and determine if it's getting better or worse over time. And regardless of location, be it backyard, balcony, or dark sky park, light pollution is a concern to all stargazers!

How do you figure out the limiting magnitude in your area? While you can use smartphone apps or dedicated devices like a Sky Quality Meter, you can also use your own eyes and charts of bright constellations! The Night Sky Network offers a free printable Dark Sky Wheel, featuring the stars of Orion on one side and Scorpius on the other, here: bit.ly/darkskywheel. Each wheel contains six "wedges" showing the stars of the constellation, limited from 1-6 magnitude.

Find the wedge containing the faintest stars you can see from your area; you now know your limiting magnitude! For maximum accuracy, use the wheel when the constellation is high in the sky well after sunset. Compare the difference when the Moon is at full phase, versus new. Before you start, let your eyes adjust for twenty minutes to ensure your night vision is at its best. A red light can help preserve your night vision while comparing stars in the printout.

Did you have fun? Contribute to science with monthly observing programs from Globe at Night's website (globeatnight.org), and check out the latest NASA's science on the stars you can - and can't - see, at nasa.gov.


The Dark Sky Wheel, showing the constellation Orion at six different limiting magnitudes (right), and a photo of Orion (left). What is the limiting magnitude of the photo? For most observing locations, the Orion side works best on evenings from January-March, and the Scorpius side from June-August.

## After Words

I never said it. Honest. Oh, I said there are maybe 100 billion galaxies and 10 billion trillion stars. It's hard to talk about the Cosmos without using big numbers. I said "billion" many times on the Cosmos television series, which was seen by a great many people. But I never said "billions and billions." For one thing, it's too imprecise. How many billions are "billions and billions"? A few billion? Twenty billion? A hundred billion? "Billions and billions" is pretty vague. When we reconfigured and updated the series, I checked-and sure enough, I never said it.

- Carl Sagan, Billions and Billions: Thoughts on Life and Death at the Brink of the Millennium (1997)
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Want some vacation inspiration? The folks at JPL have provided a set of free downloadable travel posters at https://www.jpl.nasa.gov/ galleries/visions-of-the-future. The posters include Solar System destinations as well as exoplanet possibilities.

Heavenly Bodies by Susie Christian


Sherlock Holmes and Dr. Watson go on a camping trip, set up their tent, and fall asleep.

Some hours later, Holmes wakes his faithful friend. "Watson, look up at the sky and tell me what you see."

Watson replies, "I see millions of stars."
"What does that tell you?"
Watson ponders a minute. "Astronomically speaking, it tells me that there are millions of galaxies and potentially billions of planets. Astrologically, it tells me that Saturn is in Leo. Time wise, it appears to be approximately a quarter past three. Meteorologically, it seems we will have a beautiful day tomorrow. What does it tell you?"

Holmes is silent for a moment, then speaks. "Watson, you idiot, someone has stolen our tent!"


[^0]:    Above: The positions of the stars in the Pleiades today and 100,000 years ago. The star Pleione, on the left, was a bit further away from Atlas in 100,000 BC, making it much easier to see. Right: A simulation showing hows the stars Atlas and Pleione would have appeared to a normal human eye today and in 100,000 BC. - Ray Norris

