SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

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Eagle nebula (M16). With the sell known Pillars of Creation feature centered. This was taken by Kevin Andrade using a 100mm f/9 refractor and ASI2600 OSC camera from Laguna Hills.

Because of the COVID-19 crisis and ongoing efforts to reduce exposure to the virus:
. **Most but not all in-person club events are cancelled**
. **Use of the Anza site is discouraged**

Please read more about how OC Astronomers has modified its activities on page 2.

Upcoming Events - free and open to the public

Beginner's class	Friday, 4 **March** at 7:30 to 9:30 PM ONLINE This is session 1 of the class. It covers a general overview of celestial objects with some scientific background. Class materials can be downloaded from OCA website.
Club Meeting	Friday, 10 February at 7:30 to 9:30 PM ONLINE "What's Up?": Chris Butler from OCA Main speaker: Dr. Melissa Trainer from NASA Goddard Space Flight Center whose talk will be "Dragonfly: Exploring an Organic Rich Moon"
Open Spiral Bar	Saturday,11 February at 10:00 to 11:30 PM ONLINE Want to socialize? Grab your images, experiences, questions, or none and see your fellow Orange County Astronomers face-to-face.

Please consult the calendar on the OCA website to RSVP (required)

Response to COVID-19 Crisis

COVID-19 continues to affect all our activities. Some in-person club events remain cancelled while others are beginning to occur or are in the process of being scheduled. Cancellation periods for specific events are detailed below. Please see the President's Message for additional information.

Any use of the club's Anza site by members is at their own risk as we have no way of cleaning or sanitizing the site to CDC standards. If you must go to the site, be sure to clean and sanitize surfaces you have contact with and make sure it is cleaner when you leave than it was when you arrived. You must bring cleaning supplies and sanitizer with you as it is not provided at the site. Be sure to take any trash that you generate or find on the site out with you, and please maintain social distancing if anyone else is out there.

If you have any questions, feel free to contact board members or post them to the email groups or through social media. We will do our best to respond, but please bear with us if there is a delay as we all have other responsibilities as well.

We hope you and your families and friends all remain safe and healthy, and best wishes to all of you!

Summary of Cancellations of OCA In-Person Events

Due to the ongoing COVID-19 crisis, all in-person club events are cancelled through at least the following periods:

General Meetings	Cancelled until further notice; please try our virtual meetings instead.
Anza Star Parties	Not yet, more said in the President's Message.
Orange County Star Party	Cancelled until allowed by Orange County Parks.
Outreaches	Suspended again.
Beginners Astronomy Class	Held only as Zoom meetings. Please contact Dave Pearson to attend.
SIG Meetings	Astrophysics SIG has resumed meeting in person. AstroImaging remains cancelled indefinitely, depending in part on availability of facilities and when meetings could go forward safely.

Please check the website, email groups and social media for updates.

From the Editor

Sirius wants photograph submissions from club members

Sirius is running low on pictures. Please send pictures to me along with a brief description of the subject, where the image was taken, and the equipment used.

Ideas for Future articles

The newsletter includes articles from members or about subjects suggested by our members. We seek ideas and writers to cover them. To contribute an article or work with the editor to produce one, please contact me at newsletter@ocastronomers.org .

Due dates for submission of articles, pictures and advertisements

Issue	Due date
March	19 February
April	19 March
May	23 April
June	21 May

President's Message

By Barbara Toy

By the time you see this, we'll have made it through the first month of 2022 – which, as a number of folks have commented, looks a lot more like 2021 and 2020 than we'd like. There's no doubt we've had a bit of a setback recently, Covid-wise. Fortunately the Omicron variant overall doesn't seem to be as virulent as some of its kin even if it's more contagious. As I write this, case counts, hospitalizations and deaths are going up. Hopefully we will be over the peak and all the counts will be going down by the time you see this.

On the bright side, none of this affects the sky and what's up there for viewing or imaging. Some people seem to find it a bit discouraging that the rest of the universe carries on as usual regardless of how much misery we've got going down here, but I find it reassuring. No matter what happens here, the great dances of all those wonderful objects we view in our eyepieces or learn about from researchers and others who delve into the genuine mysteries around us continue unchanged. Peering out into the beauties of our galaxy and universe beyond it can be transporting, bringing a sense of peace away from the tumult of the headlines. And – the James Webb Space Telescope successfully launched and unfurled, a really positive development with the prospect of a lot of exciting research to come.

Back here on Earth, what's in the headlines can affect us directly. The realities of the current phase of the pandemic mean that it's less likely we'll be able to start in-person general meetings again at Chapman University in the near future, maybe not for the rest of this school year. The university's primary concern must be for its students, faculty and staff, and they've been taking some pretty stringent measures to protect them, including (at this point per their website) requiring negative Covid tests of anyone coming on campus regardless of vaccination status. Even if they would let us use the auditorium, which so far doesn't seem to be something they're considering, it would be very hard for us to meet their required standards.

Fortunately, Zoom has been doing well by us for our general meetings. Although I miss seeing people in person, it's undeniably convenient to link into the meetings from home without having to drive to the campus and worry about parking – and Reza has found us some really great speakers who would never be able to attend our meetings in person, which is a very nice silver lining to the dark cloud of Covid. From what I've seen of the list of people attending the meetings, it looks like a lot of you haven't tried them out yet, even though we've had interesting topics for the main talks, recently including stories and insights from a winter at the South Pole and, for our January talk, the upcoming Psyche mission to a metal-rich asteroid. If you haven't tried the Zoom meetings yet, they're easy to attend (the link is on the website), convenient, and, mainly thanks to Reza's hard work in coordinating all of the elements, well organized, professional and well-worth attending.

As to our other club activities, our in-person Outreach events had to be postponed a few weeks in hopes that the Omicron surge will have passed by the new dates. Our Astrophysics SIG, under its new leaders, is continuing with its meetings at the Heritage Museum, following CDC guidelines to minimize risk to those attending. Our AstroImagers SIG is still on hiatus, but there have been a lot of lively exchanges on the AstroImagers email group, with sharing of some really cool images, so the lack of formal meetings doesn't mean there isn't a lot of imaging activity going on.

For those who've been looking forward to restarting of our regular star parties – we're still kind of on "hold" due to the new surge. It seems, at least as of when I'm writing this, that the weather has been doing its bit to limit star party-type activities as well, with cloudy skies and sometimes rain. If you're thinking of going out to Anza for some viewing activities, definitely check the weather forecast – clouds look just as good from home as from Anza and without the need for all that driving. And, if you do go out there, please follow the CDC recommendations on masks, at least when you're indoors, and on social distancing, and continue to provide your own sanitizing as the club doesn't have the resources to sanitize the facilities.

The OCA Election:

You may recall that we had an election for the OCA Board that ended on the day of the January general meeting. It seems the electronic voting option is encouraging more people to vote, which is a very nice development, and yet we still had a few paper ballots so we still have some traditionalists who don't mind going to the trouble of mailing them in. These are appreciated as well. Many thanks to Tim Hogle, who handled what needed to be done with the paper ballots, and to John Hoot, who dealt with the electronic side of it, together seeing us through another successful election.

Much to everyone's shock and surprise, everyone who was on the ballot was elected to the position that he/she was running for, which means that the 2022 Board is the same as the 2021 Board. I'm happy to report that, based on my past experience with everyone on the Board, the confidence expressed by your votes is very well placed. Everyone on our current Board is really great to work with and genuinely motivated by what is in the best interest of the club, even if – every now and then – we sometimes have somewhat different perspectives on what that actually may be (I'm excluding myself here, by the way, though fortunately I can report that everyone on the board seems willing to work with me). Everyone brings a different perspective to our work, and that is part of what gives us our strength. The current Board members have all been willing to take on additional responsibilities when the need has arisen in the past, and I'm sure that will be the case in the year to come as well. I'm really looking forward to working with everyone again in 2022, and I appreciate their willingness to help see us through the continuing challenges the pandemic has brought us.

We haven't exactly been deluged with new prospective candidates for Board positions in the last couple years – in fact, we didn't have any – but eventually we'll need to get some new folks on the Board. One of those new folks could be you… We know our club members all have a wealth of experience that could help the Board meet the challenges that life keeps throwing at us – please do think about getting involved as a potential Board member. October, when we start taking formal nominations, isn't really all that far away. Beyond that, sometimes things happen and we need to recruit new Board members during the year to fill unexpected vacancies – if you have any interest in participating as a Board member at all, it wouldn't hurt to let us know.

And, if you want to have a better sense of what's going on with the club, it's never been easier to attend Board meetings. They're held on Zoom, so you can attend from the comfort of your own home. Please contact Alan, the club secretary, for a link if you'd like to attend.

Meanwhile, I hope you all stay healthy and that the clouds don't get in your way on those nights you really want to be out under the stars!

Advertisements

Buy, Sell or Trade some of your gear? This is where club members can place advertisements. Please contact the editor at newsletter@ocastronomers.org to place an advertisement or to learn more about placing one. There is no cost to club members for non-commercial advertisements in the newsletter.

For Sale	contact	Ron Choi	rongrace2@cox.net	
• Orion StarShoot AutoGuider			further reduced price	$ 200

For Sale	contact	David Cook	1-949-689-0853	
• Celestron wedge #93658 for Nexstar SE5/SE6/SE8 telescopes				Free

The original cost of this wedge was about $400. This wedge has been superseded with an updated version #93665 for a list price about $500, also for the SE6/8 telescope mounts. This wedge was for a Celestron SE8i, which I gave to my grandson, but he uses it in a strictly azimuth mode.

For Sale contact Rick Hull hull3hull3@yahoo.com 949-636-2920 cell

- QSI 6120C OSC CCD camera with Mechanical Shutter $ 1975 +sh

This unit was built before the ATIK acquisition, so you know it was built to QSI quality standards.
Camera body is the "-s" version with mechanical shutter. The front end can be replaced to have an integrated OAG and/or filter wheel. Unlike more economical cameras using only desiccant, QSI 6xx series have a sealed chamber, purged and filled with a noble gas.

Built around the Sony ICX834 with EXview HAD CCD II technology, this 12M sensor is perhaps the best CCD by Sony before ending CCD production - high in sensitivity, low in noise. Pixels are 3.1um for high resolution and image array is 8.8x13.2mm in size. The 3.1um pixels are nearly ideal for those using focal lengths of 600 - 1200mm desiring to achieve maximum resolution, as seeing permits. I believe the Bayer mask is superior to most found on CMOS sensors which are designed for consumer cameras, providing less overlap of the color channel band-passes.

I can provide a few images taken at 770mm focal length out at Anza. Contact me by email.

New, this camera is now $4200, and the ATIK 4120C which is a basic lower-end cousin, is $3K.
On CN I am asking $2175, any OCA member may purchase it for $1975 plus shipping.
Please feel free to contact me with any questions.

For Sale contact Rick Hull hull3hull3@yahoo.com 949-636-2920 cell

- SBIG ST-i Mono; Guide/Planetary camera with mechanical shutter $330

Price includes shipping and PP fees

- 24mm ES eyepiece 82 deg AFOV Argon filled, original box $335

Price includes shipping and PP fees

For Sale contact Jason Oxman jason@oxmans.com 714-519-1896

- Space Shuttle "Columbia" mock up $ 500

10' long X 6'6" tall X 5' wide
Needs some TLC
Needs some plywood repair
Needs a new coat of paint

This Space shuttle stood outside of Oxman's Surplus in Santa Fe Springs marking the store entrance for over 20 years. It was originally from the BOEING AIRCRAFT CO. in Long Beach, CA. Oxman's Surplus is no longer in business and the Shuttle needs a good home.

AstroSpace Update

February 2022
Astronomy and space news summarized by Don Lynn from NASA and other sources

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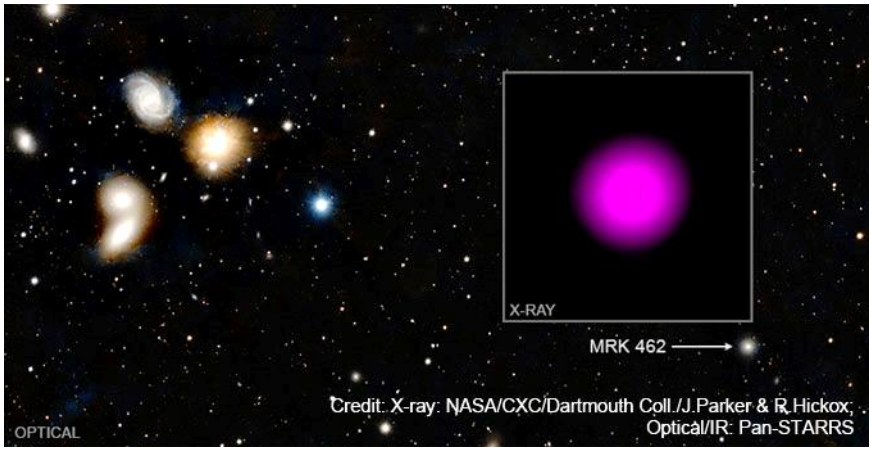
James Webb Space Telescope Launched – On December 25, the Ariane 5 rocket carrying the James Webb Space Telescope lifted off from the European launch site in French Guiana. The infrared telescope is scheduled for a month-long journey towards its final observing location, orbiting Earth's L2 Lagrange point, about a million miles away. The mirrors, sun shield, solar panels and other parts were folded up to fit in the launch vehicle and had to be unfolded in the weeks after launch. All such deployment was completed successfully. The Webb's primary mirror is significantly larger than that of the Hubble Space Telescope, and the instruments are designed to observe wavelengths of light in the near and mid infrared. Observed objects are expected to include the first galaxies in the early universe, Solar System bodies, and exoplanets, including some of their atmospheres. The project has taken 25 years and about $9 billion to build and is designed to operate for 5-10 years. However, the near-perfect trajectory imparted by the launch rocket meant that very little fuel aboard the telescope was needed to reach the L2 area, so that extra remaining fuel should add years to the life of Webb. It may take up to 6 months from launch to complete commissioning work, at which time we can expect to start seeing some amazing celestial images.

New Class of Nebula – A team of astronomers has identified a new class of nebula. It is generated by a binary star during the time in its life where one star swells up as a red giant and it engulfs the second star. This is known as a common-envelope system. The system then ejects part of its envelope to form this new class of nebula. This differs from a planetary nebula because a planetary nebula does not have the companion star engulfed in the red giant. The new nebula class has not been observed before because they expand quickly to huge size, become quite faint, and last only a few hundred thousand years (brief in cosmic time scales). The first example was found by a group of amateur astronomers. Professionals then proved that it was not a known class of nebula. The size of this object is over 15 light-years across. The nebula has about the mass of our Sun and was ejected about 500,000 years ago.

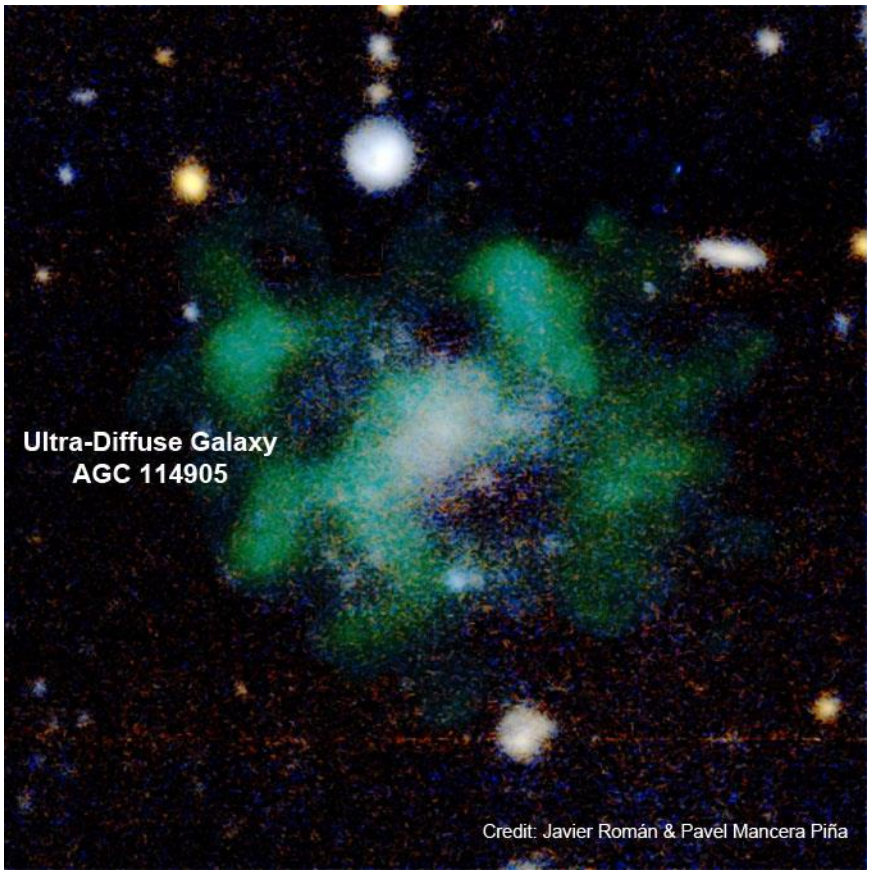
Hydrogen Filament – A group of astronomers has identified in radio light a giant filament of atomic hydrogen 3900 light-years long and 130 light-years wide located in our Milky Way galaxy, near the far side. One of the discoverers is calling the feature Maggie, after the river Magdalena. If Maggie cools enough in the future, it could convert to molecular hydrogen and supply material for star formation. It is now much bigger than any known star-forming clouds of molecular hydrogen.

The Local Bubble – It has long been known that our Solar System is located in a bubble with fewer stars than typical about 1000 light-years wide, which is believed to have been created by multiple supernova blasts over past millions of years. A new study has put together a history of this bubble. A series of about 15 supernovas have exploded in this region over the past 14 million years. Interstellar gas has collected at the edges of the resulting bubble, creating 7 star-forming regions, creating all the nearby young stars that we can see. The Sun's motion about the Milky Way galaxy caused it to enter this bubble only about 5 million years ago, and has now reached a point near the center of the bubble. The study authors plan to use similar techniques to put together histories of other bubbles within our galaxy.



Light Weight Supermassive Black Hole – Researchers using the Chandra X-ray space telescope have found a supermassive black hole at the center of the dwarf galaxy Markarian 462. It has one of the smallest masses of the supermassives, at about 200,000 times the Sun's mass, which is not surprising considering Markarian 462 is a small galaxy. The study looked at 8 dwarf galaxies in X-rays, which had shown hints in visible light that they might contain central black holes, but Markarian 462 was the only one whose X-rays showed that material was falling into a central black hole. The black hole is heavily obscured in visible light by gas. Black holes in this mass range (very low for supermassives) are rarely found. Astronomers hope further study of it might show how black holes grow to the supermassive range. Search for other low-mass supermassive black holes will continue.

Galaxy Without Dark Matter – A few years ago astronomers announced finding that two ultra-diffuse galaxies, named NGC 1052-DF2 and DF4, were found to have essentially no dark matter. Every other galaxy whose dark matter has been measured has much more dark matter than ordinary matter, so the finding has been disputed ever since. Another ultra-diffuse galaxy, designated AGC 114905, has now been found to have little or no dark matter. The dark matter is measured by determining the speeds of gas clouds orbiting the galaxy. Ultra-diffuse galaxies are ones roughly the size of the Milky Way, but with 1000 times fewer stars in them.



Pre-Supernova Observations – For the first time astronomers have monitored a red supergiant star for more than 4 months before it exploded as a Type II supernova. A great increase in brightness of the star was seen by the Pan-STARRS telescope in Hawaii, and that caught astronomers' attention, who then kept watch on the star, which exploded 130 days later. Spectra taken immediately after the explosion showed that exploded material was colliding with material around the star, which was probably thrown off during the brightening 130 days earlier. The supernova was designated SN 2020tlf, and took place in the galaxy NGC 5731 about 120 million light-years away. The star was about 10 times the mass of our Sun before exploding. The few other red supergiants that have been observed before exploding were not caught undergoing a brightness surge. More observations prior to supernova explosions are needed to determine which behavior is typical.

Wolf-Rayet Supernova – Wolf-Rayet stars are very massive stars nearing the ends of their lives. Due to very powerful stellar winds, they cast off a great deal of material to form a surrounding nebula rich in ionized carbon, neon and nitrogen, but lacking in hydrogen. There has been no convincing case of a Wolf-Rayet star exploding as a supernova however, leading some astronomers to propose that they just don't explode. But a new study found that supernova SN 2019hgp had a surrounding nebula with the ions found about Wolf-Rayet stars. So, it appears, at least some Wolf-Rayet stars do explode as supernovas.

Stellar Flyby – Scientists using 2 radiotelescope arrays have found that a star has intruded on the Z Canis Majoris binary protostar system, leaving behind a trail of dust and gas gravitationally strung out. This is probably the best observed case of a star flying through another star system. The flyby caused major impacts on the circumstellar disks that may be forming planets.

Eccentric Black Hole Orbits – Scientists studied the gravitational wave data from the merger of the 2 most massive black holes yet seen by gravitational wave detectors, matching the data to computer simulations of black hole mergers, and concluded that merger was likely between black holes in a very elongated (eccentric) orbit about each other. This may help explain how these particular black holes came to have more mass than theory says should occur in black holes that originated with the collapse of massive stars. Black holes that form in regions dense with other black holes would be likely to devour smaller black holes, and in the process, end up with more than theoretical masses and in eccentric orbits with other black holes.

Magnetar Eruption Oscillations – A team of scientists has measured for the first time oscillations in the brightness of a magnetar during its violent eruption. Magnetars are neutron stars with extremely powerful magnetic fields. About 30 of them are known. Detecting their eruptions is difficult because they last only a fraction of a second. The new eruption was seen in April 2020 by ASIM, an instrument on the International Space Station. The oscillations seen are consistent with their being produced by Alfvén waves in the magnetar's magnetosphere. The event occurred in the Sculptor galaxy group, about 13 million light-years away, the farthest of any known magnetar eruption.

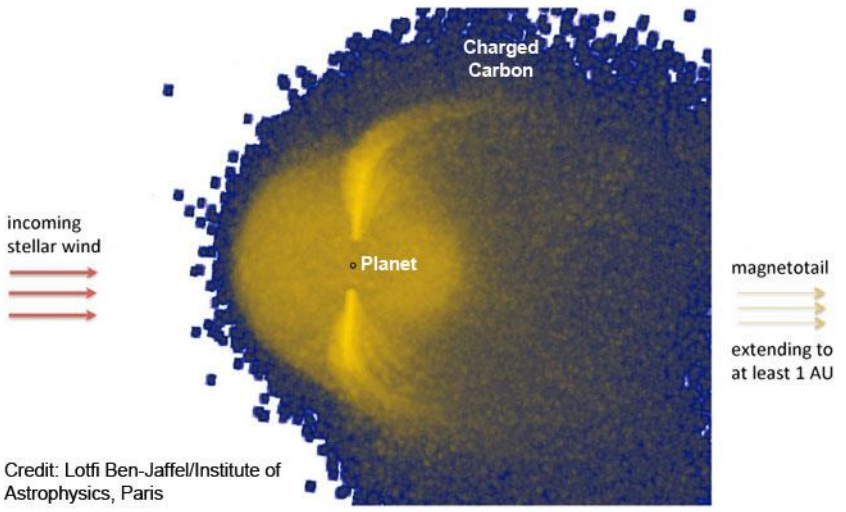
Eccentric Exoplanet – A team of researchers has discovered an exoplanet orbiting a nearby red dwarf star with a very eccentric orbit. The planet is designated TOI-2257 b and is sub-Neptune in size. It was found by its transit of its star by the TESS planet-finding space telescope. Follow-up observations showed it orbits in 35 Earth days. Its average distance from its star is in its habitable zone, that distance where temperatures would allow liquid water to exist on its surface. However, it likely is a gas giant without a real surface, and its eccentric orbit takes it out of the habitable temperature range for part of each orbit.

Free-Floating Planets – Astronomers using several ground- and space-based telescopes have discovered at least 70 more free-floating planets (FFPs), that is, ones that do not orbit any star. They were found in a study of the Upper Scorpius OB stellar association, the nearest area of star formation to us. Also found were about 100 more candidates that may be FFPs. Much work was done, in both visible and infrared light, to weed out other points of light that are not FFPs. This study nearly doubled the total of FFPs known. FFPs are normally extremely difficult to find because they are so dim, but the ones in this OB association are quite young, less than 10 million years old, and so still glow from their original heat of formation. The astronomers involved believe that at least some of the FFPs formed while orbiting stars, but were thrown out by unstable gravitational conditions with neighboring planets. This implies that such unstable conditions can frequently arise in the first few million years of life of planetary systems. If this OB association is typical, then the Milky Way must have billions of FFPs, which are simply too dim to have been discovered.

Doomed Exoplanets – Astronomers have discovered three planets orbiting quite close to their stars and probably losing orbital distance. The closest, designated TOI-2337b, is estimated to fall into its star within a million years. All are gas giants and were discovered by the TESS planet-finding space telescope and then confirmed with the Keck telescope in Hawaii. Their masses are between 0.5 and 1.7 times that of Jupiter, and their diameters range from slightly smaller than Jupiter to 1.6 times that. Their densities range widely, indicating they may have formed differently. Continued observation may allow better estimates of the lifetime the three have left before falling into their respective stars.

Exomoon Candidate – In 2018 astronomers announced the discovery of a candidate to be an exomoon, that is, a body orbiting an exoplanet. The astronomers now announced another exomoon candidate, designated Kepler-1708 b-i. It is larger than any moon in our Solar System, being almost as large as Neptune. It orbits a planet the size of Jupiter, which orbits a star similar to our Sun. The system lies 5700 light-years away. The size of the exomoon's orbit is about the size of Europa's orbit in our Solar System, while the size of the exomoon's planet's orbit is about the size of Mars' orbit. Astronomers have not been able to verify the first exomoon, to move it from candidate to confirmed status, so the second exomoon may remain a candidate for considerable time. Future plans include continuing advanced methods of searching Kepler data for exomoons and using the Hubble or Webb space telescopes to look for exomoons.

Exoplanet Magnetic Field – A team of astronomers used data from the Hubble Space Telescope to find the first evidence of a magnetic field about an exoplanet. The data consisted of ultraviolet spectra showing charged carbon particles forming a halo and tail about the exoplanet. A magnetic field best explains the shape and movement of the particle cloud. The exoplanet is known as HAT-P-11b, is 123 light-years away, and about the size of Neptune. The Earth's magnetic field protects us from charged particles from space. Hence magnetic fields about exoplanets likely make them more conducive to harboring life. This particular exoplanet, however, is likely a gas giant like Neptune, so would not be a good place for life, even with its magnetic field.



Credit: Lotfi Ben-Jaffel/Institute of Astrophysics, Paris

Another Ocean – A new study of old data from the Cassini Saturn orbiter showed libration in the rotation of the Saturnian moon Mimas that is best explained by it having a liquid ocean beneath its icy surface. Unlike Enceladus and Europa, two other moons with subsurface oceans, Mimas shows no cracks or other signs of surface geologic activity. Mimas is heavily cratered, indicating that no surface activity other than impacts has occurred there for billions of years. It is believed that tidal flexing generates internal heat to keep the ocean liquid, but the icy shell is thick enough to prevent surface activity. Computer simulations matched observations best with an icy shell between 14 and 20 miles thick. A more precise measure of the shell thickness could be obtained by measuring the heat radiated by Mimas' surface, an item on the wish list for a future Saturn mission.

Carbon Isotopes on Mars – Mars rover Curiosity has measured unusually high levels of the isotope carbon 12 in analyzing the powder drilled from various surface rocks. On Earth, most concentrations of carbon 12 are caused by bacteria, but there are two other theories of its concentration that do not involve life: ultraviolet action in the atmosphere, or long-past collision with a carbon-rich giant molecular cloud. Curiosity is the first Mars mission with capability to measure carbon isotopes. Scientists are anxious to get more data to try to distinguish what process caused these concentrations of carbon 12.

InSight In Safe Mode – InSight, the Mars lander measuring marsquakes with its seismometer, went into safe mode when a major dust storm reduced the solar panel output to levels too low to maintain full operation. Spacecraft controllers later brought InSight out of safe mode, and are awaiting more output from the solar panels, as the dust storm clears, before turning on the spacecraft instruments.

Ingenuity Flight Delayed – The same dust storm that shut down InSight also delayed the 19th flight of the Mars helicopter Ingenuity. As I write this, the flight has been rescheduled for late January. The flight plan is to fly to the river delta that once flowed into the ancient lake in Jezero Crater, to help Perseverance rover controllers plan its future activities.

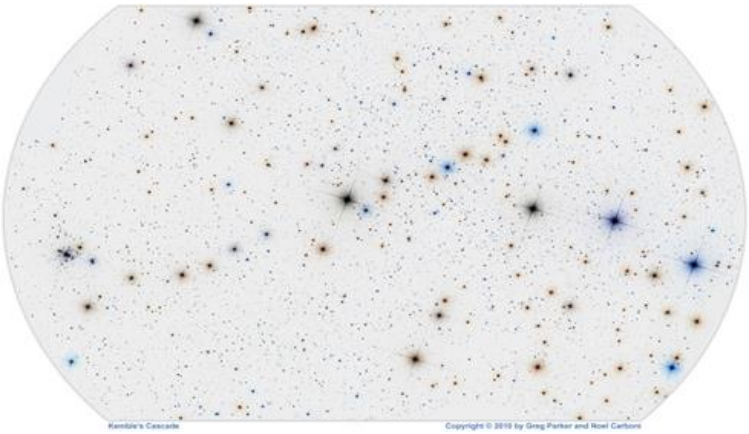
FRB Alerts – Scientists have developed a computerized system that notifies astronomers immediately every time a fast radio burst (FRB) is found by the CHIME radiotelescope. FRBs are powerful bursts of radio energy that last only milliseconds, and their cause or causes are not understood. Some of them repeat from the same source, but many do not. CHIME sometimes finds several FRBs in a day. The system sifts through about a million gigabytes of data every day of operation to locate FRBs. It is hoped that observing the sources of FRBs with other wavelengths of light will shed light on the causes of FRBs.

Another Look

Dave Phelps, February 2022

New moon Jan 31
Full moon Feb 16Snow Moon,
in Cherokee: Kagali
New moon Mar 2

In 1980, Walter Scott Houston, Scotty to his friends, wrote an article in Sky and Telescope about a Franciscan Friar, Father Lucien Kemble who wrote him about an asterism he found in Camelopardalis. Friar Kemble described it as "a beautiful cascade of faint stars tumbling from the northwest down to the open cluster NGC 1502". Friar Kemble used 8x35 binoculars. Scotty called it "Kemble's Cascade" in his column and Friar Kemble went on to found two more binocular asterisms and to have an asteroid named after him.



Thank you to APOD 2010 for Kemble's Cascade

NGC 1502

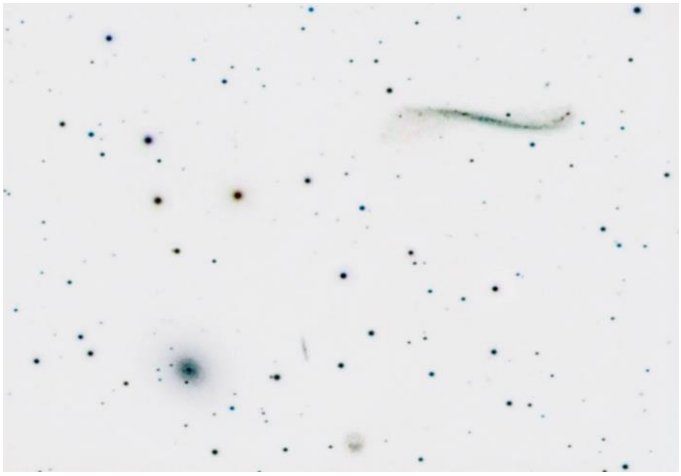
The area you'll be looking is pretty far north, +60 degrees and somewhat west of Cassiopeia. There is nothing there to fix on to help star hop. The Greeks did not name this part of the sky and it wasn't until the 1600's that a camel was placed in that spot. By the 1800's a squirrel (Sciurus Volans), a young man harvesting (Custos Messium) and a reindeer occupied that place in the sky. Eventually it became the Giraffe whom all know and love today.

Scotty also wrote about Stock 23, near Kemble's Cascade. He named Stock 23 Pazmino's Cluster after John Pazmino, who wrote about it also in Sky and Telescope. At one end of the Cascade, the afore mentioned NGC 1502 is an open cluster discovered by William Herschel. NGC 1502 has two rather nice multiple star systems that are easy to see: Σ (Struve) 484 and Σ 485. Σ 484's components are closely matched at 9th magnitude and quite close, 5.3 min, while Σ485 are brilliant in your field of view. 6th magnitude and 18 min in separation.

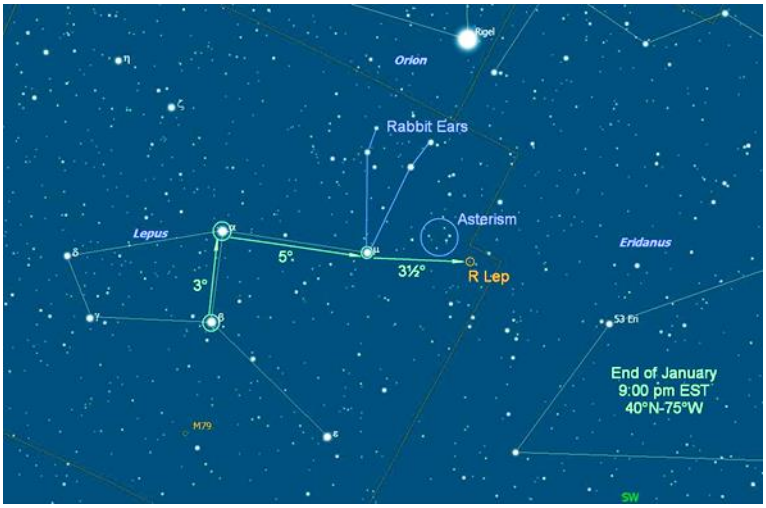
Close by Kemble's Cascade, as was mentioned, is Pazmino's cluster, Stock 23, described, per Pazmino, as "a very compact grouping of four stars, which on inspection become a neat cluster". Look for the orange outlier in the cluster. **Image by Sidney Hall – Uranias Mirror**

When you see UGC or a number preceded by a "U" in your atlas it is referring to the Uppsala General Catalog of Galaxies. It is a catalog of over 12,000 galaxies in the northern hemisphere taken from the Palomar Sky Survey blue plates. We can thank Swedish astronomer Peter Nilson for his hard work. The catalog essentially includes every galaxy mag 14.5 and brighter including particular characteristics like size, shape and degree of obliqueness. We can thank the UGC for galaxy number 3697. Once again, it seems that an object so interesting that it should be common knowledge has popped up on our radar lately. UGC 3697 is called the Integral Galaxy because of it flattened sine wave shape.

The image, from pbase.com shows UGC 3697 and a companion galaxy UGC 3714. The galaxies are pretty far up there, 71 degrees N. Not much between them and the pole. Magnitude is in the 12 and 13 range so a big scope is probably called for. APOD doesn't have an image of them but the National Radio Astronomy Observatory has an image worth archiving at **https://public.nrao.edu/gallery/warped-disk-of-galaxy-ugc-3697-2/.** UGC 3679 is definitely a bucket list item.



Back in the day of f15 Achromats, weight driven clock drives and filar micrometers, positional astronomy and double stars were all the rage. I know I am telescoping time right now, but think of the classic telescope makers like Fitz, Clark, Brashear and their telescopes constructed like fine art. Those long focal lengths, clear light paths and instrumental magic allowed for black backgrounds and usable separation. Struve (Σ) would have used refractors like the Groβen Refraktor in Hamburg, Germany to search for and catalog double stars like the two in NGC 1502. Also important at that time and continuing today is the search for and recording of Variable stars like R Leporus. R Leporis, sometimes called Hind's Crimson Star, is a well-known variable star in the constellation Lepus near its border with Eridanus. It is designated "R" in the chart up top. It is a carbon star which appears distinctly red. "R" has been the focus of some study. It has shown radical magnitude changes over the last one hundred and fifty years and appears to be on every serious AAVSO members radar. It is named after famous British astronomer J. R. Hind, who observed it in 1845.



R Leporis from Wikipedia

You all know about M42, the Flame, the Horsehead, the Belt Stars, all of these beautiful winter objects and asterisms. If you point your telescope at the Orion nebula you will see something almost all professional images lose...the Trapezium. We see it, they blow it out. I imagine one of your smallish APO telescopes with their unobstructed objective will show a spectacular image of the Trapezium. Add a little focal length and objective size and their separation just gets wider and wider.

At the top left of Orion is Betelguese, α Orionis, this orangish star has been getting a lot of print lately about its variability. It's designated a pulsating variable, has a magnitude differential of less than one magnitude, from 0.4 to 1.3 (Bright Star Atlas) and is expected to blow "any day now". It's a pretty star to look at, so if you have your binoculars on R Leporis, might as well look at another orange star in Orion.
Near Betelguese, between it and the belt, is the only part of Barnard's Loop I have seen visually. You guys and girls with your fancy cameras and point on guiding can take 1200 micro-second images, stack them on your computer and come out with something the pro's of thirty and forty years ago would salivate over, much like the image taken in 2004 by a Danish amateur in South Africa. Screw an anti-pollution filter into your Nagler and look through your eyepiece. Go ahead, try it.

Barnard's Loop in Orion

We'll get to the Horsehead, the Flame and environs later.
https://galaxy.phy.cmich.edu/~axel/Astrophotography/images/Orion_HaHaRGB.html

The brightest star in the Pleiades is Alcyone, η Tauri, and the third brightest star in the constellation of Tauris. She is also a beautiful multiple star system with at least four members and a possible fifth companion one second of arc away. (From a recent article I just read, a small group used a masking technique to observe the Pup, Sirius B. Perhaps they'd be interested in a newer challenge?) Alcyone b,c,and d make up a small triangle only a minute of arc from their mother. Although they have not been named officially by the International Astronomical Union I believe we can name these stars Hyrieus, Hyperenor, and Aethusa, the names of Alcyone's three children by Poseidon. Alcyone is half Titan, father Atlas-27Tauri and half Sea-Nymph, mother Pleione-28 Tauri. To further mix their genealogy, Poseidon was god of the sea.


Alcyone (Eta Tau, mag. 2.87)

All of this was to further the goal that you go out with a telescope or binoculars and look at a very nice star. To put Alcyone to rest, her name was derived from the Greek *αλκυων* (*alkyon*), meaning "kingfisher." **https://www.star-facts.com/alcyone/**

While we are looking at orange stars, lets slip back to the Hyades, on the way to the Pleiades and find Hind's Variable Nebula. It's difficult to give a lot of hard data on Hind's, like magnitude and size because it is uh, well, variable. T Tauri, which illuminates the nebula is brightest at about 8ish and fades to about 13ish but was around 14th when Hind found it in 1852. My memory of the nebula was of a small, unassuming and unimpressive object too dim for anyone but a member of the **AAVSO** to spend much time on. Turns out I was wrong.

T Tauri is the prototype of the T Tauri Variable describing a young, hot star still in formation. In fact they (**AAVSO**) say that T is less than a million years old. T Tauri is also a multiple star system one of whom is really young and really wild. By the way: Hind's Variable Nebula (NGC 1555) is also designated Herbig-Haro Object (HH) 155.

I am guessing that Hind's is formed at least in part from gas ejected from a very small star still in the act of construction and throwing off gas as its forming cloud condenses. That is a poor description of an Herbig-Haro Object. Still, go ahead, how often do we see a star in the act of creation. An amazing image of Hind's is found at:
http://annesastronomynews.com/tag/hh-155/ .

While there, be sure to look for NGC 1554, Struve's Lost Nebula. Struve found it, Dreyer recorded it, no one has seen it since. Maybe you'll be the first.

I think we'll close-out this month with two last objects inside the horns of the Bull, one not too far from Aldebaran and one not too far from the Crab, both with some history. You will find NGC 1647 near Aldebaran, a niceish open cluster discovered by Herschel in 1784. The other object, NGC 1746 you may find in one atlas but not another. They say it was "described" not discovered by d'Arrest in 1863 and cataloged as another open cluster like NGC 1647. More recently, however, they are describing it as an asterism, not physically connected. When you look, maybe you can judge for yourself.

-- Dark skies

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