IO - May 2023

Eugene Astronomical Society, PO Box 591, Lowell, OR 97452
www.eugeneastro.org
Annual Club Dues $25
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Secretary: Randy Beiderwell 541-342-4686
Additional Board members:
Dan Beacham, Ken Martin, Robert Asumendi.
EAS is a proud member of The Astronomical League

Next Meeting Thursday, May 18th, 7:00 p.m. ZOOM ONLY.

Interstellar Wayfarers and Life in Our Galaxy

by Mel Bartels

Our May meeting will feature Mel Bartels speaking about two related subjects: Objects drifting from star to star and the possibility that some of them might be evidence of life elsewhere in our galaxy.

Mel writes: My talk is inspired by two brilliant experts: Chris McKay, leading NASA astrobiologist and planetary scientist, on where life may have originated, and Michael Wong, planetary scientist and astrobiologist at Carnegie. I'll present some of their latest thoughts. I'll touch on:

•Oumuamua: Extraterrestrial asteroid or alien artifact?

•Prospects that life on Earth originated elsewhere, panspermia, perhaps beginning on Mars or even from outside the solar system.

•The role that the Vera Rubin (LSST) telescope will play. It's very unlikely that we will visit extraterrestrial planets; instead we will observe them with telescopes.

•How we might eventually seed our galaxy with life from Earth.

•Defining life and lyfe, explaining their differences.

•How we look for biosignatures with JWST. And how we will know unambiguously that we've detected life outside our solar system.

•Chatbots and neural networks: how they work.

•Looking for cyberlife.

•Asymptomatic burnout and homeostatic awakening: prospects that we will turn away from the stars.

Mel now lives on the other side of the Cascades, so **this meeting will be held via Zoom only.** The link will be provided a few days ahead of time via our email list.

Next First Quarter Friday: May 26th

Our April 28th star party was a great success despite high clouds that drifted in just before dusk (and drifted out around midnight just as the star party was winding down — Arrrgh!) We had about a dozen telescopes and probably three times that many guests. The Sheldon High club brought their scope and several observers, too. Fortunately the Moon punched through the clouds and provided a great subject all night, with the Straight Wall at its best and Clavius just emerging from shadow. Venus at half phase (matching the Moon) and Mars also made popular targets. Sucker holes provided views of a few clusters and double stars too. The temperature stayed shirt-sleeve warm all night, and everyone seemed to be having a great time. All in all it was a good start to the summer star party season.

Our next star party will be May 26th. First Quarter Fridays are laid-back opportunities to do some observing and promote astronomy at the same time. Mark your calendar and bring your scope to the College Hill Reservoir (24th and Lawrence in Eugene) and share the view with whoever shows up. Here's the schedule for the remainder of 2023. Star parties start at dusk or 6:00, whichever is later. (9:00 on 5/26.)

May 26 (45% lit)
June 23 (30% lit)
July 28 (82% lit)
August 25 (68% lit)
September 22 (53% lit)
October 20 (38% lit)
November 17 (24% lit)
December 22 (84% lit)

Dark Sky Star Party at Dexter State Park: July 15

April Meeting Report

What's Up
by Sylvia Collazo

Telescope Tune-Up
by All of Us

Our April 20th meeting was a four-parter. We kicked off with a great "What's Up" presentation from Sylvia Collazo, who gave us a tour of what to look for in the next month, including a challenge to observe the extremely thin crescent Moon on the evening after the club meeting. (Frank Szczepanski did manage to see it from the airport that night!)

After Sylvia's talk, Justin from the Science Center showed us the planetarium program "Two Small Pieces of Glass: The Amazing Telescope." It was neat to see a full-dome presentation, and several people remarked afterward that we should do more of them.

After the planetarium show, Jerry Oltion gave a talk on how to collimate a Newtonian telescope. Then

Club members gather around to help tune up telescopes and learn how to collimate optics.

we turned up the lights and got to the actual hands-on part of the meeting, where club members helped visitors who had brought in their scopes for tune-up. We had half a dozen of them with various needs, and we managed to get most of them up and running.

Jerry had also set up a demonstrator scope for people to practice collimating, which proved to be a popular activity. Jerry would screw up the collimation, then invite a volunteer to re-collimate it step by step as Jerry explained the how and why of each procedure. Several volunteers gave it a try, including Halie, the organizer of the Sheldon High astronomy club. The experience of watching how simple it is to align the mirrors helped people get over their fear of messing with the telescope, which is generally a good thing.

Robert Asumendi helps collimate a telescope.

We need volunteers to do more "What's Up" presentations and main-event presentations in upcoming months. Please consider doing one! The idea is to give everyone a chance to contribute to the meetings and get us all used to speaking to the group, with the hope that more of us will feel comfortable contributing to the club. So please give it some thought. Previous speakers will be happy to help you out. Contact Amy, Andy, or Jerry to get on the schedule.

Jerry Oltion leads a collimation exercise with his travel scope.

Step out this Spring to see the Zodiacal Light

by Mel Bartels

Now that winter is in the rearview mirror, the Sun is out, and nature is stirring from animals to flowers and insects, it is time to look for a special treat in the western skies after sunset, the Zodiacal Light.

Best seen twice a year in the evening spring skies and again in the autumn morning skies, the Zodiacal Light is a twilight-ish glow tilting upward from the horizon. This glow takes its name from the Zodiacal constellations that it follows.

I first saw the Zodiacal Light as a young whipper snapper while observing at Pine Mountain Observatory in central Oregon. Taking a break during pre-dawn hours while looking up at the beautiful jewel-strewn sky in the constellation Auriga, twilight surprised me by starting way early. The morning twilight glow became steadily brighter — I could read newspaper headlines. Unbeknownst to me, it was the Zodiacal Light, preceding true twilight by an hour.

It's thought that the Zodiacal Light is scattered sunlight by interplanetary particles in the plane of our solar system. It's faint. To see it, situate yourself away from light pollution and look on dark-Moon evenings. On particularly dark nights, you can see the light extend as a band almost up to the zenith that we call the Zodiacal Band. On exceptionally dark nights, this band extends to the anti-solar point, into an oblong glow that we call the Gegenshein (which means the counter-glow). The Gegenshein is maybe 10x15 degrees in size and best seen near midnight in the autumn sky. These types of objects have no borders to delineate them so employ the visual detection technique of moving your eyes back and forth every few seconds. You will gradually become aware of it, though you will not see it steadily.

Back to these interplanetary particles. They are thought to range in size from 100 to 300 micrometers (about one one-hundredth of an inch), their weight measured in micrograms (a hundred million of these particles would weigh an ounce, if you could catch them in the palm of your hand).

Their origin is argued over. Also not clear is exactly where these particles reside. Apparently the consensus is that they live between the Earth's orbit and Jupiter's orbit. This suggests their origin. Data from the Juno spacecraft suggested that the dust comes from Mars but subsequent probes have said otherwise. The latest evidence suggests that the dust comes from Jupiter-family comets like 67P/Churyumov-Gerasimenko and from collisions in the asteroid belt. In any case, that we see the Zodiacal Light is evidence for a dynamic solar system.

Early Mesoamericans mentioned the Zodiacal Light. The Egyptian god Sopt's name was written with an upward-pointing triangle, the shape of the Zodiacal Light. Sopt was "Lord of the East," personification of the Zodiacal Light. The Chinese astronomer Zhang Heng, famous for the first recorded observation of a supernova in 120 CE, wrote about the Zodiacal Light in his book, *Ling Xian*. And of course, the Zodiacal Light is important in Islam.

And by the way, Brian May, with the band Queen, completed his PhD thesis on the Zodiacal Light 36 years after going into music instead. Good for him!

Finally, if you've read this far, a special treat. If you go to a dark site with great horizons, you'll see something special each spring: the Milky Way hugging the horizon encircling you. Spin around a couple of times while concentrating on the Milky Way. Just maybe you'll feel like you are floating in the vastness of our galaxy.

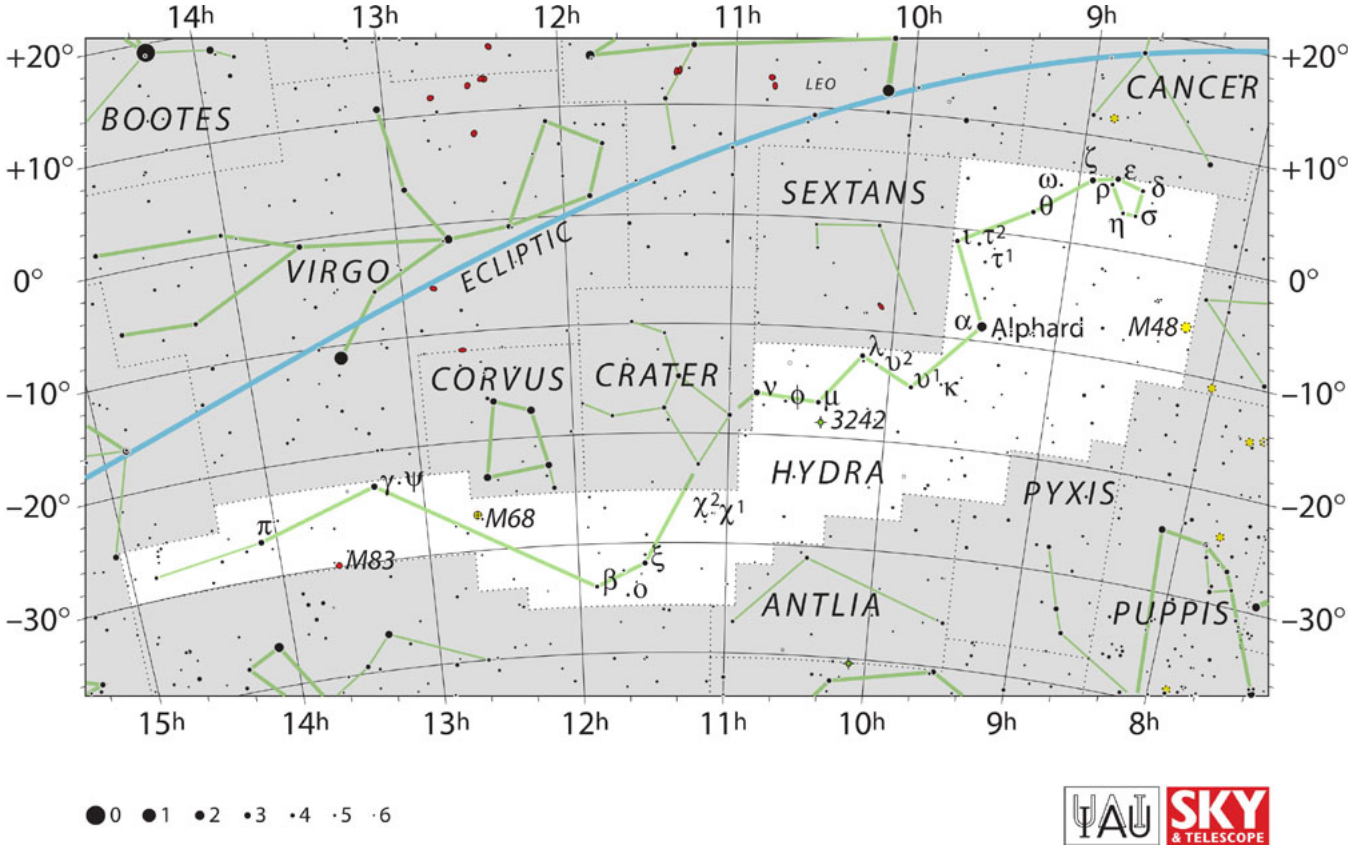
For an image or two, try these:
https://en.wikipedia.org/wiki/Zodiacal_light#/media/File:Submillimeter_Array_Night.jpg
https://the-public-domain-review.imgix.net/shop/nfJIksDyQGaj3uUVcbhtHg4-edit-1.jpeg?w=640

Constellation of the Month: (Eastern) Hydra

by Andy Edelen

We pick up this month where we left off in April: about mid-way along the prodigious span of Hydra, the Female Water Snake. This month, we'll tackle the constellation's eastern half. As we covered the mythology of Hydra last month, we'll plunge right in here with the observing notes and challenges.

The full extent of Hydra once caused uranographers (celestial map makers) to "borrow" some of its stars for other constellations of their own making, with the intent of gaining a whiff of immortality via the permanence of star charts. The western half of Hydra had stars borrowed to create *Felis*, the Cat; on the extreme eastern end of the constellation, the stars 54, 55, 56, 57, and 58 Hydrae, along with 4 Librae, were used to create the short-lived constellation ***Noctua*, the Night-Owl**, which is our naked-eye target this month. Noctua forms a very shallow 'V', with 55 Hya as the "point" of the 'V'. These stars range from magnitudes 4.4 (58 Hya) to 5.7 (4 Lib), so you'll need dark rural skies to see them all. It's a shame Noctua never caught on as a constellation — could there be anything more appropriate to represent astronomers?



Hydra, as seen in modern star charts. Courtesy IAU and *Sky & Telescope*.

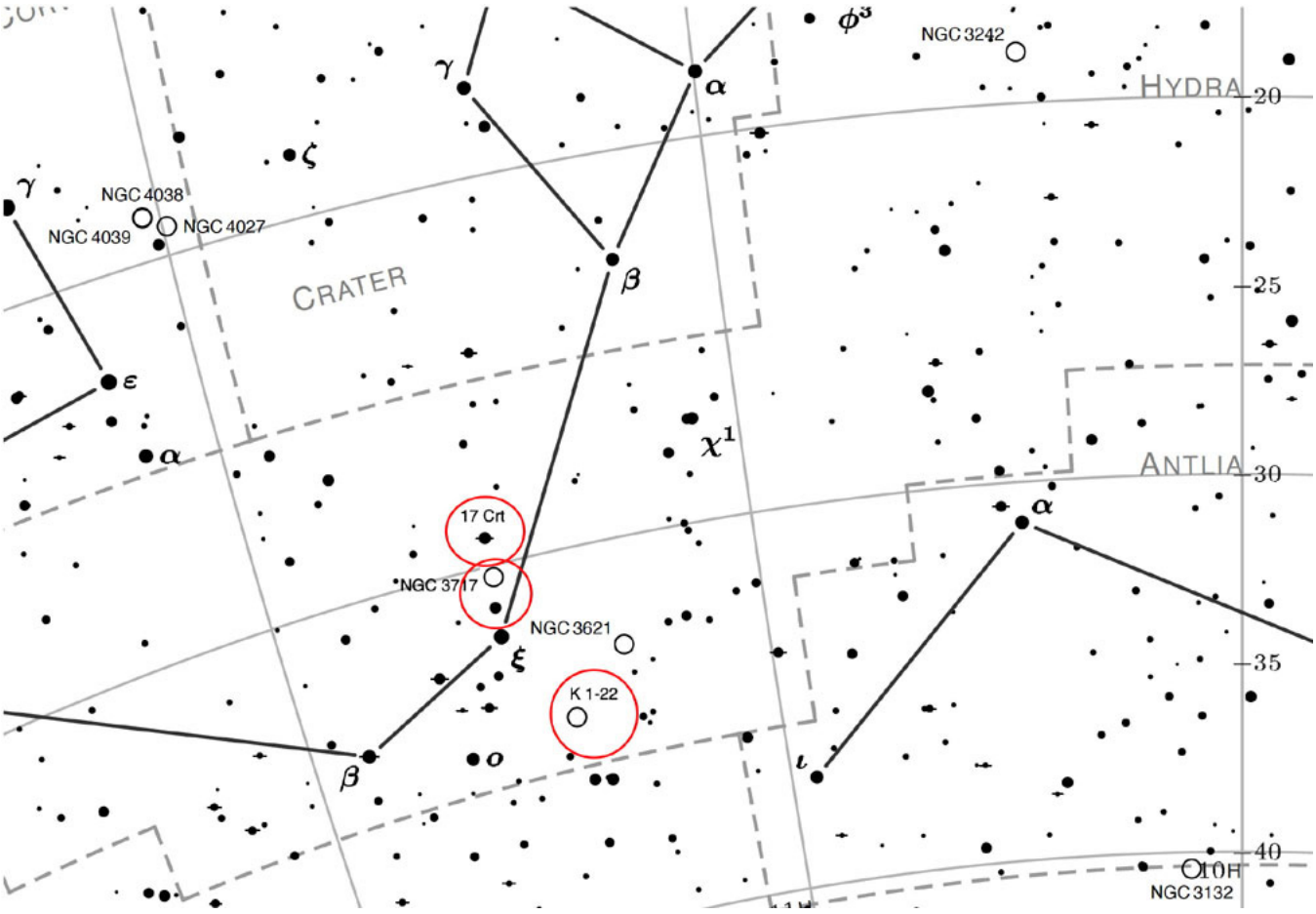
The familiar trapezoid that makes up the figure of Corvus the Crow is a signpost for the month's binocular target. **Messier 68 (M68)** is one of three Messier objects in Hydra and one of (at least) three globular clusters in the constellation. It's not one of the more impressive Messier objects, but at magnitude 7.4 is still a pretty easy catch in even modest binoculars. M68 extends for 11' (' = arcminutes) in photographs, but will merely appear as a tiny fuzzy spot with binoculars and small telescopes; it'll require an 8-inch telescope to begin resolving the cluster's 100,000 stars — of which we can, of course, only see a fraction with even the largest backyard telescopes.

To find M68, draw a line from Delta Crv through Beta Crv — the two stars on the eastern side of the Crow's trapezoidal figure — and extend it another 50% of the way; you'll spot M68 with binoculars just over a half-degreee northeast of a 5.4-magnitude star (which may be a naked-eye star from a dark observing site).

Hydra's third Messier object (after M68 and M48, the latter of which we covered last month) is, appropriately, a galaxy. **M83** lies on Hydra's border with the constellation Centaurus, a "here be tygers" region largely unexplorable by Oregon-based observers due to its southerly declination. Yet M83 — our target for 2-inch telescopes — can be seen somewhat readily once found, due to its brightness, proximity, and immense size. A majestic three-armed spiral, seen almost face-on (so from "above" its galactic pole), M83 is a pale, diaphanous glow spanning almost 7' in a 2-inch scope, its light ghostly and evenly bright (or dim, as the case may be). A small scope might even reveal the galaxy's 30" (arcsecond) core region, the brighter hub around which the arms wrap. (Note that these details require dark skies.)

M83 lies at a relatively-nearby 16 million light years, which contributes to its relative size and brightness. Larger telescopes may show something of its spiral nature and mottled texture across its halo. To find M83, look about 2/3 of the way from Gamma Hya to the 4th-magnitude star 1 Centauri; the galaxy lies near the toe of an eastward-pointing boot-shaped asterism that's fairly obvious in binoculars. (Keen-eyed observers may see the galaxy in binoculars as well.)

The historical constellation boundaries used by early uranographers gave way to the modern boundaries set by the International Astronomical Union in 1928; the IAU did its best to keep the traditional patterns of the constellations intact, but a few of their decisions resulted in stars being reassigned to different constellations than before. One notable victim of the IAU's decision-making was the star **17 Crateris** (then in neighboring Crater, the Cup; see last month for the mythology behind Hydra, Crater, and Corvus). 17 Crt



The middle 1/3rd of Hydra. Chart adapted from Andrew Johnson's *Mag-7 Star Atlas*, https://www.cloudynights.com/articles/cat/articles/observing-skills/free-mag-7-star-charts-r1021

suddenly became the property of Hydra, becoming known as N Hydrae (the numbered names of stars, known as Flamsteed numbers after the British astronomer John Flamsteed, start west with the number 1 and work their way eastward, ending at a constellation's eastern border; there was already a 17 Hydrae, and it lies far to west of 17 Crt/N Hya). This name is equally confusing, as a single or double capital letter designation implies at first glance that the star is a variable star, which 17 Crt/N Hya is not.

What the star actually *is* is a beautiful double star, and our target for 4-inch telescopes this month. 17 Crt (I'll drop the N Hya designation here, as it's actually less-commonly used) is a gorgeous double star of nearly-equal magnitudes, 5.63 and 5.73, separated by a respectable 9.4" (9.4 arcseconds). Both components are yellow stars of spectral type F8V: F = yellow stars, midway in temperature from O to M (in the OBAFGKM classification); 8 = on the cooler end of the F class, with 0 being hottest and 9 being coolest; and V = Main Sequence, i.e. "normal", everyday stars with no extremes of size (versus giants or dwarfs) and no real peculiarities of note. Look for 17 Crt 2-2/3 degrees, a little over five Full Moon widths, north of the third-magnitude star Xi Hydrae and south of the middle of Crater's goblet-like star pattern.

Given that Hydra winds its way from the end of the winter constellations to those of summer's beginning, we would expect the constellation to be primarily a hunting ground for galaxies, and this is indeed the Water Snake's most-common class of deep-sky object. A faint but interesting target for 6-inch telescopes, **NGC 3717** is one of Hydra's less-known galaxy showpieces; it's a spiral galaxy seen edge-on to us, a sliver of light whose major axis is oriented SW-NE, with a 13th-magnitude star embedded just north of its core (which may not be apparent in a 6-inch scope). Larger telescopes will show the brighter core to the galaxy, but the galaxy's dust lane — obvious in photographs — requires the largest of amateur telescopes to detect.

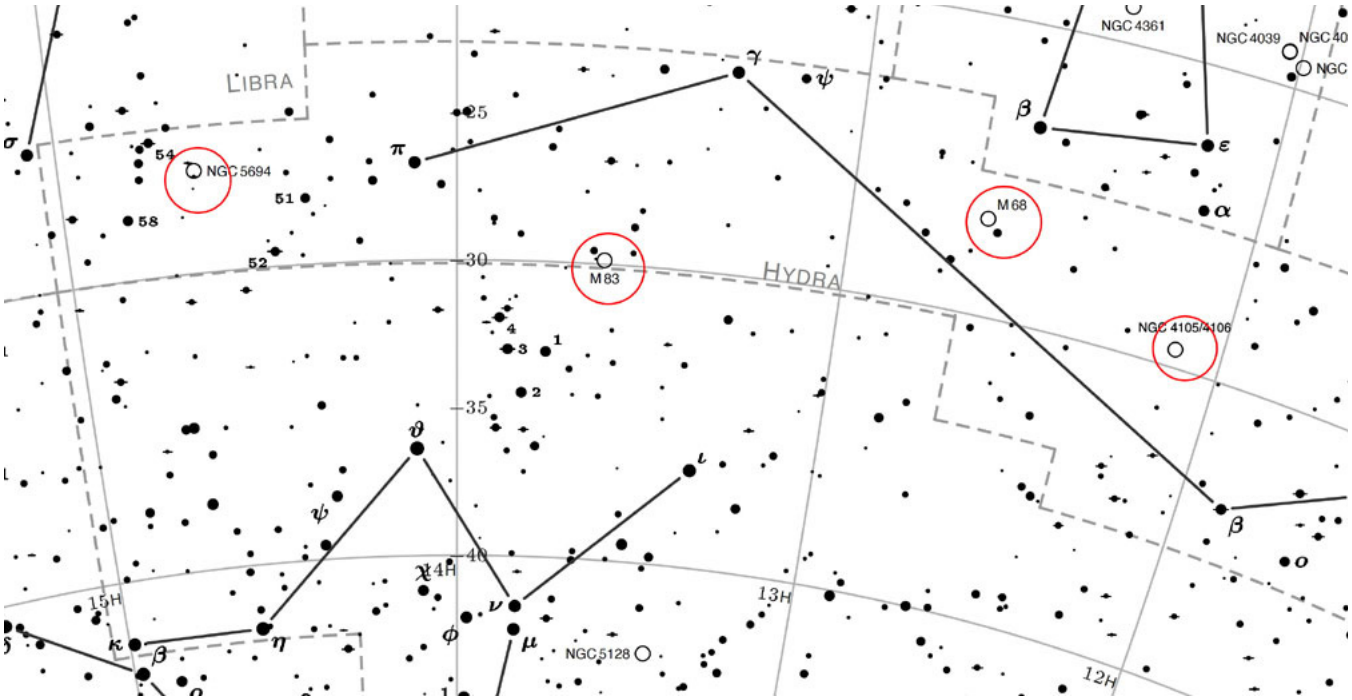
NGC 3717 lies just over a degree due south of 17 Crt. It has a nearly-identical twin galaxy, IC 4351, 32 degrees to the east: equal-sized and equally edge-on, and despite its IC designation (which implies, often falsely, that the object is more difficult to see), about equally bright.

Hydra's "second" globular cluster is fairly nondescript visually, but is of considerable astrophysical interest and holds a somewhat special place for your writer: it was one of his first non-Messier objects and was one of the more-challenging objects he found with his 8-inch Schmidt-Cassegrain telescope from the hazy, light-polluted skies of northwest Cincinnati back in the late 1980s. **NGC 5694** is a small circular glow in an 8-inch scope, with a slightly-brighter center but no hint of resolution into its constituent stars (hardly a surprise, given that its brightest stars are of magnitude 15.5).

The globular's greatest interest is in its distance and origins. NGC 5694 lies over 114,000 light-years away from us, on the opposite side of the galaxy, but it also lies nearly 100,000 light-years from the center of the galaxy, making it one of the most-distant known globular clusters in the Milky Way — consider that our galaxy is itself under 100,000 light-years in diameter, meaning that NGC 5694 is a full Milky-Way radius beyond the visible edge of the galaxy. The cluster is also one of the oldest-known globulars, at an approximate 12 billion years. Even more interestingly, NGC 5694 is moving at an extremely high rate of speed, implying that it came from outside of our galaxy; from its trajectory, it appears to have been ejected from one of the Magellanic Clouds, two small companion galaxies to the Milky Way which are seen from the Southern Hemisphere.

Find this unusual cluster in the aforementioned defunct constellation Noctua, just under two degrees west of 5.8-magnitude 57 Hya; the cluster lies 11' north of a 7th-magnitude star, and has two 10.5-magnitude stars immediately southwest of it.

When it comes to bright galaxies, the only thing better than seeing one is seeing two of them in the same field of view! **NGCs 4105 and 4106** are an interacting pair physically distorting each other; their centers are only 1' apart, their halos merging or in contact. This pair is our target for 10-inch telescopes this month — they're actually visible in smaller scopes, but really only begin to show much detail in scopes of double-digit apertures. NGC 4105, the western of the pair, is the larger of the two and slightly elongated, and reveals a brightish non-stellar nucleus. NGC 4106 is slightly smaller and shows a small, bright core but no nucleus. In 16-inch or larger scopes, the haloes of the galaxies can be seen to be in contact. And there are surprises to the SSE and SSW: a pair of edge-on spiral galaxies. IC 2996 lies SSW of NGC 4105 by 17',



The eastern-most 1/3rd of Hydra. Chart adapted from Andrew Johnson's *Mag-7 Star Atlas*, https://www.cloudynights.com/articles/cat/articles/observing-skills/free-mag-7-star-charts-r1021

and IC 3005 lies SSE by 17.5'. IC 3005 is the larger and brighter of the two, but both are quite small and faint, and probably require at least a 12-inch scope to detect. Other, smaller galaxies lurk around the field of NGCs 4105 and 4106, so observers with larger scopes might find the area worth the time to examine closely.

Find the NGC 4105/4106 pair, and their attendant galaxies, about a third of the way from Beta Hydrae to Beta Corvi.

Longtime amateur astronomers may remember what the media in the 1970s referred to as "The Bust of the Century"… Comet Kohoutek, which was predicted to be an all-time great comet and, like so many since, fizzled out completely. (A friend of mine referred to it as "Comet Oh Heck.") But Lubos Kohoutek, the Czech astronomer who discovered the comet, was better known for his work on planetary nebulae than on comets, and one of his best discoveries is our target for 12-inch and greater scopes this month. **Kohoutek 1-22**, the Southern Owl Nebula, lies just under three degrees SSW of Xi Hya, and it apparently went unobserved visually until 1987, when a Japanese amateur in California documented his sighting using a 14-inch telescope and a new-to-the-marketplace gadget called a *nebula filter*.

Australian astronomer Kent Wallace — the planetary nebula guru (if there is such a thing) — has observed K 1-22 in an 8-inch Schmidt-Cassegrain. He notes: "At 62.5x, very faint, large disk, requiring the O-III filter and averted vision…. At 100x, the nebula still requires the O-III filter and averted vision. No central star is visible. At 200x, the [nebula] is not visible. This is a [planetary nebula] to use low powers on."

Very few online observations of K 1-22 can be found; I haven't seen it myself. In photographs, the nebula appears reasonably-bright and large, but as we know, photographs can be deceiving in astronomy. The nebula measures 3.1' x 2.9': it's almost round and nearly the same size as its northern counterpart, M97. Also like M97, K 1-22 has dark indentations in it that resemble the eyes of an owl. Due to the lack of recorded observations of this nebula, though, it's hard to know if these indentations can be seen visually. Who will be the first member of EAS to observe the Southern Owl and make notes on it?

Either half of Hydra contains a multitude of objects to unearth; together, the constellation has enough wonders to occupy a lifetime. With the western half of Hydra already slinking toward the horizon for the year, now is the time — provided the weather lets us — to explore what Hydra has to offer.

Gallery

April showers bring flowery curses from astrophotographers, and this April seemed even rainier than most. But we had enough sucker holes for a few decent shots of the Moon, and a couple of our club members in remote locations managed to get some camera time on deep sky objects. Wes Magyar, who now lives in Florida, got some excellent deep-sky shots with his new astrophotography setup, and Mark Wetzel continues to amaze us with his deep sky photographs taken on his frequent trips to New Mexico. Zoom in a bit and enjoy this month's bounty!

Moon on 4/23/23. © by Alan Gillespie.

Moon on 4/27/23. © by Alan Gillespie.

Moon on 4/25/23. © by Jerry Oltion.

Copernicus region on 4/29/23. © by Frank Szczepanski.

The Orion Nebula and neighboring Running Man Nebula, with much gas and dust visible around the entire complex. © by Wesley Magyar.

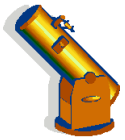
M12, the Gumball Cluster in Ophiuchus. © by Mark Wetzel

M16, the Eagle Nebula, with the iconic “Pillars of Creation” made famous by the Hubble photo.
© by Wesley Magyar.

NGC 2903, “The Mouse” in Leo. This is one of the objects that Sylvia Collazo mentioned in her “What’s Up?” talk at our April meeting. © by Mark Wetzel.

PK 164+31.1 (Jones-Emberson 1) the Headphone planetary nebula in Lynx. © by Mark Wetzel.

Colliding galaxies NGC 3226 & 3227 in Leo (very close to Algieba, Gamma Leonis). © by Mark Wetzel



Observing in May 2023

Full | Last Q | New | 1st Q

May 5, 10:34 AM	May 12, 7:28 AM	May 19, 8:53 AM	May 27, 8:22 AM
Mercury lost in Sun	Mercury Rise: 5:22 AM	Mercury Rise: 5:01 AM	Mercury Rise: 4:44 AM
Venus Set: 00:06 AM	Venus Set: 00:13 AM	Venus Set: 00:16 AM	Venus Set: 00:15 AM
Mars Set: 1:37 AM	Mars Set: 1:23 AM	Mars Set: 1:08 AM	Mars Set: 00:50 AM
Jupiter Rise: 5:22 AM	Jupiter Rise: 4:59 AM	Jupiter Rise: 4:35 AM	Jupiter Rise: 4:08 AM
Saturn Rise: 3:31 AM	Saturn Rise: 3:05 AM	Saturn Rise: 2:38 AM	Saturn Rise: 2:08 AM
Uranus lost in Sun	Uranus lost in Sun	Uranus Rise: 5:20 AM	Uranus Rise: 4:49 AM
Neptune Rise: 4:16 AM	Neptune Rise: 3:49 AM	Neptune Rise: 3:22 AM	Neptune Rise: 2:51 AM
Pluto Rise: 2:04 AM	Pluto Rise: 1:36 AM	Pluto Rise: 1:09 AM	Pluto Rise: 00:37 AM

All times Pacific Daylight Time (March 12 – Nov 4, 2023 = UT -7 hours) or Pacific Standard Time (November 5, 2023 – March 9, 2024 = UT -8 hours)

Date	Moon Rise	Moon Set	Twilight Begin	Sun Rise	Sun Set	Twilight End
5/1/2023	16:09	04:34	04:10	06:04	20:16	22:10
5/2/2023	17:15	04:52	04:08	06:03	20:17	22:12
5/3/2023	18:23	05:10	04:06	06:01	20:18	22:14
5/4/2023	19:35	05:29	04:04	06:00	20:19	22:16
5/5/2023	20:49	05:52	04:02	05:59	20:20	22:18
5/6/2023	22:06	06:20	04:00	05:57	20:22	22:20
5/7/2023	23:22	06:56	03:58	05:56	20:23	22:22
5/8/2023		07:43	03:56	05:55	20:24	22:24
5/9/2023	00:31	08:43	03:54	05:53	20:25	22:26
5/10/2023	01:28	09:54	03:52	05:52	20:26	22:28
5/11/2023	02:13	11:12	03:50	05:51	20:27	22:29
5/12/2023	02:48	12:32	03:48	05:50	20:29	22:31
5/13/2023	03:16	13:50	03:46	05:49	20:30	22:33
5/14/2023	03:39	15:06	03:44	05:47	20:31	22:35
5/15/2023	04:00	16:20	03:42	05:46	20:32	22:37
5/16/2023	04:20	17:33	03:40	05:45	20:33	22:39
5/17/2023	04:41	18:47	03:38	05:44	20:34	22:41
5/18/2023	05:04	20:00	03:36	05:43	20:35	22:43
5/19/2023	05:32	21:13	03:35	05:42	20:36	22:45
5/20/2023	06:05	22:21	03:33	05:41	20:37	22:46
5/21/2023	06:46	23:23	03:31	05:40	20:38	22:48
5/22/2023	07:36		03:30	05:39	20:39	22:50
5/23/2023	08:33	00:15	03:28	05:39	20:40	22:52
5/24/2023	09:36	00:56	03:26	05:38	20:41	22:54
5/25/2023	10:40	01:30	03:25	05:37	20:42	22:55
5/26/2023	11:45	01:56	03:23	05:36	20:43	22:57
5/27/2023	12:50	02:18	03:22	05:36	20:44	22:59
5/28/2023	13:54	02:38	03:20	05:35	20:45	23:00
5/29/2023	14:58	02:56	03:19	05:34	20:46	23:02
5/30/2023	16:05	03:13	03:17	05:34	20:47	23:04
5/31/2023	17:14	03:32	03:16	05:33	20:48	23:05

All times are for Eugene, Oregon Latitude 44º 3' Longitude 123º 06'

Items of Interest This Month

Ceres within a couple degrees of Denebola (Leo's tail) this month.
5/1 Mercury in inferior conjunction (between us and the Sun).
5/5 - 5/7 Eta Aquariid meteor shower.
5/9 Uranus in conjunction with Sun.
5/15 Mars, Castor, and Pollux line up.
5/17 Moon occults Jupiter in early morning. There's a double shadow transit in progress, but Jupiter will be very low on the horizon.
5/22 & 5/23 Moon and Venus add some sparkle to Gemini.
5/26 First Quarter Friday star party.
5/29 Mercury at greatest western elongation (visible in early morning before sunrise).

For ongoing discussion of astronomical topics and impromptu planning of telescope outings, join the EAS mail list at
www.eugeneastro.org
(Click on the Mailing List link.)
Also, subscribe to our free newsletter by clicking on the Newsletter link.