

July 2023

Free to members, subscriptions \$12 for 12 issues Vo

Volume 50, Number 7



Allen Schiano made this picture of the Hercules galaxy cluster (Abell 2151) in May 2022 from a site on Mount Palomar. These were caught using a Mallicam DS10cTEC camera on a Celestron C14HD SCT.

Upcoming Events - free and open to the public

Beginner's class	Friday, 4 August at 7:30 to 9:30 PM ONLINE This is session 6 of the class: An introduction to astrophotography discussing different types of imaging, how different types of cameras are used, equipment and other considerations for taking a good picture.
Club Meeting	Friday,14 July at 7:30 to 9:30 PM In person at Chapman University and ONLINE "What's Up?": from Chris Butler Main speaker: Christopher Go speaking on "Tips and Secrets on Planetary Imaging". The talk will be given in person at Chapman.
Open Spiral Bar	Saturday, 15 July 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.
Star Parties	Saturday, 17 July at the OCA Anza site. >>> Starbeque <<< ??? Irvine site dates are yet to be determined

The monthly club meeting is viewable in progress on Zoom and our social media platforms. The recording is available on these platforms after the meeting is over. https://twitter.com/OCAstronomers https://www.facebook.com/OrangeCountyAstronomers https://www.youtube.com/@ocastronomers

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

President's Message

By Barbara Toy

Just a reminder – the Starbecue potluck party for 2023 will be on the night of the July Anza Star Party, July 15, 2023. Bring some food to share and a desire to socialize with your fellow club members and their guests and come on up to the club observatory around 5:00 p.m. – see you there!

Alan found this picture from when they were playing with a drone at the 2015 Starbecue – it's an overview of what was a very fun event. Hopefully people will remember to take some pictures of the Starbecue this year, too!



July General Meeting – In Person Speaker!

Several people have asked me about whether we plan to have more in person speakers for the general meetings, meaning speakers who come in person to Chapman University to give their talks. Well, our next meeting will feature such a speaker – Christopher Go, who happens to be visiting from the Philippines.

For those who are not aware of his work, Mr. Go is known for his planetary observations and his images of other bodies in our solar system, and his website shows a particular interest in imaging transient events (https://astro.christone.net/). He was the first to discover that one of the ovals on Jupiter had turned from white to red in 2006 and has been involved in follow-up professional research on Jupiter and in other areas in addition to his personal projects as an amateur astronomer and imager.

If you've missed the opportunity to interact directly with speakers in person, do make it a point to come to our meeting on July 14 at Chapman! It would be great to have a good turnout to show Mr. Go that we really appreciate him coming to speak to us in person.

Another Development for the Chapman Meetings

Policies and procedures at Chapman have been changing, and one result is that it looks like we'll be having a closer relationship with their Physics Department. Our new contact there attended our June meeting and enjoyed it enough that she's planning to attend future meetings when she can. She also said that they are planning to have some of the physics professors attend some future meetings, and she seemed delighted when I told her that Chapman students are always welcome to attend as well.

We have made attempts over the years to publicize our meetings to the Chapman community and to let them know that they're welcome to come to hear our speakers but haven't really had much success. This new contact with the Physics Department seems very promising – I think we could be a valuable resource for them, and strengthening the relationship would help us

keep our access to Irvine Auditorium as our meeting venue, which has been a great convenience for our club. We are an educational non-profit, and welcome members of the public to our general meetings as part of our educational efforts; having more people attend from Chapman would be in keeping with those efforts as well. If you happen to meet any visitors from Chapman at any of our meetings, please do make them welcome!

June Star Party

There were a number of people out at Anza for the star party on June 17, 2023, which also happened to be the night of the new moon. We don't often have New Moon on the night of the star party itself – it's usually a few days before or after the star party, which is set on the Saturday night closest to the new moon. If New Moon is on a Wednesday, we have two star parties, on the Saturday nights before and after that Wednesday.

Our calendars as amateur astronomers tend to be driven by the phases of the moon, and the second favorite weekend for viewing/imaging is generally the weekend closest to the third quarter moon. In that phase, the moon rises late, so it's darker in the earlier hours of the night, when most of us are more active; when the moon does rise, that can be a good excuse to go to bed.

For the June star party, there were four of us up in the club observatory, introducing one of the group, who hasn't done much observing, to various objects in the early summer sky. Omega Centauri, properly a southern hemisphere globular cluster, could be seen, but without much contrast as it's now in the sky glow from San Diego County in the early evening. M13, the largest northern hemisphere globular cluster, was pretty spectacular when it got near to the zenith, where the sky was steadiest. It was actually a pretty humid night (we closed down before we got much dew) so a lot of galaxies and nebulas didn't show up as well as on nights with more contrast, but it was nice to see old favorites anyway, including the Whirlpool Galaxy, the Ring Nebula and the Hourglass.

We were rather surprised that we didn't get any visitors from other parts of the site, particularly as there was a family group that came up to see the Kuhn in daylight. Although there seemed to be several people setting up on the Football Field when we went by there earlier, there didn't seem to be people set up on pads on other levels. With warmer days and nights coming, along with the ending of the emergency phase of dealing with Covid (though the virus remains a fact of life we have to continue contending with), we hope to see more of the Anza site in use more often as we all get used to coming out for star parties again. We're also hoping to have the club observatory open more regularly on star party nights, so those on site can come up and do some viewing through the Kuhn.

We had a great night out there, I hope everyone who was at the site did, too, and I hope that those of you who didn't make it out there found other ways to enjoy some nights out under the stars!

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Response to COVID-19 Crisis

Meeting in person: Meeting via Zoom: Coming soon: Cancelled until further notice: Check with Coordinator: Astrophysics SIG, Anza star parties, Beginner's class (July) and **monthly club meeting Monthly club meeting**, Beginner's Astronomy class (other than July this year) Orange County Star Parties AstroImaging SIG Outreach events

Help Wanted (Volunteering Opportunities)

- OC Astronomers Club Representative to WAA (Western Amateur Astronomers)
- Communications Coordinator doing social media presence and announcements to members

AstroSpace Update

July 2023 Astronomy and space news summarized by Don Lynn from NASA and other sources

Distant Galaxies - The James Webb Space Telescope (JWST) has observed the faintest galaxy yet seen, and astronomers dubbed it JD1. Due to its great distance, we are seeing it as it was when the light left it about 500 million years after the Big Bang. It was visible to JWST only because its light passed through a nearer cluster of galaxies whose gravity formed a gravitational lens that magnified and brightened it. This galaxy and others nearly as distant were found mostly to be furiously forming bright massive stars. This star formation was found to proceed in fits, not continuously. More work is needed to determine what caused star formation to temporarily stop. JWST observations have already found hundreds of galaxies seen as they were less than 600 million years after the Big Bang. Previous to JWST only dozens of such galaxies had been observed.

A study of galaxies seen by JWST at 900 million years after the Big Bang showed that most are surrounded by huge transparent bubbles of ionized hydrogen. The bubbles were detected by their effect on quasar light shining through them. Unionized hydrogen absorbs ultraviolet light, so previous to the hydrogen being ionized,



the Universe was in a time known as the "cosmic dark ages" because that hydrogen blocked ultraviolet light. It is thought that most of the Universe's hydrogen was ionized by about 1 billion years after the Big Bang, so the galaxies at 900 million years show the ionization process nearing completion. Astronomers have argued over what was the cause of the ionization that ended those dark ages, but these new JWST observations support that the bright light from furious star formation was the cause.

Binary Black Hole Quasar - The distant quasar known as OJ 287 has long been suspected to contain two supermassive black holes rather than the usual one found in quasars. OJ 287 has been found in archived images taken as far back as 1888. So, any theory of its structure has to match more than a century of observations. Those observations showed that about every 12 years OJ 287 outbursts for weeks, and it also has a repeating pattern every 55 years. A new study shows that the 12-year cycle is caused by the orbital period of the pair of black holes, while the 55 year one is due to the wobble in orientation of the pair. The black holes have masses of 18 billion times that of the Sun (one of the most massive black holes known) and 150 million times the Sun. New analysis showed that flarings of the



quasar match when the orbit of the smaller black hole plunges it through the accretion disk surrounding the larger black hole. Observations in multiple wavelengths of light during the predicted accretion disk plunge of 2021-2022 confirmed the binary nature of the black holes. The brightest flaring lasted only one day, but astronomers were waiting for it. Observations showed a surprising flare in gamma rays, which is now being attributed to the smaller black hole having a jet that hit the accretion disk. Theoretically the orbiting black holes should be producing gravitational waves that would be detectable with pulsar timing measurements, but the waves would be out of the frequency range detectable by the LIGO gravitational wave detectors.

Intermediate-Mass Black Hole – Black holes almost always exist in one of only two sizes: stellar size, with several times the mass of our Sun; or supermassive, with millions or billions of times the Sun's mass. Extremely few black holes have been found to have masses between these extremes and have been dubbed intermediate-mass. A new study of more than 10 years of Hubble Space Telescope observations of the nearest globular cluster M4 shows motions of stars indicating they are orbiting an object of about 800 times the Sun's mass at the globular's center, making it an intermediate mass black hole. Other sources of this much mass were ruled out by this study. Previous searches of other nearby globulars have resulted in hints of massive objects, but not conclusive evidence that they are black holes. Black holes are very difficult to observe when they are not consuming material, so globulars may well be hiding more black holes.

Actively Feeding Galaxies Studied – A new study of more than 290,000 galaxies shows that midsize and dwarf galaxies relatively isolated from other galaxies are more likely to have actively feeding central supermassive black holes than similarly sized galaxies in regions crowded with galaxies. This was found not to be true of large galaxies however. Less than 20% of all galaxies live in isolated regions. Previous studies have had difficulty finding actively feeding galaxies because many of them are shrouded in dust. This new study used wavelengths of infrared that penetrate dust better. It found 20,000 actively feeding galaxies to the process of channeling material gravitationally into central black holes.

Milky Way's Black Hole Activity – The space telescope Imaging X-ray Polarimetry Explorer (IXPE) has observed X-ray echoes bouncing off molecular clouds near the center of our Milky Way galaxy. Polarization measurements, along with observations from two other X-ray space telescopes, show that the flash of X-ray light that caused these echoes came from the galaxy's central supermassive black hole. The distance that the echoes have traveled indicates the flash occurred about 200 years ago. Although that black hole is largely inactive now, it must have consumed quite a bit of material, causing the X-ray flare, sometime in the early 1800s.

Fast Radio Bursts (FRBs) are short but powerful flashes of radio waves. Some have been found to repeat from the same location, but others have not. The cause of FRBs is hotly debated. A new study using the Canadian CHIME radiotelescope doubled the number of known repeating FRBs to 50. This study found that some repeating FRBs produce less than one burst per week. The study team concluded that all FRBs might be repeating if observation continued long enough. CHIME is designed such that it observes most of the sky at once, which helps immensely to capture FRBs when no one knows where in the sky the next one will occur.

White Dwarf "Pulsar" – Pulsars are neutron stars that give off pulses of light (including radio and other forms of light) with each rotation. However, one white dwarf star, AR Scorpii, is known to behave like a pulsar. A second white dwarf acting like a pulsar has now been discovered. It is known as J1912-4410, which is actually an abbreviation for an even longer string of characters. The two each consist of a rapidly spinning white dwarf with a red dwarf star orbiting it so closely that the companion dropped material onto the white dwarf. This dropping of material is what spun the white dwarf up to its current rapid spin. The pulsing is believed related to strong magnetic fields, but more work is needed to understand this completely. The two white dwarfs are cool as white dwarfs go, which indicates they are fairly old. The new white dwarf pulsar was found in an all-sky survey made by the eROSITA X-ray space telescope and found to pulse by the XMM-Newton X-ray space telescope.

FU Orionis – The variable star FU Orionis brightened about 7 magnitudes in the 1930s and has shown only small variations since. It is known to be a binary star still in its formation stages. One component has a Sun-like mass, and the other is smaller. Computer simulations of a still-forming binary star have now been able to match the observations. The huge brightness change was caused by a forming planet being absorbed into an accretion disk. It has remained bright because material in the disk continues to be consumed by the stars. FU Orionis has become the prime example of a class of stars that have been found to behave similarly. When the pair finishes their star formation phase, the system may well have formed planets that orbit both the stars.

Enceladus – JWST observed Saturn's moon Enceladus and found its geysers that have long been known to be spewing water ice and vapor are creating a much larger cloud than seen before, owing to JWST's greater sensitivity. The vapor was measured at more than 6000 miles across and was spewing out at 79 gallons per second. Some of the vapor ends up in the planet's E-ring and some drifts off to other parts of the planet and ring system.

Solar Wind Source – The Parker Solar Probe spacecraft on its most recent approach to the Sun observed what are believed to be sources of the fast solar wind. The solar wind comes in two different speeds, and these observations dealt with the faster variety. Streams of high-energy particles were found in the locations of supergranulations within coronal holes, so these are now believed to be the source of the fast solar wind. Areas of the Sun form which magnetic field lines emerge that don't loop back to the Sun are known as coronal holes. Supergranulation is where the large convections of hot gas rise to the surface of the Sun. It has now been posited that breaking and reconnecting of magnetic field lines in coronal holes provides the energy to accelerate charged particles to the speed of the fast solar wind. Parker has made observations of the Sun closer than ever before, allowing these new findings to be seen for the first time.

Geminids – Parker has also been observing the size, composition, speed and direction of particles in the orbit of the Geminid meteor shower. The parent body that sheds Geminid material is an asteroid (3200 Phaethon), while most meteor showers are parented by comets. The leading theory of how the asteroid sheds particles is that its close passages to the Sun bake material off its surface, adding to the particles with each orbit. However, computer simulations of material coming off the asteroid show that the best match to the Parker observations is when most of the material comes off the asteroid at one time, such as would happen when a smaller body collided with Phaethon.

Exoplanet Observations – JWST measured the temperature of the exoplanet TRAPPIST-1 c, one of 7 rocky planets that orbit a red dwarf star 40 light-years distant. The dayside temperature was found to be about 225°F. The planet is about the size of Venus and receives about the same radiation from its star. However, the JWST observations show the exoplanet has little or no atmosphere, with no clouds, unlike Venus, which has a very thick carbon dioxide atmosphere with complete cloud cover. Previous observations have shown the adjacent planet in the system, TRAPPIST-1 b, likely has no atmosphere. It has been debated whether the strong X-ray and ultraviolet radiation characteristic of young red dwarf stars would strip away the atmospheres of their planets. These 2 planets tend to confirm that stripping. Further observations of TRAPPIST-1 b and c are planned.

Axiom-2 Mission – The second Axiom mission of private astronauts has visited the International Space Station for 10 days. The 4-person crew used a SpaceX Dragon spacecraft launched from Florida. It was commanded by former NASA astronaut Peggy Whitson, the most experienced American space traveler. The crew included an American businessman and two Saudi citizens. They performed more than 20 scientific experiments in space, as well as public relations and commercial activities.

Last Kepler Data – The Kepler exoplanetfinding space telescope ran out of fuel to stabilize it in late 2018, ending its mission, but astronomers have just finished analyzing its data. Its last observing session was the hardest to analyze because it



degraded, then abruptly ended early due to the fuel issue. Three more planet candidates were found in this last session data, and two of those have been confirmed. They are two hot (due to proximity to their star) mini-Neptunes and one of Neptune size. One of the big surprises from Kepler is that the most common size of exoplanet is in between that of Earth and Neptune, a size that does not exist in our Solar System.

LIGO Resumes – The two LIGO gravitational wave detectors have been offline for about 3 years for upgrades that should double their sensitivity. An observation run planned for 20 months has begun. They are to be joined by observation runs of the European Virgo and Japanese KAGRA gravitational wave detectors. In the previous runs LIGO and Virgo have detected about 90 gravitational waves, all from merging of black holes or neutron stars. Expect great discoveries from this run.

Exoplanets Named – The IAU is the authority to give official names to objects and features in the sky. They held a contest



to name 20 exoplanets and their stars that will soon be observed by JWST. Themes that could be followed for future namings and references to diverse cultures were encouraged. 603 entries were received. Winners included the Cherokee words for eagle and star. Other cultures represented include Thai, Kenyan, Greek, Basque and Cameroon. A red star and a blue planet were given red and blue names in other languages. **Mercury Flyby** – The joint European-Japanese spacecraft BepiColombo made its 3rd pass by its final target Mercury, using the opportunity to test onboard instruments and take pictures. The plan is to fly by Mercury 6 times, each to gravity slingshot closer to the speed necessary to orbit the planet. There is also a large solar electric ion engine to help attain orbital speed. The mission is actually 2 spacecraft attached until they go into orbit (scheduled for December 2025) then separate into a high and a low orbit. Only 2 previous missions have visited Mercury: Mariner 10 and Messenger.

Psyche Progress – The Psyche mission to visit the asteroid of the same name was about a year ago declared behind in development such that it would miss its launch date. An investigation released its findings last November on the causes of the delay and steps to be taken to remedy those causes, including changes in staffing, communication and management. A new evaluation has found that NASA and JPL have made exceptional progress in those remedies, not only for the Psyche mission, but also for other missions. The Psyche mission could have been canceled. However, Psyche is now on track to launch in October this year, resulting in arrival at the asteroid in August 2029. Earlier plans had it arriving



in 2026. Psyche is likely metallic, as opposed to most asteroids, which are rocky.

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Contact Bill Prats <u>b.bill.p@gmail.com</u> Shipping is extra. All items can be picked up in Huntington Beach.					

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•	Mars Hill Pad	I # MH-05 OCA lic	ense is up for sale.	. Includes solid equatorial pier.	\$ 2300 obo
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 For Sale contact Val Akins akins7821@gmail.com 949-301-5956 Telescope: Orion's Sirius 8" Go-To Reflector, Focal Length: F6, 1200 mm, Case: for 8 x 6 OTA Mount: Sirius EQ-G Go-To Equatorial with tripod Controller: Synscan 42,000 Celestial object database Lens: Siriusplossl 26 mm Viewfinder: 8 x 50 mm Rt. Angle Note: Equipment is used, but all functional 	\$ 1200
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For Sale contact William Lee wlarch@socal.rr.com • Vixen A70Lf #2602 Optical Tube Assembly wlarch@socal.rr.com New, in factory sealed carton. Very light weight with very sharp and color free optics. Includes finder scope, two eyepieces, star diagonal, tube rings, and Vixen mounting plate. Pickup in the City of Orange, or at the Monthly Meeting Reference Link for detailed description: Vixen A70Lf 70mm f/12.9 Refractor Telescope - OTA # 2602 (agenaastro.com)	\$ 120
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 For Sale contact David W. Pearson p.davidw@yahoo.com Star Splitter 20 inch Dobsonian telescope with servo-cat go-to capability Includes 8 eyepieces, laser collimator, telerad, plus more If the equivalent was bought today from Obsession, it would be \$15385+shipping without extra accessor Intes MK66 6" f/12 Maksutov-Cassegrain OTA includes rings/dovetail, case, finderscope, and diagonal These items are local pickup only. If interested please send me email requesting a complete description. 	\$ 8000 obo ies \$ 800 obo
For Sale contact Eric Jonk eric.jonk@att.net 949-501-6742 • Telescope: Celestron NexStar 11 GPS with HD mount, 9x50 viewfinder & 40mm Plosol eyepiece Includes JMI carrying case, AP 2" visual back, WO 2" star diagonal + more	\$ 750
For Sale contact Ami Dvir amiaddvir@gmail.com 949-294-1073 • Eyepiece Celestron X-CEL : 12mm,9mm,7mm, with boxes and all 949-294-1073 • Eyepiece Meade 5000 PWA 28mm [like new in the box]. list price is \$330	\$ 170 \$ 220

From the Editor

Due dates for submission of articles, pictures and advertisements

Issue	Due date		
August	22 July		
September	19 August		
October	23 September		
November	21 October		

Another Look

Dave Phelps July 2023

New moon July 17th. Full moon July 3rd

July's new moon is called the Buck Moon. Some Native American tribes called it the Thunder Moon and the Hay Moon. In Europe the full moon is also referred to as the Budding and Birth of Spring. The Anglo-Saxons called it Egg Moon, the Celts had names like New Shoots Moon, Seed Moon, and Growing Moon, Claiming Moon and Horse Moon. In France its Pleine Lune de Juillet, in Germany Juli Vollmond and in Spain, Luna Ilena de Julio.

Check your ephemeris. There are a number of lunar-planet and planet-planet conjunctions this month and a lunar occultation of Delta δ Scorpii.

I have always liked July astronomy. It is finally shirtsleeve weather, and we can do galaxy and globular hunting hopping up and down the sky. Looking up we see two constellations centrally located for us at 8:00 pm in the middle of the month: Libra and Corona Borealis.

Integral to a modern discussion of Corona Borealis (CrB) has to be the Corona Super Cluster, concentrated near Beta and roughly enclosed by the larger circle. Thankfully to George Abell (I met him in the early 60's) we have smaller discrete groupings to help us organize at least a portion of the structure, though much of what we know is not in optical wavelengths. Even with our telescopes, though, we can see and image foundation galaxies and patterns of galaxies in every Abell object. This job was once reserved for pros but is now an objective well within the range of many of our members. For the record, Scotty Houston would consider this a worthy endeavor.

The CrB supercluster contains the galaxy clusters Abell 2056, Abell 2061, Abell 2065, Abell 2067, Abell 2079, Abell 2089, and Abell 2092. Of these, Abell 2056, 2061, 2065, 2067 and 2089 are gravitationally bound and in the process of collapsing to form a single massive cluster.



There are in excess of 400 galaxies in the supercluster, Abell 2065 being the largest galaxy cluster within the supercluster.

There are individual galaxies in CrB. Abell 2162 has NGC's 6085 and 6086. Others like 6001, 5961 and 5974 can be seen. Remarkable about the CrB supercluster is its membership in a much bigger picture. The X on the map above marks the apparent center of the Hercules-Corona Super Cluster, i.e. the Great Wall, the largest structure we have found in the observable universe, about 11% of our current size of the universe. Imagine that I have also placed that X on the Sidney Hall painting of Hercules just below the second "R" in Cerberus and CrB to show the approximate location of the center of the great wall.

The story of Corona Borealis is rather standard myth, but the circlet has been around as an identifiable asterism since Babylonian times when it was called a bowl. In Australia, the aborigines called the constellation after their boomerang and American Indians pointed the stars out as the "Celestial Sisters", one being the wife of the hunter White Hawk, our Arcturus and to the Celts she was a Fairy Princess



The Greeks, of course, managed to confuse the whole matter with conflicting characters and stories. The nexus of the legend revolves around a woman named Ariadne. Spencer in the "Fairy Queen" says

Look: how the crowne which Ariadne wore Upon her yvory forehead... Being now placed in the firmament, Through the bright heavens doth her beams display, And is unto the starres an ornament, Which round about her move in order excellent.

Ariadne was the lady who gave Theseus the spool of yarn used to escape the labyrinth after his fight with the Minotaur. So Theseus takes Ariadne to the Greek island Nexus (Naxos) where he promptly abandons her. A real jewel he turned out to be. All is not lost for fair Ariadne, however. She found another guy. Some say Bacchus, some say Dionysus. Upon their nuptials, she was given a crown that was placed in the sky in her honor.

There are two stars and two galaxies worth looking up. In Abell 2162 are 12th magnitude galaxies NGC 6085 and 6086. You should be able to place both in your field of view. 6086 is one of those huge elliptical galaxies with a bright nucleus. N6065 is identified as spiral/elliptical. You choose.

There are two variable stars worth your notice, also. T Coronae Borealis is a recurring nova. It is nicknamed the Blaze star. Usually, it sits down near 10th magnitude, but suddenly can rise to as bright as 2nd magnitude. It is quite near Epsilon, so check it out visually and if you see a star there email the AAVSO. R Coronae Borealis is a variable because of its cloud of dust that obscures its face. It normally sits at 6th magnitude before abruptly plunging down to 14th, then recovering slowly and erratically.

Over 3000 years ago, in Babylon, the stars we now know as Libra were called the "Balance of the Heavens" while the Egyptians showed a set of scales on the Denderah Planisphere. It is also interesting that the Egyptians did not include the beam of the scales in their cosmology. Rather the beam, termed Milometer or Nilometer, was used as a measure of the flooding of the Nile.

Up north in Persia and surrounding regions Libra was a man holding a scale in one hand and a lamb in the other. It was the usual form of weight at that time in the east. Later the Chinese called it the "Celestial Balance", but in early China it was the Dragon.

Greeks called it *Erafiok*, Weigh-beam. The sacred books of India mention it as Tula, the Tamil, Tulam or Tolam, somewhat translated as a Balance, plus, on the zodiac of that culture it portrays a man bending on one knee and holding pair of scales.

Both the Greeks and the Arabs identified the stars as the Scorpion's claws and that identification can still be found in its brightest stars names, Zanenelgenubi and Zubeneschamali, in Arabic meaning the northern and southern claw. The Romans named her for a set of balances though even Ptolemy in 150AD still referred to the stars as a scorpion's claws.

Centuries were interesting times in Libra's life. Early Romans likened her to a token, believing Rome was founded under her auspices. From the Greeks to the Farnese Atlas some 200 years AD the constellation was transformed to the set of scales we now know. Eventually Libra became associated with the scales held by Virgo, representing either Dike or Astraeia, the goddess of Justice. <u>https://sci.esa.int/web/gaia/-/53265-sculpture-of-atlas-with-farnese-globe</u>.

During Rome's founding and ascension Libra was favorably placed as the balance between day and night and the seasons.

"Then Day and Night are weigh'd in Libra's Scales Equal,"



<u>Manilius,</u>

and

"bear the Scales, when hang in equipoise The night and day."

Longfellow

Also, for the Romans per Virgil:

"But when Astraea's balance, hung on high, Betwixt the nights and days divides the sky, Then yoke your oxen, sow your winter grain, Till cold December comes with driving rain."

The sun was in Libra at the autumnal equinox up until 3000 years ago when precession moved it to Virgo.

NGC 5897 is an 8th magnitude globular cluster found on the line from gamma to sigma (Brachium). You will find it interesting because it is rather loose. The image shows it to be a little more concentrated than it actually is. It's XI on the SHS classification which is about as loose as you can go. It would be great if one of our CCD experts were to image 5897 across the whole frame of the chip. I imagine that would be a spectacular shot.

Near 5897 is Merrill 2-1, PK 342+27.1, a very small 11^{th} magnitude planetary. I never found it. The charts show it next to a star (9th mag.?). Finding it visually will be a bear and I have no idea how you would image it. The catalogs tell us it is 16" of arc across. That's about $1/_3$ the apparent diameter of Tycho in your telescope.

NGC's 5903 and 5898 are two elliptical galaxies very close in your field of view. They are not perfect, but certainly fraternal twins, both 11th magnitude and 2ish to 3sh min. of arc. They are classified E1, so they are almost perfect circles.



https://www.astrobin.com/goxcku/?q= 5897



Above Beta β , Zubeneschamali, is a small patch of sky with three rather interesting but completely different objects. We have delta δ , Zuben Elakrabi, an Algol type variable that changes a whole visual magnitude from 4.9 to 5.9 in just over two days. Then we have Gliese 581, an 11th magnitude M class, very red star, that is very near to us and has three planets. Also right there is NGC 5812, another nearly perfectly circular elliptical galaxy easily visible at 11th magnitude and 2' across.

Another system we know about is Gliese 570, on a line between alpha a and sigma σ . Gliese 570 is a 5 star system with maybe a brown dwarf and maybe a planet. It is 5th magnitude and very orange. The two primary companions B and C each have a red dwarf companion. B is 9th and C is 11th, good luck splitting them.

Look for NGC 5885 near Zubeneschamali, Its a 3'x3' face on spiral of 11th magnitude with a hint of a bar. There are a number of galaxies east of the line between alpha and sigma. One of them is NGC 5728, a ¾ face on spiral. Many of the galaxies here The NGC/IC Project are in the 11th to 14th magnitude, perhaps making their observation a little project.

Square in the middle between beta and sigma is NGC 5892, a 10th magnitude open face spiral with wide arms. Resolution will be difficult.

Quite some years ago Walter Scott Houston wrote:

"At first, time spent under crystalline starlight has all the flush and romance of a soft embrace on a warm summer's eve".

He spoke of moving past the romance of astronomy and challenging ourselves with binoculars, then smaller and then larger and even more massive telescopes. He would be just as much in love today when so many amateur astronomers have moved from huge mirrors to Richey-Chretien optics to apochromates with stunning optical performance and larger and more sensitive CCD chips. We have amateur astronomers and astro-photographers today who are producing images that rival the best of the professionals 50 years ago. We have others who have used larger instruments that vault over the NGC and IC to visually observe fainter and more difficult objects. We have amateurs who study the massive amounts of data collected by professionals and discover previously unknown planetary, emission, globular and any and all types of extra-galactic object.



Scotty would have been 110 years old this year. He felt immense gratification at the promises of amateur astronomy while he was still with us, and I have no doubt he would feel the same gratification at the place amateur astronomy is today.







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