



IO - July 2023

Eugene Astronomical Society, PO Box 591, Lowell, OR 97452

www.eugeneastro.org

Annual Club Dues \$25

President: Andrew Edelen 618-457-3331

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, July 20th, 7:00 p.m.

The Sound of Crickets

We don't have a "What's Up" or a main program scheduled yet for our July meeting, or for several future meetings. We desperately need volunteers to put on talks. If you speak English and enjoy astronomy, please consider giving a talk at one of our upcoming meetings. Those are really the only requirements for doing a presentation. Those of us with some experience will gladly help you figure out the logistics of creating and putting on a talk.

Contact Andy, Amy, or Jerry for more details.

Somebody's got to volunteer. Otherwise...crickets.

Next First Quarter Friday: July 28th

Our June 23rd star party was one of the strangest we've ever had: Nobody showed up. Club members did — we had half a dozen scopes set up and ready to go — but we had no guests. We enjoyed visiting with one another and looking through each other's scopes, but clouds finally started to roll in so we packed up and went home. Two people did finally show up as we were packing up, and they got a look at the Moon through at least one of our scopes, but that was it. Usually our summer star parties are mobbed, but this one was a bust.

The roller skaters were there again when we arrived at the reservoir, complete with loud, unwelcome music blaring away. That might have turned off a few early arrivals, but we talked the skaters into turning off the music before dark, so that shouldn't have driven away the majority of people. Maybe everybody was saving it up for our big Dexter blow-out on July 15th. Hopefully people will show up there!

Our next First Quarter Friday star party will be July 28th. 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 7/23.)

July 28 (Moon 82% lit)

August 25 (Moon 68% lit)

September 22 (Moon 53% lit)

October 20 (Moon 38% lit)

November 17 (Moon 24% lit)

December 22 (Moon 84% lit)

Dark Sky Star Party at Dexter State Park: July 15

June Meeting Report

What's Up by Kathy Oltion

Observing Basics, Part 1 by Andy Edelen and Jerry Oltion

Our June 15th meeting was a three-parter. Kathy Oltion led off with a “What’s Up” presentation on globular clusters. Summertime is globular cluster season, and Kathy gave us a great preview of what’s out there, where to find them, and the classification system for comparing them against one another. There are hundreds of globular clusters in the Milky Way. Go track down a few and enjoy these spectacular, tightly-packed collections of ancient stars.

After Kathy’s presentation, Andy Edelen gave a talk on angular measurement and magnitude, two concepts that a person needs to know when searching for an object in the night sky. Angular measurement helps you figure out how far to go from a known object to a new target, and understanding magnitudes will help you identify landmarks along the way. Andy showed us how to use your hand to estimate angles from 1° to 25° , and how to use a Telrad’s calibrated circles to track your motion across a star chart. He then talked about stellar magnitudes and how both intrinsic brightness and distance affect how bright a star appears to us. One particularly interesting illustration showed what Canis Major would look like if all the stars were the same distance: Decidedly strange! Sirius, currently the brightest star in our sky by virtue of its proximity, would barely be noticed among the much brighter stars that make up the constellation.

Jerry then continued on with a presentation on two more subjects that an amateur astronomer needs to know: magnification and field of view. Magnification is basically a measure of how much the telescope squishes down the incoming light beam, while field of view is a measure of how wide a cone of the incoming light makes it through the eyepiece into your eye. Different eyepiece designs will provide different fields of view even if they all have the same magnification. Eyepiece fields of view range from about 40° with the cheap Huygens eyepieces that often come with “hobby killer” telescopes, all the way up to 100° with the Televue Ethos eyepieces (and some of their cheaper knock-offs). Magnification and field of view are inversely related, in that a higher magnification will give you a smaller field of view (with the same design of eyepiece).

Jerry also discussed the concept of “empty magnification,” wherein the telescope’s aperture simply isn’t large enough to produce a crisp image with certain eyepieces. The rule of thumb is that a telescope can’t do more than about 50x per inch of aperture. That led to the concept of exit pupil, which is the diameter of the light beam exiting the eyepiece. It should be no larger than the diameter of your dilated pupil; otherwise you’re wasting light, effectively reducing the aperture of your telescope.

The presentations led to a fairly lively group discussion afterward. We didn’t clear out until almost 9:00.

Speakers Needed

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.

Golden State Star Party Report

On June 19th Ken Martin wrote on our email list: “We just returned from the Golden State Star Party held at Frosty Acres Ranch in Adin, California. Great weather this year. Usual daytime temps can be in the low to mid 90s. This year they were a very pleasant mid 70s. As you can see in the photos, there were high clouds during the day which dissipated at dusk. There was absolutely no dust. Attendance was estimated around 300+. Mount Shasta can be seen in the distance. If you’ve never been to this star party you might consider it for next year. Paved roads all the way to the observing field.

When asked what objects he observed, Ken replied, “Just the usual suspects. The Veil looked especially good, along with M17, and a number of globular clusters.”



Mt. Shasta in the distance beyond the Golden State Stera Party in Adin, California. Photo © by Ken Martin.



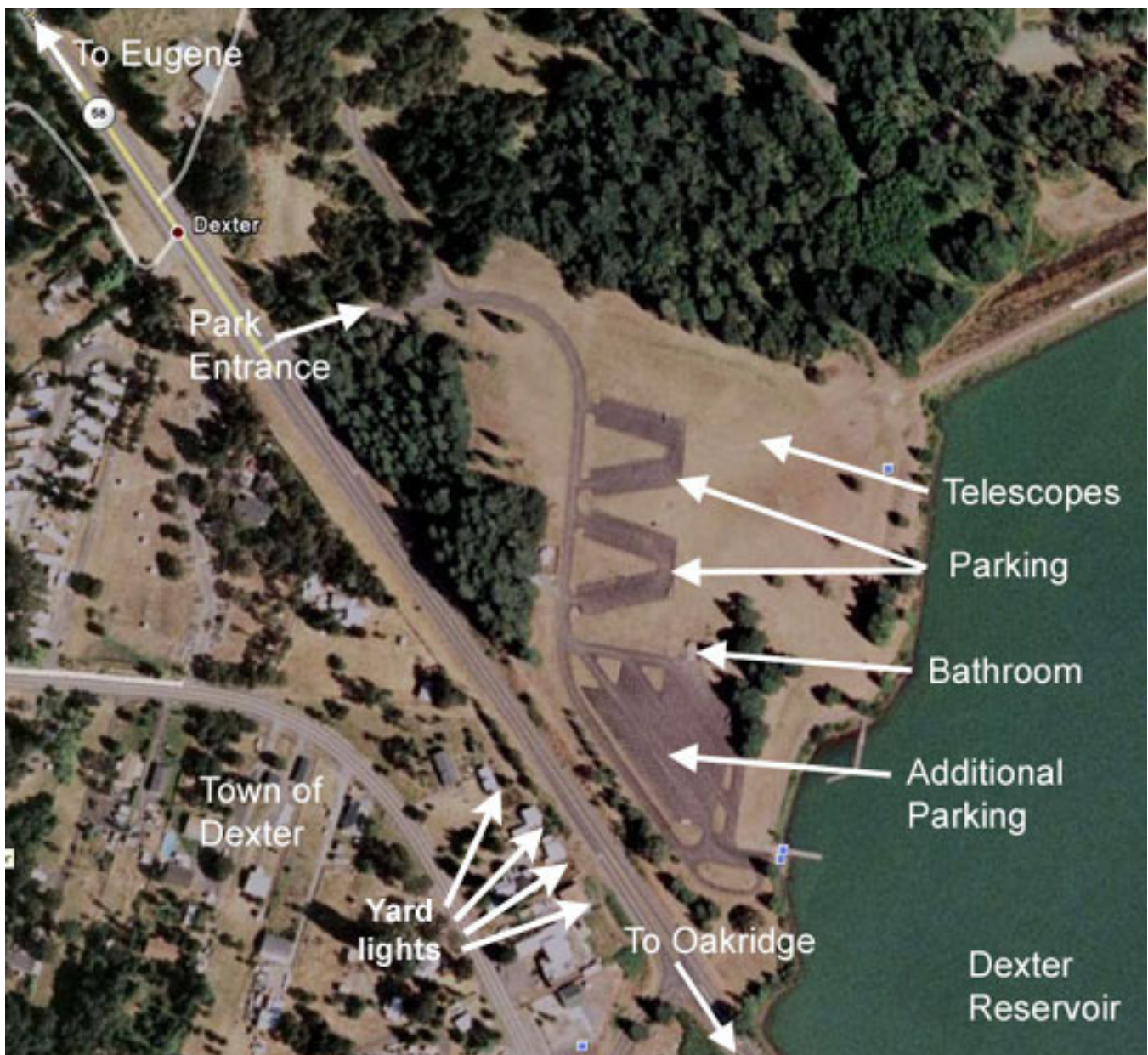
The observing field at Golden State Star Party. Photo © by Ken Martin

Dexter Dark Sky Star Party July 15th

Our 13th annual Dark Sky Star Party is scheduled for Saturday, July 15th at Dexter State Park, 15 miles southeast of Eugene on Highway 58, just opposite the town of Dexter at the west end of Dexter Reservoir. The site has wonderful wide-open views in all directions, and sky dark enough to reveal the Milky Way.

This is our big blowout star party of the year, the one where we give away two telescopes to kids between the ages of 8 and 18, and we show well over 100 people what you can see through a telescope under a truly dark sky. This is by far our most popular star party of the year. Mark your calendar and make sure you're there! The party will start at dusk, which should be around 9:15. Get there early to set up and learn where everything is. We'll be setting up in the grass to the east of the first parking lot.

To get there, head up Hwy 58 from Goshen. Just as you approach the town of Dexter, you'll see signs



Here's a satellite photo of the park showing where to park, where to set up, and perhaps most importantly, where the bathroom is.

EUGENE ASTRONOMICAL SOCIETY PRESENTS

Dark Sky

DEXTER

Star Party

JULY 15 @ 9:00

DEXTER STATE PARK

VIEW

GALAXIES, NEBULAE,
PLANETS, AND MORE

THROUGH DOZENS OF TELESCOPES

TELESCOPE GIVEAWAY

(kids between the ages of 8-18)

This year, we're giving away two telescopes:
a 4.5" Orion Starblast and a 6" Orion
Skyquest Dobsonian. Both are brand new
telescopes with extra eyepieces
to make complete observing packages.



Come see the wonders of the night sky far from city lights

ABSOLUTELY FREE!



Sponsored by Oregon State Parks and the Eugene Astronomical Society
check EugeneAstro.org for details and weather updates

for Dexter State Park on the left (north). Park in the first parking lot you come to and set up in the grass toward the reservoir from there. Note that the closer you set up to the parking lot, the more you risk being in the glare of yard lights across the highway in the town of Dexter.

We have volunteers to run the welcome table, but we can always use more. We also need help with the telescope giveaway (kid wrangling, handing out tickets, shouting instructions really loud, etc.) But the biggest need is for plenty of people to bring their own telescopes to show the night sky to the big crowd. We can coordinate all that on our email list as the time approaches.

Robert Asumendi has made a beautiful poster for the event, which we reproduce here. Print it out and post it at work and anywhere else you can think of that's appropriate. We also made 100 professionally printed copies in 8.5 x 11 and 11 x 17 sizes, which club members have already distributed around town. This should be a big event! Come join the party!

Constellation of the Month: Serpens

by Andy Edelen

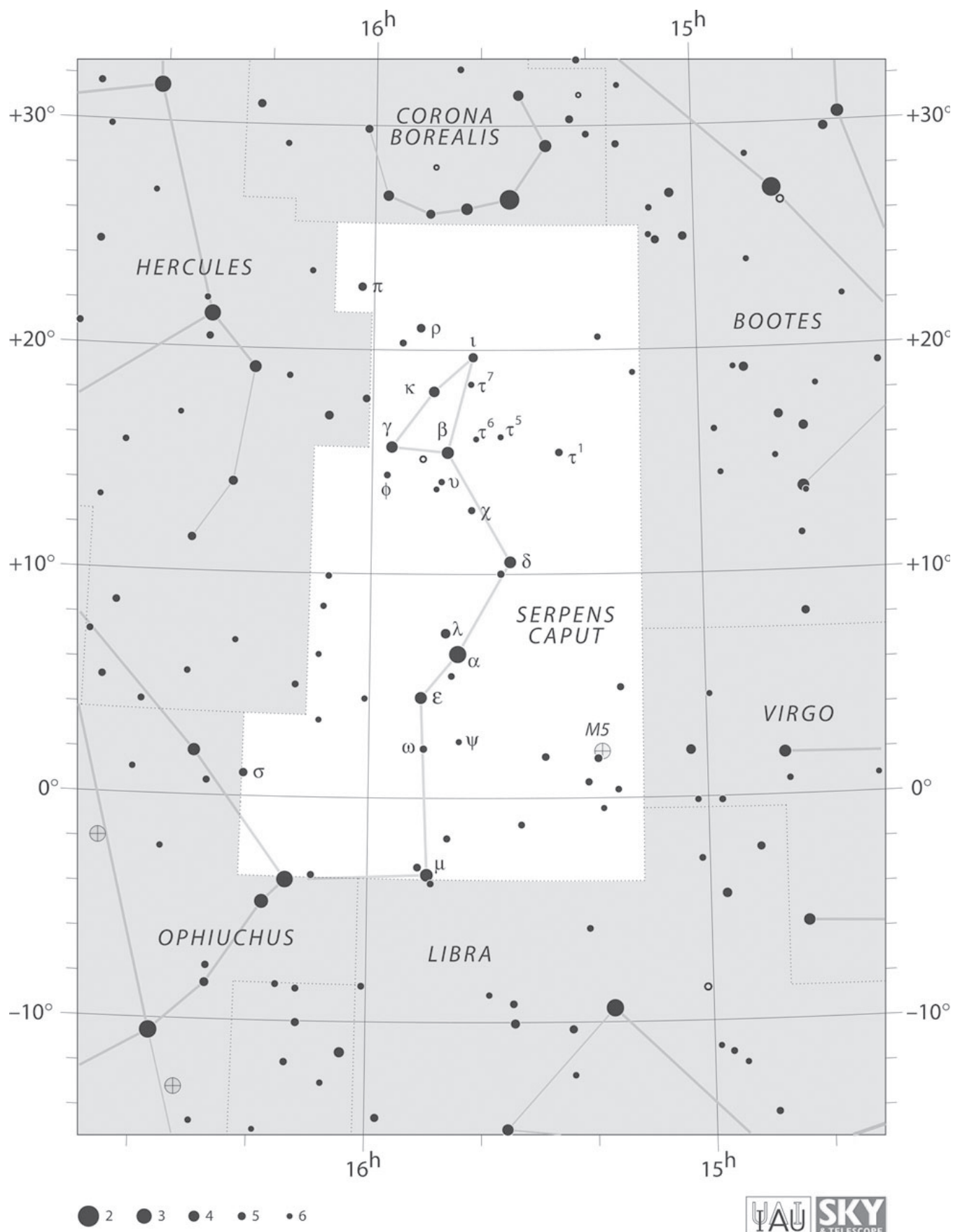
Continuing our recent reptilian theme — previously having visited Hydra the Female Water Snake and Draco the Dragon — leads us this month to the constellation Serpens, the Serpent. Serpens is unique among the 88 constellations in that it consists of two discrete parts, broken up by the presence of another constellation between them; in this case, the Serpent's Head (Serpens Caput) is separated from his Tail (Serpens Cauda) due to his midsection passing behind the body of Ophiuchus, the Serpent-Bearer. Although the Serpent's two segments are often listed separately in observing guides or other astronomy books, they are not considered separate constellations unto themselves. The two unequal halves of the constellation together rank 23rd in area among the 88 constellations.

Serpens' lore is largely entangled with that of Ophiuchus; while Ophiuchus literally means "Serpent-Bearer" (and the fear of snakes is *ophidiophobia*), Ophiuchus actually represents, in Greek myth, the god of medicine, Aesculapius. Aesculapius learned medicine from the centaur Chiron (a.k.a. Sagittarius) and developed the ability to raise the dead; this he demonstrated by bringing a serpent back to life. (He would later do the same for Orion, after the latter was killed by a scorpion [Scorpius] sent by Hera.) This myth is also the reason the Western symbol for the medical profession is the Rod of Aesculapius, the serpent-entangled staff (not to be confused with the caduceus, which has *two* serpents).

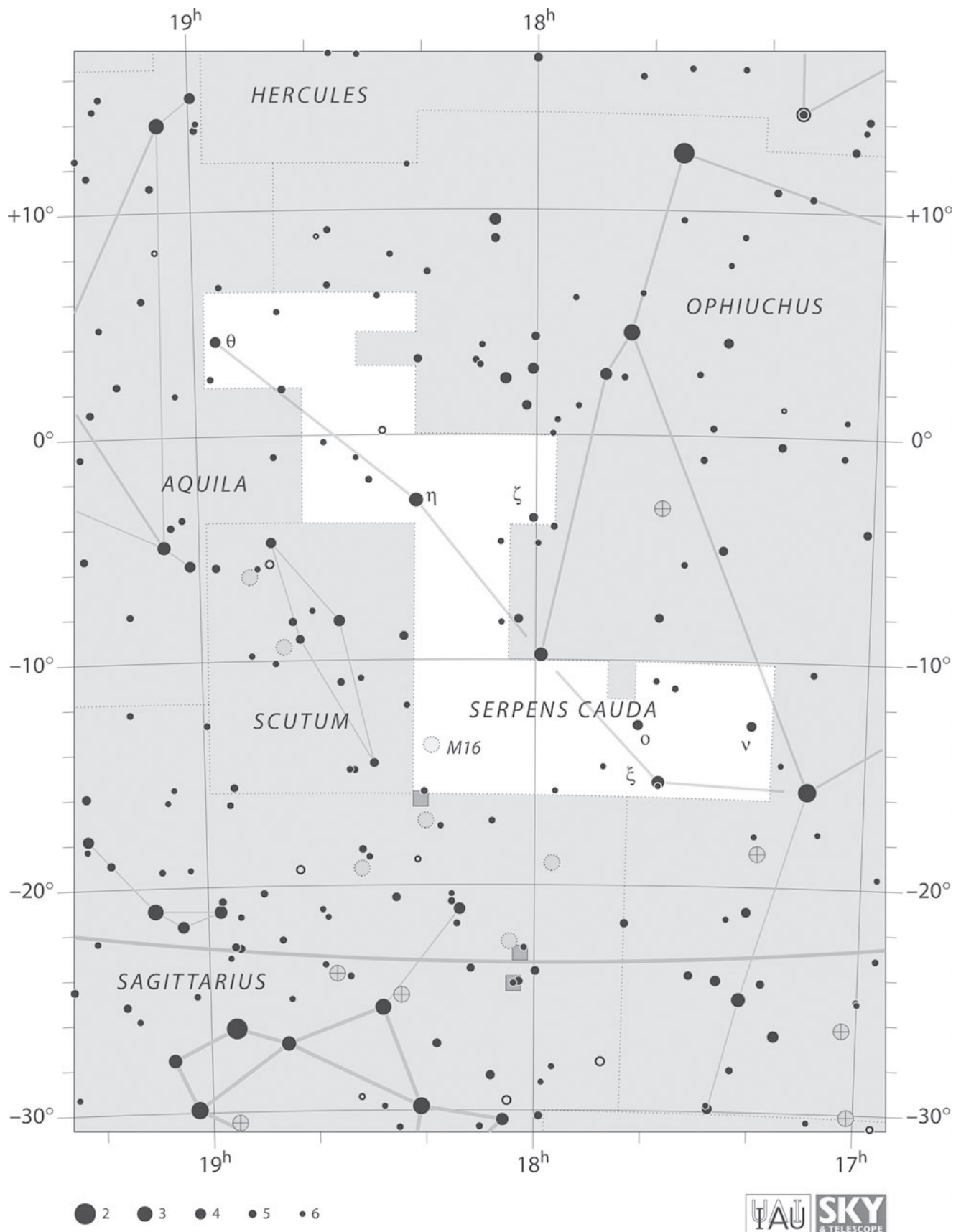
To the Pawnee Indians of the American Great Plains, Serpens may represent the Snake Not Real, a serpentine helper of the god Tirawa (whose animal helpers, the Nahurac, all have the tag "Not Real" appended to their names). To the Chinese, the constellation was broken up into several smaller constituent parts: with stars from Hercules and Ophiuchus, part of Serpens Cauda represented the wall of the marketplace *Tianshi*; parts of Serpens Cauda composed a tower and jeweler's shop.

To astronomers, Serpens is indeed a tale of two halves. The western half, Serpens Caput, lies preceding the Milky Way, and is a rich hunting ground for galaxies and galaxy groups; the eastern half, Serpens Cauda, reaches into the dense summer Milky Way and contains fine examples of everything *but* galaxies. Serpens is often skipped over in favor of the richer hunting grounds of Ophiuchus, Scorpius, Sagittarius and even Aquila, which all border it on the south and/or east, but there are plenty of suitable quarry in each half of the Serpent.

Serpens contains two Messier objects, both among the finest of their classes in the entire heavens. M16 is a nebulous star cluster—a cluster of young stars still enshrouded in the hydrogen gas and silicate dusts from which the stars were birthed—known as The Eagle Nebula. The nebula's most-famous features, the Pillars of Creation, were the subject of one of the Hubble Space Telescope's most iconic photographs



Serpens Caput as seen on modern star charts. Courtesy Sky & Telescope/IAU.



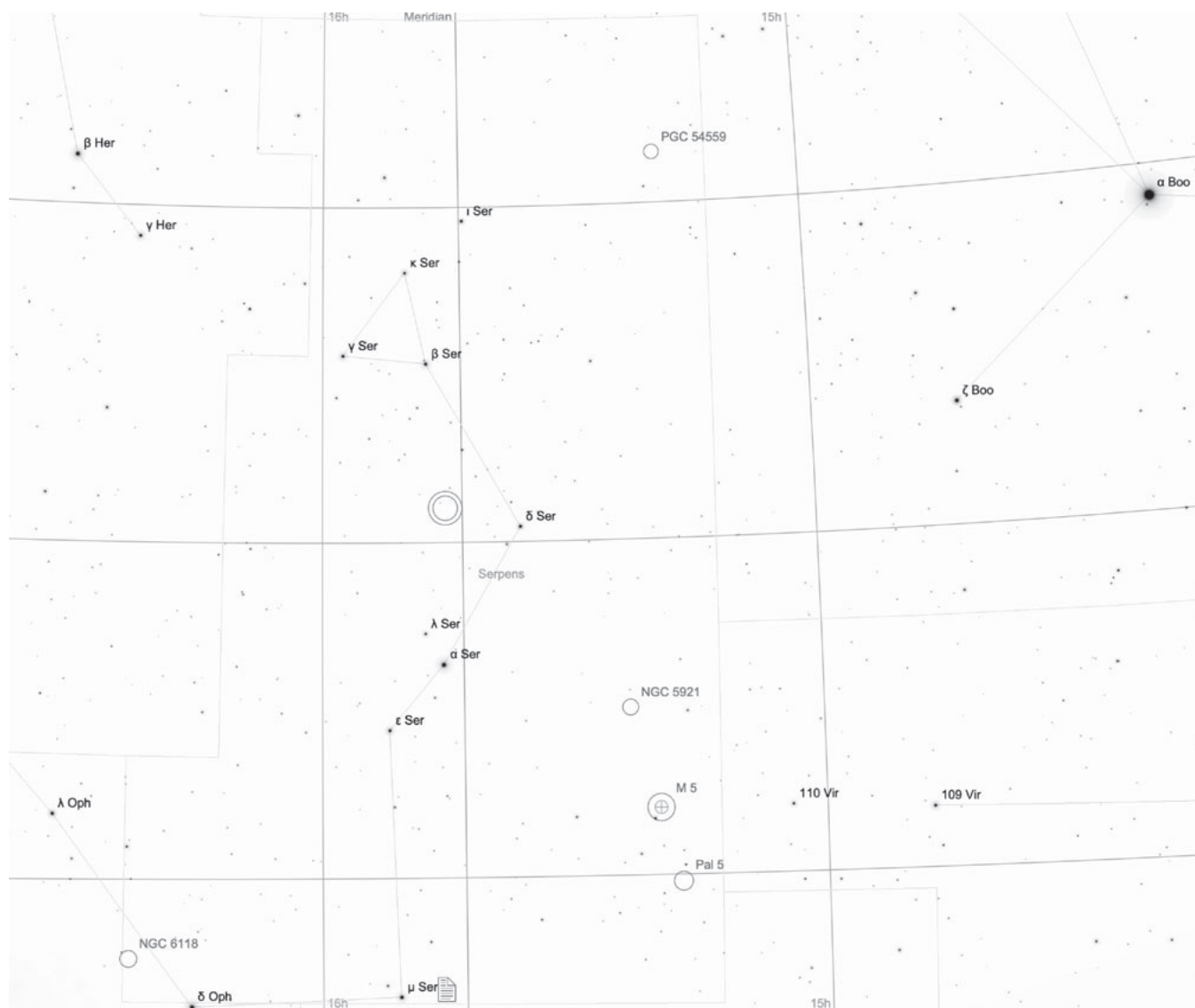
Serpens Cauda, as seen on modern star charts. Courtesy *Sky & Telescope*/IAU.

(as well as countless merchandising opportunities afterward). The other Serpens Messier object, **Messier 5**, is our naked-eye challenge for this month.

M5 is one of the Northern Hemisphere's most spectacular globular clusters, ranking behind only M13 and perhaps M22. The cluster shines in Serpens Caput at magnitude 5.7, making it just visible to the unaided eye from a dark rural site. To find it, locate the stars 109 and 110 Virginis in neighboring Virgo, which point directly at M5; drawing a line from 109 Vir through 110 Vir and extending it an equal distance will bring you to M5. (In other words, M5 is the same distance from 110 Vir as 110 is from 109 Vir.)

To the unaided eye, the cluster will appear as a barely-visible "non-stellar" (non-starlike) object. In binoculars, the cluster can be easily noted as a faint round glow; telescopes as small as 6" diameter will begin to resolve the cluster into stars. In my 12.5-inch scope, the cluster is a stunning sight, with a blazingly-bright center (core) and tendrils of stars streaming out in long arcs from that center. These arcs remind me of the peculiar leg pattern of a brown recluse spider; when the spider's at rest, it curls its legs in a nearly-circular affect, like iron filings around a magnet. The beautiful double star 5 Serpentis lies 22 arc minutes to the southeast of the cluster; it has a fifth-magnitude primary star (also visible to the naked eye; you may see the star rather than the cluster) and a 10th-magnitude secondary star 11" to the northeast.

An altogether different globular cluster lies 2.25 degrees south-southwest of M5. This is **Palomar 5**, the fifth entry in a list of fifteen globular clusters discovered on the Palomar Observatory Sky Survey

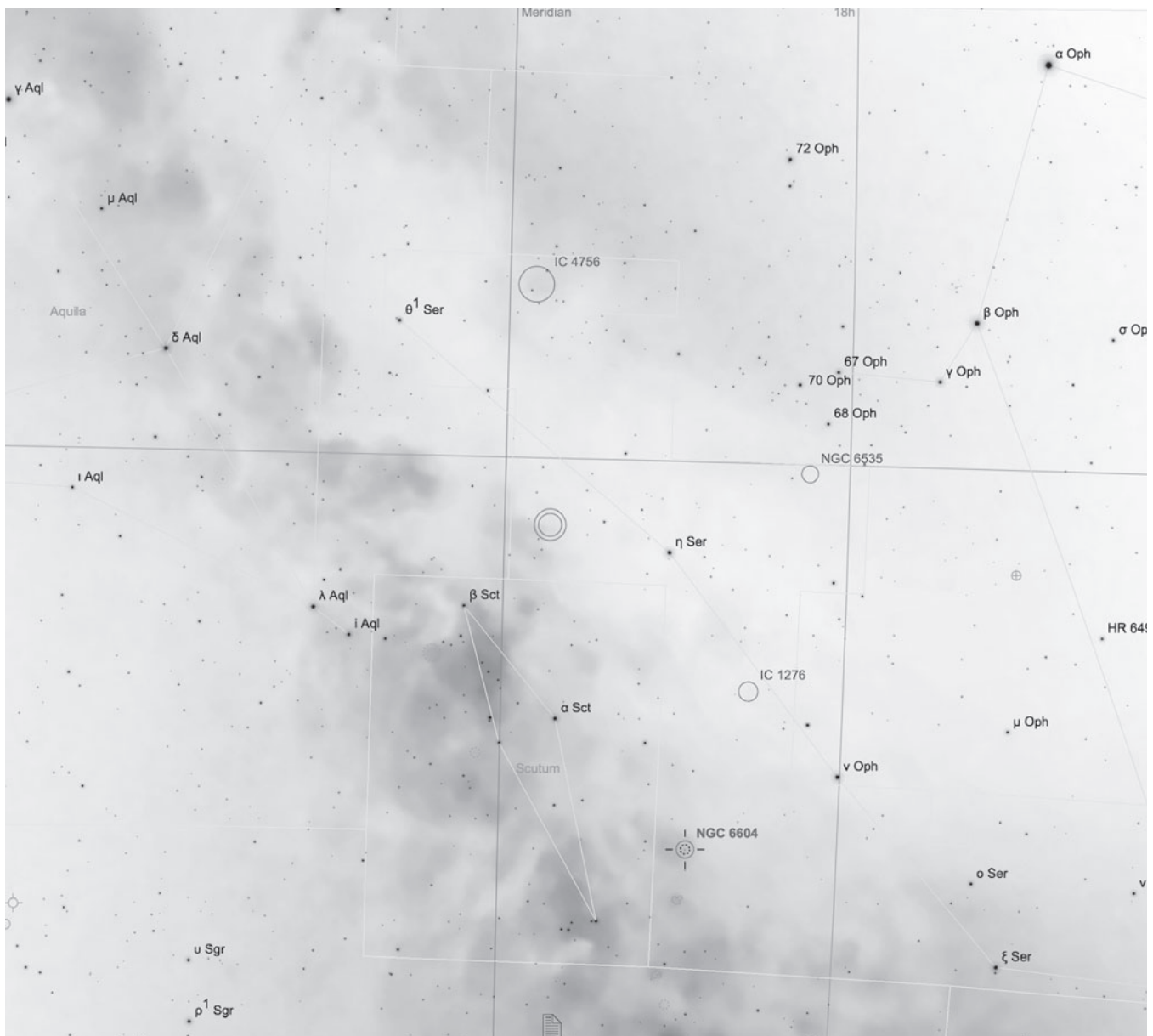


Serpens Caput, rendered in *Sky Safari 5*.

photographs of the 1950s. Given that it was only discovered in the mid-20th Century, and then only in photographs, you might think that this is a difficult object, and indeed it is — Pal 5 requires a large telescope (12" minimum; probably much larger in reality) and very dark skies to reveal itself.

Each of the Palomar globulars is difficult for one (or more) of three reasons: they are very poor in member stars; they lie at extreme distances from the Earth/the center of the Milky Way; or they lie behind thick layers of dust in the plane of the galaxy. Palomar 5 is relatively close as the Palomar globulars go, at 61,000 light years from the center of the Milky Way (and 76,000 light-years from Earth). Its real difficulty comes from its feeble luminosity, which renders the cluster visible only as a very dim 5' patch of light. This is an object for medium power viewing: too low a power and the background won't be sufficiently dark to see it; too high a power and the field will appear *too* dark.

Another Palomar globular cluster lies in Serpens Cauda, the Serpent's Tail. **Palomar 7** is considerably easier than Palomar 5, and accidentally has a more-familiar catalogue number (IC 1276, which is how it's plotted on our detail map of Serpens Cauda), due to having been previously discovered by Lewis Swift in 1889 and then forgotten about by the compilers of the Palomar catalogue. Pal 7 should be detectable in a



Serpens Cauda, rendered in *Sky Safari 5*.

10-inch telescope; it lies quite close as Palomar globulars go, at 12,000 light-years from galactic center/17,600 light-years from Earth. My notes from 2014 (with a 12.5-inch scope) indicate that the cluster was in a pretty sparse field, apparently filled with obscuring galaxy-dust; in average conditions, I called it 4' in diameter and very indistinct. A 10-inch telescope under rural Oregon skies should be enough to spot Pal 7/IC 1276. Look for it about 60% of the way from Eta Ser to Nu Ophiuchi and just slightly east of that line. Alternatively, it lies just over 2 degrees northeast of fifth-magnitude Tau Ophiuchi.

I had originally intended this month's column to be a celebration of globular clusters, but the other cluster often mentioned as a binocular-worthy target, NGC 6539, proved to be elusive in my 11 x 80 binoculars from even dark rural Oregon skies. So instead, we'll turn our attention to the large open cluster **IC 4756**, tucked in the far north corner of the Serpent's Tail by the borders with Aquila and Ophiuchus. Don't let the IC designation discourage you; many clusters in the Index Catalogues are large and bright, and IC 4756 is no exception.

IC 4756 spans a whopping 52', almost twice as large as the Full Moon; within it are at least 75 young stars of 7th magnitude and fainter. Clusters like IC 4756 are so large, in fact, that they lose their identities when observed with large telescopes or high power; binoculars are the perfect optics for showing these objects as cohesive entities. In binoculars, the cluster appears as a misty patch with a sprinkling of stars over the top of it — how many can you count? To find IC 4756, look west-northwest of Theta Ser (Alya); the cluster forms an isosceles triangle with Theta Ser and 4 Aquilae.

As Serpens Cauda dips into the summer Milky Way — as opposed to Serpens Caput, which is primarily a hunting ground for galaxies — it contains a greater variety of objects than the constellation's western half. Here we find emission and planetary nebulae, open clusters, and globular clusters in greater abundance. Our target for 2-inch telescopes this month is a tiny knot of an open cluster, **NGC 6604**, awash in a field of nebulosity (called Sharpless 2-54) that remains out of the reach of smaller telescopes with smaller fields of view.

NGC 6604 spans only 4', with its brightest members arranged in a 2' triangle amid a sprinkling of 9th-magnitude and fainter stars. Its brightest star, 7th-magnitude MY Ser (the double-capital letter designation indicating that the star is known to vary in brightness) lies near the actual center of the cluster. About eight of the stars in NGC 6604 will be comfortably within reach of a standard 60mm refractor. But this little cluster may take some patience to seek out; it lies 1.5 degrees north of the huge, bright cluster/nebula M16 in Serpens Cauda's southeast corner, or about 1/3 of the way from Gamma Scuti (in the neighboring constellation Scutum) to 3rd-magnitude Nu Ophiuchi.

After examining M5 and the two Palomar clusters, we return to globular clusters for moderate-sized telescopes. A 6-inch telescope will be the minimum needed for the string of globular clusters along Serpens Cauda's border with Ophiuchus; of these, perhaps the easiest is the small (3') cluster **NGC 6535**, about 1.75 degrees south-southwest of the fourth-magnitude star 68 Ophiuchi. William Herschel discovered this little globular with a 6.2-inch reflector, noting that he could resolve some of its stars in such an aperture. If you have similar success, try some of the other nearby globular clusters: NGC 6539 in Serpens and NGC 6517 in Ophiuchus, both small and both south of NGC 6535 by 7-8 degrees.

So what is in the other half of Serpens, the Serpent's Head? As we've noted, most of the deep-sky objects in the Serpent's western half are galaxies, aside from M5 and Palomar 5. Of these, few are show-pieces, although there are certainly galaxies of interest to be found. One of these, **NGC 6118**, is our object for 8-inch telescopes this July. NGC 6118 is a large (2.5' x 1.25') oval glow with a poorly-defined perimeter and only slight brightening toward its center; the galaxy's glow fades indistinctly into the background sky. As galaxies go, it's not visually that noteworthy, so why choose to observe it?

Many new stargazers wonder what the next step is after observing the 110 objects in the Messier Catalogue — these 110 comprise the “sky's greatest hits,” for the most part, so what should follow after observing all of them? The next step, for many, is the Herschel 400, consisting of 400 of the biggest/

brightest/best objects from among the 2397 galaxies, nebulae, and star clusters Herschel (and his sister Caroline) discovered in their observing lifetimes. Of the objects in the Herschel 400, NGC 6118 is often considered the most difficult to observe, hence its significance here. I've seen NGC 6118 in telescopes as small as 70mm, so it's really not that "difficult" for those with some aperture in front of them. (It's also quite a pretty galaxy in photographs.) If you're looking for a list of new objects to work on, give NGC 6118 a try, knowing that it's usually considered the hardest of the Herschel 400.

The brightest of Serpens' galaxies is the still-modest **NGC 5921**; the *interstellarum Deep-Sky Atlas* indicates that this spiral galaxy can be observed with telescopes as small as four inches' aperture. Can it? I've seen it in my 12.5-inch scope (a.k.a. Bob the Dob), but haven't tried it in anything smaller.

NGC 5921 is a lovely barred spiral in photographs, its central bar running roughly north-south, but its halo elongated NW-SE. My notes on the galaxy mention seeing the bar and a "brightish stellar nucleus" within it, although I apparently didn't see much of the actual halo (I noted that it was elongated basically N-S). A 4-inch scope obviously won't show this much detail, but it's what a telescope and observer **do** see that counts—what can *you* see of NGC 5921? To find the galaxy, look 3 degrees north-northeast of M5, or 5.75 degrees west-southwest of 2nd-magnitude Unukalhai, Alpha Serpentis.

One other galaxy draws our attention this month, one that's a favorite of EAS users with large telescopes. **PGC 54559** — better known as **Hoag's Object** — is one of a rare "species" of galaxy... a ring galaxy, formed by the direct collision of at least one spiral galaxy with another galaxy of any type.

Hoag's Object was first noticed on the Palomar Observatory Sky Survey photographic plates in the 1950s, and was thought for some time to be a planetary nebula. Much later, the galaxy became famous as a result of a Hubble Space Telescope image and the Astronomy Picture of the Day website; this Hubble image showed the galaxy as a round yellow core surrounded at a distance by bluish spiral "arms" twisted into a perfectly-circular ring. Astoundingly, another perfect ring galaxy can be seen *through* Hoag's Object, in the clear gap between its core and the ring.

Hoag's Object is exceedingly faint, usually requiring at least a 16-inch telescope and dark skies. If you're willing to track it down, look exactly halfway between Beta Ser and Epsilon Bootis (Izar). A distinctive triangular asterism lies just west of the galaxy as seen in the eyepiece. Hoag's Object appears as little more than a tiny, round, blurry smudge in a 20-inch scope; it would require considerably-greater aperture to discern any further details from the galaxy.

Both halves of this bipartite constellation hold fascinating objects within their boundaries; I didn't even touch on the galaxy groups of Serpens Caput or the splendor of M16 and the summer Milky Way in Serpens Cauda. These and countless other objects await those willing to venture into the Serpent's coils on a warm July evening; see what else this overlooked constellation has to show you.

EAS T-Shirts

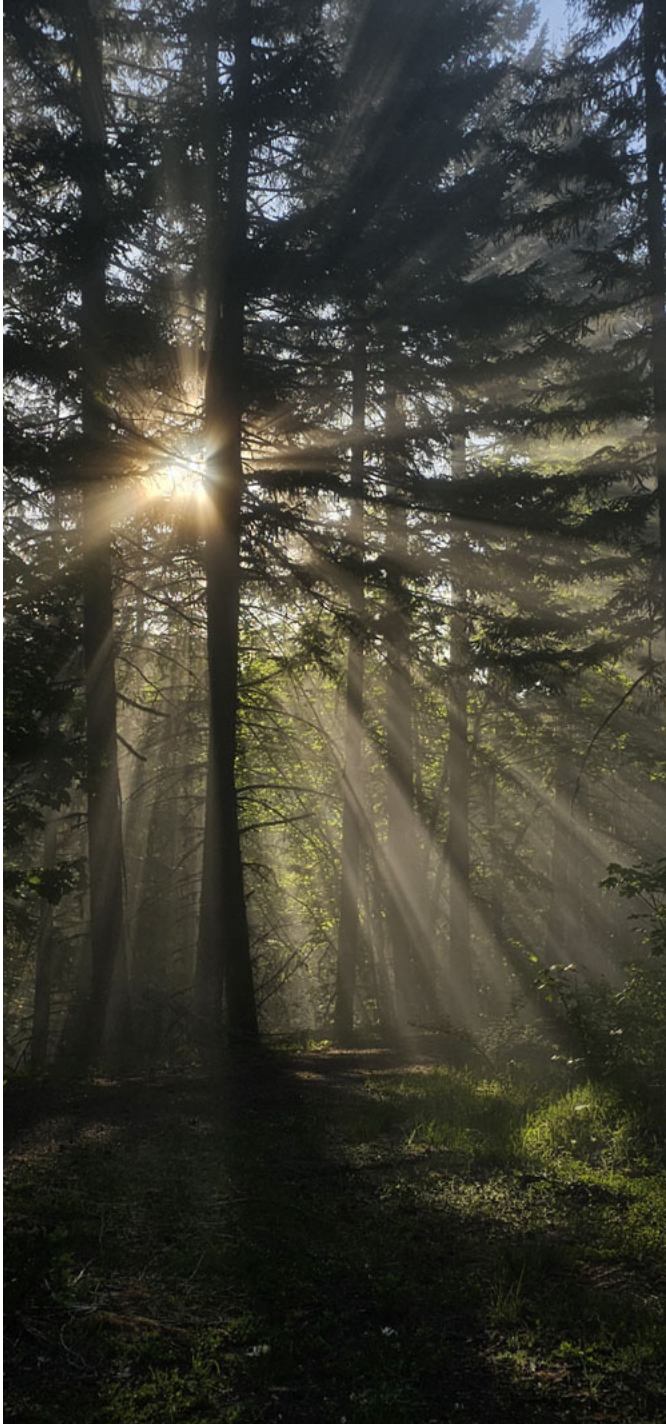


EAS has a new logo, and you can have it put on your very own T-shirt or sweatshirt. Coaches Athletic Supply, 3990 Roosevelt Blvd, Unit C (corner of Roosevelt and Bertelsen) has the logo on file. You can buy a shirt from them or provide your own and they'll print the logo on it for about \$5. The standard size for a T-shirt is about 7 inches, but Coaches can enlarge or reduce the size and price accordingly. The logo can be in a variety of colors depending on the color of your clothing item.

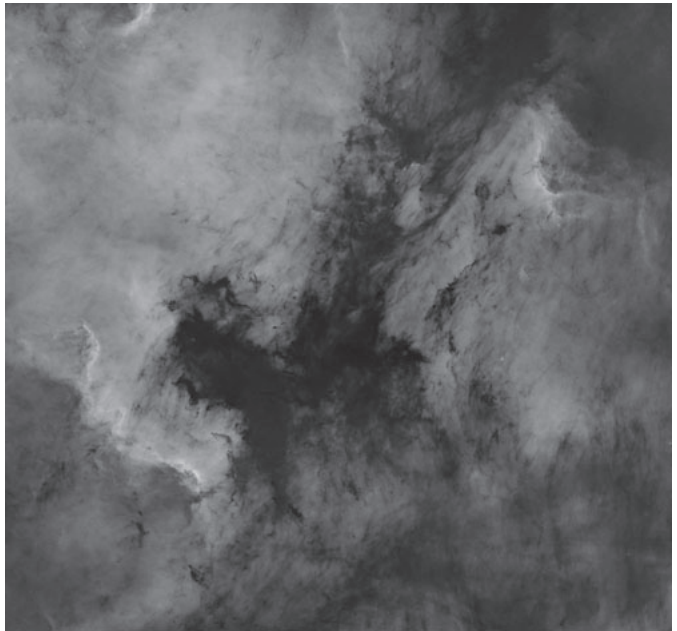
Providing your own shirt could save you some money. Michaels on Gateway sells good quality shirts for under \$5. (Note that Baseball caps are currently not something Coaches can print on.)

Gallery

June was a great month for astrophotos, starting with a gorgeous one taken through a dense forest. We had so many photos shared on our email list this month that I couldn't fit them all in here and keep the Io to a reasonable size, so this is just a sample of June's bounty. Make sure you're on our email list to see all the beautiful images that EAS members share with the group. And feel free to zoom in a bit on the ones reproduced here; they'll still be pixel-sharp at 200%.



The Sun from Clover Ridge, east of Roseburg.
Photo © by Joe Earp.



North America and Pelican Nebulae.
Photo © by Ronald Perez.



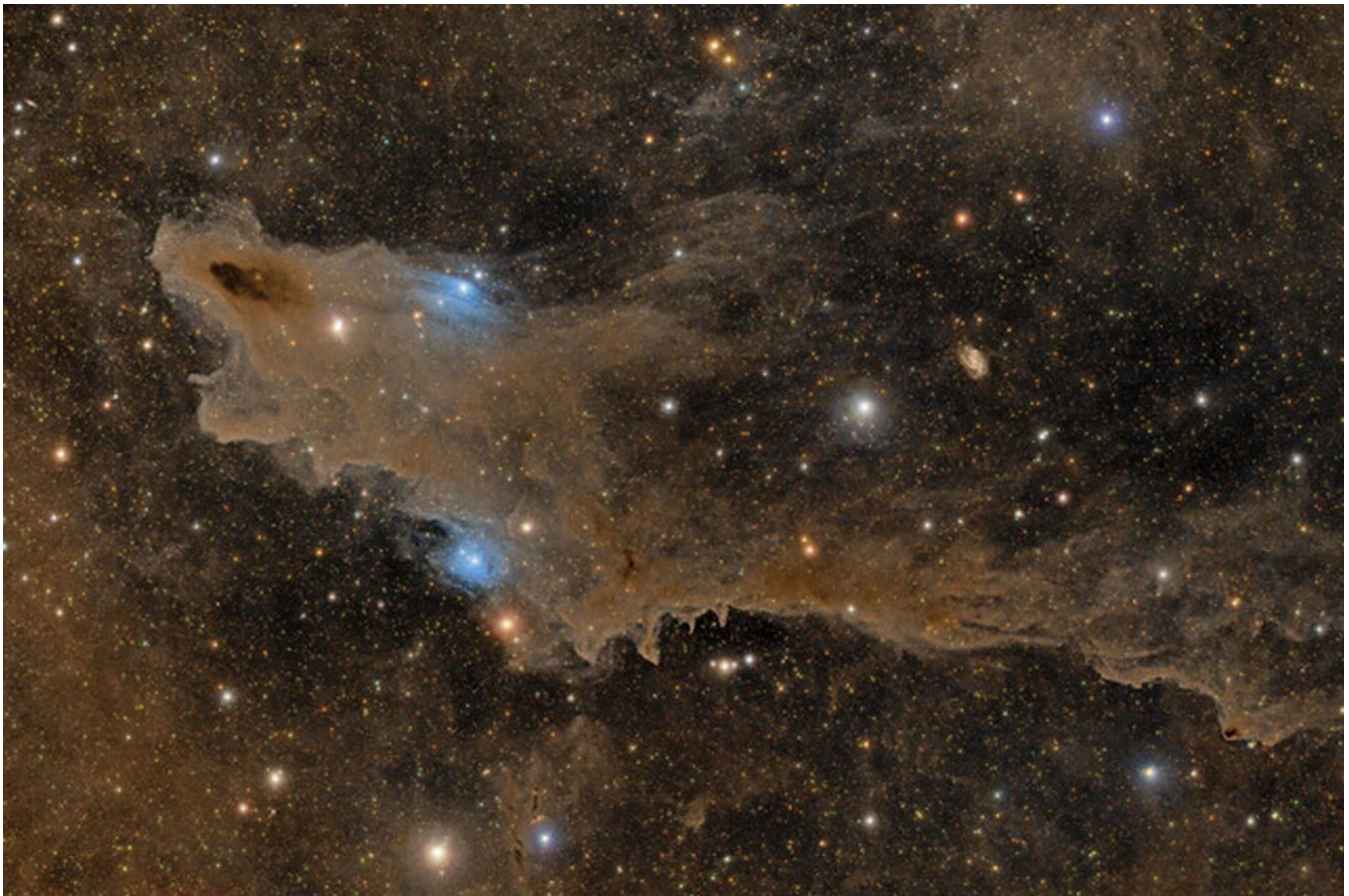
Venus lined up with Castor and Pollux on the night of May 31st. Photo © by Sylvia Collazo.



Mars in the Beehive cluster on June 1st.
Photo © by Alan Gillespie.



Nearly full Strawberry Moon 6/2/23.
Photo © by Alan Gillespie.



Mark Wetzel captured LDN 1235, better known as the Dark Shark Nebula, with data collected on two separate dates and two separate locations in June. This is a dark molecular cloud with portions illuminated by embedded stars and the rest visible by the light of the general Milky Way. It spans about 15 light-years and lies about 650 light-years away in the constellation of Cepheus. Photo © by Mark Wetzel



Giant sunspot on 6/28/23. Photo © by Alan Gillespie.



Herbig-Haro object in the neck of the Pelican Nebula.
Photo © by Andy Nowlen.



Hoag's Object — a very difficult galaxy to observe (See Andy's "Constellation of the Month"). Sketch © by Mel Bartels.

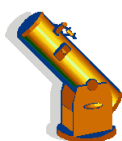


The Milky Way on 6/14/23, looking into the heart of the galaxy in Sagittarius. Note the Pipe Nebula just to the right of center. (It's the hindquarters of the Dark Horse Nebula, which is rearing upward with its hooves pointed to the right of the image.) Note also the M24 star cloud, which looks like a bright double cluster just to the left of center.

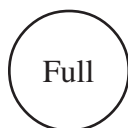
Photo © by Alan Gillespie.



Wes Magyar reprocessed some earlier data he'd gathered on the Orion Nebula and came up with this extremely deep image that shows off the bubble being blown by the hot stars of the trapezium. The bubble has blown outward in our directions, letting us see through to the back side of it. Note also the Running Man Nebula to the lower left. Photo © by Wes Magyar.



Observing in July 2023



July 3, 4:39 AM	July 9, 6:48 PM	July 17, 11:32 AM	July 25, 3:07 PM
Mercury lost in Sun	Mercury Set: 9:41 PM	Mercury Set: 9:52 PM	Mercury Set: 9:49 PM
Venus Set: 11:04 PM	Venus Set: 10:42 PM	Venus Set: 10:09 PM	Venus Set: 9:29 PM
Mars Set: 11:19 PM	Mars Set: 11:03 PM	Mars Set: 10:43 PM	Mars Set: 10:22 PM
Jupiter Rise: 2:01 AM	Jupiter Rise: 1:40 AM	Jupiter Rise: 1:12 AM	Jupiter Rise: 00:43 AM
Saturn Rise: 11:40 PM	Saturn Rise: 11:16 PM	Saturn Rise: 10:44 PM	Saturn Rise: 10:11 PM
Uranus Rise: 2:29 AM	Uranus Rise: 2:06 AM	Uranus Rise: 1:36 AM	Uranus Rise: 1:05 AM
Neptune Rise: 00:26 AM	Neptune Rise: 11:59 PM	Neptune Rise: 11:27 PM	Neptune Rise: 10:56 PM
Pluto Rise: 10:06 PM	Pluto Rise: 9:42 PM	Pluto Rise: 9:10 PM	Pluto Rise: 8:38 PM

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

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

Items of Interest This Month

- 7/4 Moon at perigee (closest to Earth).
- 7/6 Earth at aphelion (farthest from Sun).
- 7/7 Venus at its brightest (Magnitude -4.5).
- 7/9 & 7/10 Mars within 1° of Regulus in Leo.
- 7/15 Dexter Dark Sky Star Party.**
- 7/18 – 7/23 Oregon Star Party
- 7/19 Moon, Venus, Mars, and Mercury all near Regulus, low in west after sunset.
- 7/20 Moon at apogee (farthest from Earth).
- 7/28 First Quarter Friday star party.**
Mercury 0.1° south of Regulus. Might be visible very low in west after sunset.
- 7/29-31 Delta Aquariid meteor shower. Radiant is near Saturn.



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