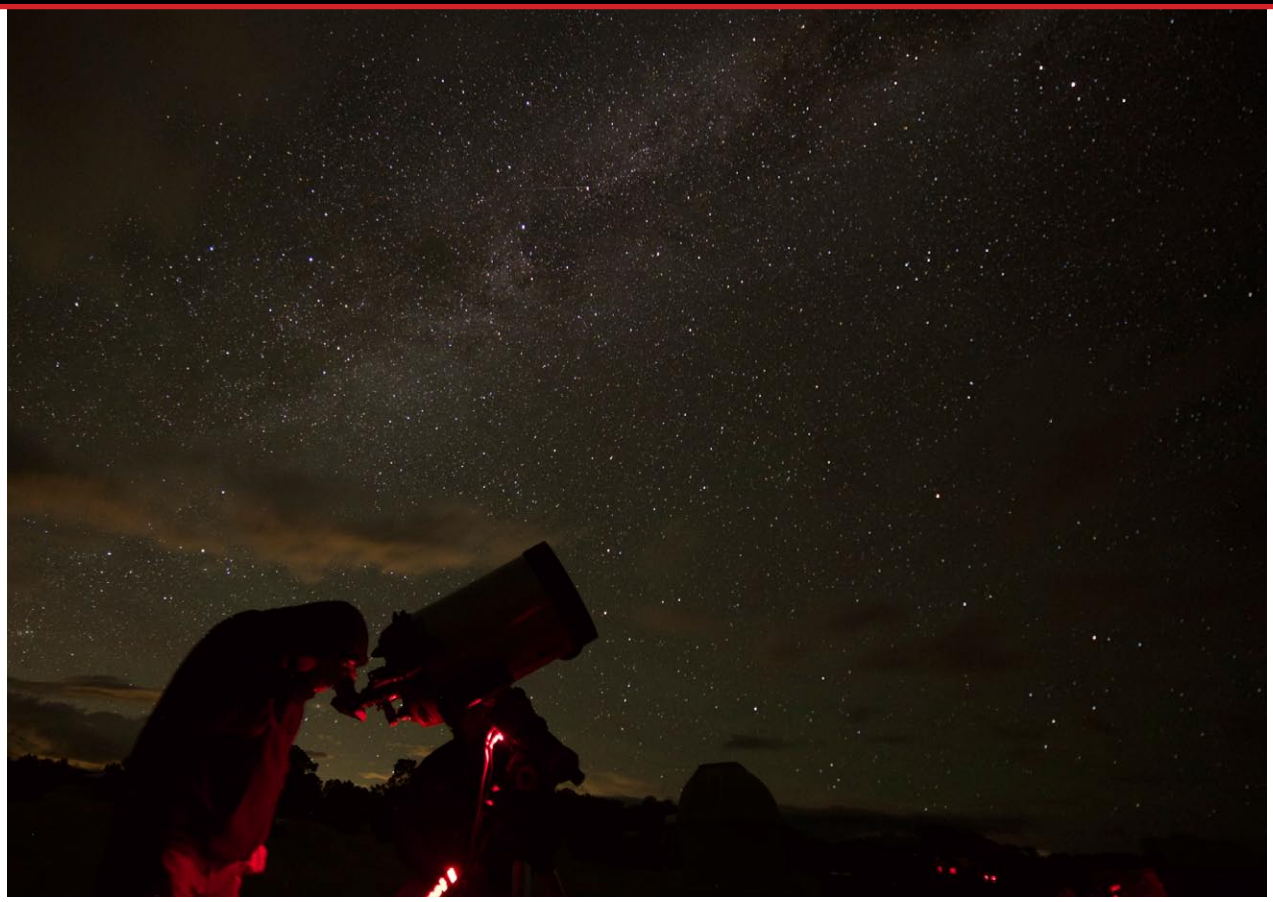
The Denver
OBSERVER
AUGUST 2018



An observer under the dark skies of the Rocky Mountain Star Stare, June 2018.

Image © Ron Pearson.

AUGUST SKIES

by Zachary Singer

The Solar System

If you follow the planets, you're likely aware that **Mars** *is just past opposition* at the beginning of August, and thus more or less at its biggest and brightest for the year. Dust storms, though, have blanketed the planet, cloaking surface details that should've been visible even in moderately sized telescopes. Recent NASA reports suggest that the planet's weather is quieting down, and that atmospheric clarity should begin to improve.

That time frame could still span several weeks, long enough to miss the closest look at the red planet. Putting all the "closest approach" hype aside, though, Mars' apparent size will shrink only slightly by mid-month, and it will *still* be a very large 21" at the end of August. Even at the end of *September*, Mars' disk will still span a good 16", more than enough for you to make out surface detail, under good seeing conditions. Observing will be more convenient, too—by mid-August, Mars transits around 11:30 PM, and a full hour earlier at the end of the month.

Mercury is lost in the dawn for the first half of August, but it gains enough angular separation from the Sun that dedicated observers might find it after mid-month. At that point, Mercury will be relatively dim at magnitude +2.2, and just 5° up in the east, 30 minutes before sunrise. If you can make out an image telescopically, your reward will be a thin crescent more than 9" across. As the days progress, the disk will shrink, but it will widen and brighten—all the way to magnitude -0.7, with a slightly gibbous disk,

Continued on Page 6

Sky Calendar

4	Last-Quarter Moon
11	New Moon
18	First-Quarter Moon
26	Full Moon

In the Observer

The Observer is available in color PDF format from the DAS website: https://www.denverastro.org/das/?page_id=13

Society Directory

DAS Executive Board

President:
Ron Hranac
president@denverastro.org

Vice President:
Lindsey Shaw
vpresident@denverastro.org

Secretary:
Ed Ladner
secretary@denverastro.org

Treasurer:
Scott Perrin
treasurer@denverastro.org

Executive Board Members:
Past President, Ron Pearson

July Candia	Ed Scholes
Jack Eastman	Sorin
Joe Gafford	Chris Ubing
Dena McClung	Dan Wray

President Emeritus, Larry Brooks

Committees

Van Nattan-Hansen Scholarship Fund:
Megan Daniels (Chair)
VNH@denverastro.org

EGK Dark Site Committee:
Darrell Dodge, Interim Chair
darksite@denverastro.org

IDA Representative:
Dr. Robert Stencel
colorado.ida@gmail.com

Volunteers or Appointed Representatives

ALCor:
Darrell Dodge 303 932-1309

Newsletter Editor:
Zachary Singer 303 718-4188
editor@denverastro.org

Newsletter Proofreaders:
Darrell Dodge, Ron Hranac

Website:
Darrell Dodge
webmaster@denverastro.org

IT Coordinator:
Ken Sturrock
itdept@denverastro.org

External Outreach Coordinator:
Julie (July) Candia
external@denverastro.org

Public Night Coordinator:
Hugh Davidson 303 679-0629

Librarian:
Eileen Barela

Telescope Loan Program:
Ed Scholes
scopeloan@denverastro.org

DAS Information Line:
(303) 871-5172

DAS Correspondence:
Denver Astronomical Society
P.O. Box 102738
Denver, Colorado 80250
president@denverastro.org

New-Member Ambassador:
Digby Kirby
odigby@gmail.com
(970) 301-2287

Membership Coordinator:
Dena McClung
membership@denverastro.org

http://www.denverastro.org

PRESIDENT'S MESSAGE

by Ron Hranac

DAS Membership: Resources and Benefits

While preparing for our July E-Board meeting, Denver Astronomical Society's Membership Coordinator, Dena McClung, reported that membership had reached 480, an impressive count just halfway through the year.

To those of you among the 480 who are new to DAS, welcome! We're glad to have you as a member. You've joined a community of like-minded people who share an interest in astronomy. You'll find within our ranks a wide range of astronomy-related experience. DAS membership includes a variety of benefits, too.

What We Do

Public outreach is one of the things that we do best. We host upwards of 130 to 140 outreach events annually, reaching some 5,000 people per year. Another is to provide opportunities for people to learn about astronomy, observing, and space exploration. Those learning opportunities occur during our monthly membership meetings, our monthly In-Reach program (just for members and guests), external outreach events, and our twice-weekly Public Nights and monthly Open Houses (including the popular "Learner's Land").

Activities and Meetings

Each year, DAS holds monthly general membership meetings, a spring banquet, a summer picnic, an auction, and a December holiday party. We invite speakers from the astronomy and aerospace fields to our General Meetings and banquets. The Society's board of directors, better known as the Executive Board or E-Board, meets monthly. You're welcome to attend those meetings.

Our public events include the previously mentioned twice-weekly Public Nights at DU's historic Chamberlin Observatory, where we offer a brief astronomy-themed lecture, followed by observing through the 1894 observatory's powerful Alvan Clark-Saegmuller 20-inch refracting telescope (in case of inclement weather, we offer tours of the observatory building after the lecture). In addition to Public Nights, we host monthly Open Houses at Chamberlin, usually on the Saturday closest to the first-quarter Moon.

At each Open House, DAS members set up their personal telescopes on the park lawn next to the observatory building, where the public (and DAS members) can take a peek

Continued on Page 3

DAS SCHEDULE

August 2018

3	E-Board Meeting—At DU's Historic Chamberlin Observatory, 7:30 PM. All members welcome.
4	Member In-Reach: Observing Tools, at DU's Historic Chamberlin Observatory, 7:30 PM. All members and their guests welcome.
11	Dark Sky Weekend—EGK Dark Site & Brooks Observatory
18	Open House—DU's Historic Chamberlin Observatory—Starts at 7:30 PM
24	DAS General Meeting—DU's Olin Hall, Rm. 105—Starts at 7:30 PM

(September 2018)

8	Dark Sky Weekend—EGK Dark Site & Brooks Observatory
15	Open House—DU's Historic Chamberlin Observatory—Starts at 7:30 PM

During Open House, volunteer members of the DAS bring their telescopes to the Chamberlin Observatory's front (south) lawn, so the public can enjoy views of the stars and planets, try out different telescope designs, and get advice from DAS members. The Observatory is open, too (costs listed below), and its historic 20-inch telescope is open for observing with no reservations necessary.

Open House costs (non-members): If the skies are clear, $2/person ($5/family), $1/person in inclement weather. DU students with ID, and DAS members free.

Public Nights feature a presentation on astronomical subjects and a small-group observing session on the historic 20-inch telescope (weather permitting), at Chamberlin Observatory on Tuesday and Thursday evenings (except holidays), beginning at the following times:

March 10 - September 30 at 8:30 PM

October 1 - March 9 at 7:30 PM

Public Night costs (non-members): $4/adult, $3/child and students with ID. DAS members and DU students with ID: free.

Members of the public (non-DAS/DU, as above), please make reservations via our website (*www.denverastro.org*) or call (303) 871-5172.

President's Message

Continued from Page 2

through those 'scopes. Learners' Land provides a hands-on opportunity for adults and children to try 'scopes themselves, pointing the instruments at celestial objects of their choice. For a small fee, folks can head upstairs to the observatory's dome room and view objects with the 20-inch refractor as well. DAS members can attend the Public Nights and Open Houses for free.

Volunteer Opportunities

DAS takes lectures and telescopes into the community with its external outreach program. Details are available on our web site at http://www.denverastro.org/?page_id=141. If you're interested in helping out, drop a note to our External Outreach Coordinator, July Candia, at external@denverastro.org.

We encourage you to consider volunteering to help support some of our events. We always need assistance managing the activities at Open Houses, Public Nights, external outreach events, and other activities. You don't need special astronomy skills, so feel free to pitch right in!

Dark Site

DAS operates the Edmund G. Kline Dark Site near Deer Trail, Colorado, with the Brooks Observatory and its 14-inch telescope for our members and guests to view the night sky under reasonably dark conditions. The site includes a warming hut, and concrete pads with electrical power on which members set up their telescopes. For more information, see http://www.denverastro.org/?page_id=85.

We Have Telescopes

Need to borrow a telescope, or try out a couple different models? Consider taking advantage of our 'Scope Loan program. Details can be found at http://www.denverastro.org/?page_id=184.

Online Presence

The DAS web site, www.denverastro.org, has pages with information about the DAS, its current activities, and a list of people you can contact to become more involved with the Society and its operations.

In addition to our web site, we have a presence on social media, where you can find us on Facebook (https://www.facebook.com/denverastro/), Twitter (@denverastro), and YouTube (https://www.youtube.com/user/denverastro).

DAS has an active Yahoo Group listserv where many of our members stay in touch. To join the listserve (it's free), go to: https://groups.yahoo.com/neo/groups/denverastro/info. Click on the "+ Join Group" button, follow the instructions, and be sure to include your name so your membership can be verified.

Membership Benefits

A summary of membership benefits can be found here: http://www.denverastro.org/das/?page_id=378, as well as the "President's Message" in the August 2015 issue of our monthly newsletter, *The Denver Observer*, at http://www.denverastro.org/xobserver/august2015_denverobserver.pdf.

If you have any questions, feel free to get in touch with our New-Member Ambassador, Digby Kirby (odigby@gmail.com), or contact anyone on the E-Board. A list of officers and other key people is available on our web site and in the "Society Directory" on page two of this newsletter.

Once again, welcome to DAS!

∞

ABOUT THE DENVER ASTRONOMICAL SOCIETY

Membership in the Denver Astronomical Society is open to anyone wishing to join. The DAS provides trained volunteers who host educational and public outreach events at the University of Denver's Historic Chamberlin Observatory, which the DAS helped place on the National Register of Historic Places. First light at Chamberlin in 1894 was a public night of viewing, a tradition the DAS has helped maintain since its founding in 1952.

The DAS's mission is to provide its members a forum for increasing and sharing their knowledge of astronomy, to promote astronomical education to the public, and to preserve DU's Historic Chamberlin Observatory and its telescope in cooperation with the University of Denver. The DAS is a long-time member in good standing of the Astronomical League and the International Dark Sky Association.

The DAS is a 501 (c)(3) tax-exempt corporation and has established three tax-deductible funds: the Van Nattan-Hansen Scholarship Fund, the DAS General Fund, and the Edmund G. Kline Dark Site Fund.

***JOIN US!** More information about DAS activities and membership benefits is available on the DAS website at www.denverastro.org.

∞

ASTRO UPDATE

Selected Summaries of Space News

by Don Lynn

Neutrino Source

The *source* of a neutrino from outside our galaxy has been found for the first time. The neutrino was detected by the Ice Cube Observatory, buried under a mile of ice at the South Pole. Ice Cube gives a rough source location, and using that, observations from other types of telescopes found a gamma-ray flare that is very likely the neutrino source: It is a blazar in a galaxy 3.7 billion light-years away. (A blazar is a quasar with a jet pointed in our direction, so it appears brighter than normal. And a quasar is a supermassive black hole that is bright because much material is falling into it.) The gamma ray flare was first seen by the Fermi Gamma-ray Space Telescope, and also by the Swift satellite (which has X-ray and UV/optical instruments) and the MAGIC Cherenkov telescopes in the Canary Islands.

Matter Found

Astronomers have an estimate of the mass of all the baryonic matter, the ordinary matter made of protons, neutrons and electrons, that exists in the universe. (They derived it from the sizes of waves in the Cosmic Microwave Background.) But the mass found in galaxies plus the mass of hot hydrogen and helium *between* galaxies (detected by their emitted X-rays) doesn't add up to the baryonic density.

A new observation may have found the remaining baryonic matter. Using the Hubble Space Telescope and XMM-Newton X-ray space telescope, astronomers measured how much gas was between us and a distant quasar, based on how much that gas altered the spectrum of the quasar. Extrapolating from what was found in this one observational study, there is about enough previously undiscovered gas to add up to the known baryonic matter total. To confirm this, similar observations of other quasars will need to be done.

Black Holes Found

Galaxy evolution theory says that there should be thousands of star-sized black holes orbiting near the center of galaxies. Stellar black holes, formed when massive stars collapse, slowly fall into the galaxy center. Such black holes have not been found, until now, because they're difficult to detect unless they have a companion star dumping matter onto them, causing a glow in X-rays.

New observations of the center of our Milky Way using the Chandra X-ray space telescope found 415 X-ray sources, of which a dozen matched the characteristics of a binary black hole with companion material being dumped on it. Factoring in the sensitivity limit of the observation and the greater number of single black holes than binary, the astronomers concluded that there are indeed thousands of stellar black holes near the center of our galaxy.

Martian Volcano

The Medusae Fossae region of Mars has undulating hills and mesas unlike those in other regions of the planet. The region has been known since the 1960s, but precisely what formed it remained a mystery. Analysis of gravitational data from various orbiting spacecraft has shown that the area has low density. Radar data reveal a lack of ice that could have accounted for this, so the region's rock must be porous. The only source that could produce this much porous rock is explosive volcanic activity, where the lava is mixed with great quantities of gas.

Like a Diamond in the Sky

Anomalous microwave emission (AME) is the term given to patches of faint microwave emissions spread across the Milky Way. It has long been thought that AMEs are caused by clouds of tiny, spinning dust particles. What kind of particles is a subject of debate, but the best guess was polycyclic aromatic hydrocarbons (PAHs). New infrared observations of AMEs emitted from 3 protoplanetary disks (disks around young stars where planets are forming) show that the disks contain nano-diamonds, which are likely the particles emitting AMEs, not PAHs. Eleven other young stars observed had neither detectable AMEs nor nano-diamonds.

General Relativity Test

In the most distant precision test of General Relativity to date, astronomers observed a massive galaxy known as ESO 325-G004, which is producing a gravitational lens acting on the light from a more distant galaxy. They calculated the mass of the foreground galaxy from the motions of its stars, and then measured how much the distant galaxy's light was bent by the foreground galaxy's gravity. The amount of bending was exactly what was calculated from General Relativity for that foreground mass.

Interstellar Asteroid

Remember 'Oumuamua, the asteroid that came from outside our solar system? Astronomers found that it did not quite follow a gravitational orbit as it passed through. This happens similarly with comets, because they emit gas or dust as they warm from sunlight, and this stream of emissions nudges comets slightly off-path. So 'Oumuamua is likely a comet, not an asteroid, though the emissions were small enough that they were not imaged. Recent simulations of forming planetary systems show that many more comets than asteroids are thrown out of such systems, so it makes sense that 'Oumuamua is a comet.

James Webb Space Telescope

Forget what I reported in May about the James Webb Space Telescope being delayed until 2020—after completion of an investigation into problems testing the telescope, it was further delayed until March 2021.

DAS NEWS

August General Meeting

Please join us for our next **General Meeting**, on **Friday, August 24, 2018,** at **7:30 PM, at DU's Olin Hall, Room 105, for Professor Anthony Villano's presentation on dark matter.**

The case of dark matter was closed 30 years ago. Astronomers had convincingly shown there were gravitational anomalies in galaxy clusters and spiral galaxies, and particle physicists had answered with a solution so beautiful that cosmology was forever changed. There is just one problem: Nobody has detected dark matter on earth yet, but we probably should've been able to. These three decades of confusion saw amazing advances in detector technology, but one thing remains clear: The issue is probably not as simple as we thought 30 years ago.

Professor Villano will take us through the maze of the last 85 years of dark-matter research to arrive at a current diagnosis of the "particle hypothesis" for dark matter.

Professor Anthony Villano obtained his PhD at the Rensselaer Polytechnic Institute in the field of particle physics. His initial post-doctoral work was in nuclear physics, where he took a key role in a project to produce supporting measurements for the neutrino-less double-beta decay efforts. Since 2010, he has applied his knowledge of particle and nuclear physics to the dark matter direct detection effort; first as a post-doctoral associate at the University of Minnesota and now as an Assistant Professor at the University of Colorado Denver.

Professor Anthony Villano.

A reception following the meeting will be held at DU's Historic Chamberlin Observatory. Coffee and light refreshments will be served.

DAS Picnic

The DAS had a good turnout for its Annual Picnic on July 21st, in spite of the possibility of rain. Many stayed on afterward to offer telescopes to the public during Open House, and the clouds provided a few openings to share some lunar and planetary views with the crowd.

Image © Joe Gafford.

Preserving Dark Skies

Next month, we expect an article on light pollution by Dr. Robert Stencel. In the meantime, the Colorado section of the Dark Sky Association needs your help. Contact colorado.ida@gmail.com.

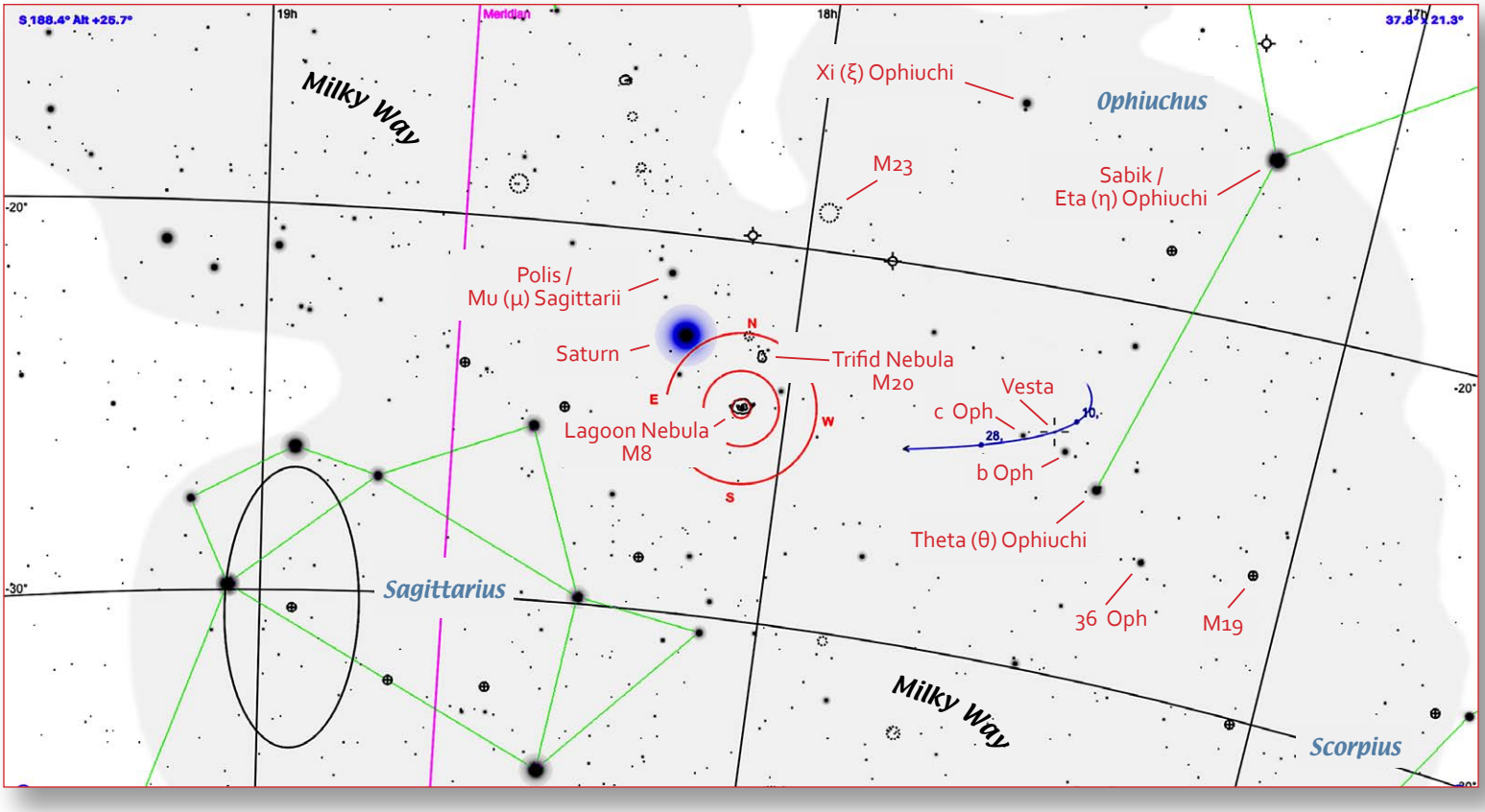
Remembering Chuck Carlson

DAS member **Chuck Carlson** passed away last month. He was a long-serving DAS treasurer, public outreach volunteer, coordinator of activities, lecturer, and the designer of the well-regarded Denver Chair, a seat optimized for observing. He was awarded a special plaque in 2007, in recognition of his dedication and service to the DAS.

In Chuck's own words, "I first became interested in astronomy as a child during World War II (boy, am I dating myself), being taken to the old Hayden Planetarium on several trips to New York City. This was a latent fascination for many years until I built my own reflector and joined the DAS."

Chuck has a special place in the hearts of DAS members, and he will be sorely missed.

Chuck Carlson, right, with Al Nagler, left, and John Anderson, center, in 2004.
Image courtesy Joe Gafford.



Viewing southward in Denver at 10:00 PM on August 15th. Telrad circles are centered on the Lagoon Nebula, M8; note position of the Trifid Nebula, M20, just inside the 4° circle, and thus in most finderscopes' field of view (remember that M20 will be shown *at the bottom* of an inverted finderscope view).

Vesta passes between b Ophiuchi and C Ophiuchi this month, as illustrated by the thin curving arrow at center-right. Look at last month's chart to get a feel for this area of Ophiuchus, located right above Scorpius (just off this month's chart at bottom-right).

Object positions, constellation and meridian lines charted in SkySafari, and then enhanced.

August Skies *Continued from Page 1*

at month's end. (Greatest elongation, the widest angular separation from the Sun, is August 26th.)

Venus boasts a brilliant, magnitude -4.2 "lemon wedge" disk at the beginning of August, about 16° above the western horizon a half-hour after sunset. By the end of the month, the disk appears almost *half-again larger*, or almost 30" across, and its phase narrows to a subtle crescent. The changes come as Venus swings around in its orbit, coming closer to the Earth and narrowing the angle we see between Venus and the Sun. In turn, though, that narrower angle means that at month's end, Venus stands less than 10° above the horizon a half hour after sunset.

As for **Jupiter**, catch it while you can. As August begins, the planet is already past the meridian after sunset, appearing in the southwest as darkness falls, and getting low (just over 20° up) by 10 PM. By mid-month, the planet is low by 9 PM—and it *sets* just before 10:30 at month's end.

The shadows of two of Jupiter's four largest moons, Io and Europa, will cross the planet's face on the 26th, starting around 8:35 PM Mountain Daylight Time, joined by the moon Io itself. Unfortunately for us, Jupiter will be just 22° above the horizon and sinking, so Denver's usual challenging seeing conditions will be made that much worse.

Still, it's worth trying—even if the view is too blurry to see the shadows, you *should* at least be able to witness the end of the Io transit, when the moon finishes crossing Jupiter's disk and begins to become visible as a separate object to the west. (It will join Europa there, making for a striking change.) According to SkySafari software, the end of the transit occurs at 8:59 our time; be ready to observe several minutes before and after, to see the moon's dot come into view—you'll see a subtle "bump" before there is a clear separation.

Saturn passed its opposition early last month, so it's *technically* no longer at its prime—but on a practical basis, it's in a great position for observing! The ringed planet is at its highest in the south (and thus offering the sharpest image) around 10:30 PM in early August, a much easier hour for observing than we had last month. By month's end, Saturn will be in about the same spot by 9:30, so August is a great time to show this planet to the kids (as many of you know, it's among the most popular targets for "kids" of all ages). Better still, Saturn will continue to be a good target well into the fall.

At mid-month, magnitude +6.6 Vesta cruises directly be-

Continued on Page 7

August Skies

Continued from Page 6

tween two stars we used for finding last month's targets, b Oph and c Oph—Vesta's path is marked on the chart on page 6. (If you missed last month's issue, catch up in "July Skies," on pp. 6-8; the file itself is at: http://www.denverastro.org/xobserver/july2018_denverobserver.pdf.)

Putting a finderscope's crosshairs between b and c Oph will show Vesta within its field for most of August—if you got familiar with b, c, and Theta (θ) Oph last month (or do so now), *identifying Vesta should be simple after about the 7th or 8th*, when the minor planet makes a noticeable triangle with b and c Oph. That triangle shrinks noticeably in size, until Vesta swings close to c Oph between about the 19th and 22nd—*they'll be just 7' apart on the night of the 21st*.

I usually avoid covering meteor showers here, but this year's **Perseid shower** is expected to be a decent one, with the **peak on the nights of August 11th-12th (Saturday night) and, perhaps better, the 12th-13th (Sunday).** The best time to watch a shower is when its *radiant* (its apparent point of origin in the sky) is well above the horizon—with the Perseids, that's at about 2 AM. Some years, moonlight washes out the meteors, but the Moon won't be a factor this time—for best viewing though, find a dark sky, away from obscuring city lights.

Stars and Deep Sky

Unlike last month, when we toured some less commonly visited objects, this month's are better traveled—the first is a bright nebula in Sagittarius, and the other is a beautiful open cluster.

Our first target, the **Trifid Nebula**, or **M20**, at **18h 04m, -23° 02'**, is noted—and named—for its "three-lobed" appearance. This well-known object has several components; the first is an *emission* nebula, similar to the nearby Lagoon Nebula, M8, and the Orion Nebula, M42. These nebulae are glowing clouds of ionized hydrogen gas, often also referred to as H II regions (the "H II" designation means that these clouds are singly ionized; H I is neutral).

H II regions are typically pink or reddish in photographs, but the nebulae are usually too dim for our eyes to perceive the color, so we see them as gray. (I have seen some observing reports, though, that suggest that color may be visible in the Trifid under very good conditions.) The clouds glow because they're energized, or "excited," by ultraviolet light from stars within them; the idea is similar to that of a fluorescent tube.

In front of M20's great glowing cloud, from our point of view on Earth, lies a complex pattern of molecular gas and dust, forming dark lanes that obscure parts of the cloud behind it, and causing the "split" appearance of the bright cloud behind it. That is, the main glow *is all one cloud,* with the silhouette of the dark area superimposed on it—the Horsehead Nebula in Orion is another famous example. The gas here is very much denser than in the glowing area, and in spite of its darkness, it actually conceals numerous new stars and proto-stars (these were long suspected, but it took recent infrared images to finally show them).

To the north of the emission nebula lies a *reflection* nebula. Such nebulae commonly appear blue in photographs for the same reason that Earth's sky does during the day—the blue component of starlight or sunlight is more easily reflected than longer wavelengths, like red. As with the emission nebulae, though, we usually can't see the color ourselves in a telescope, so this part of M20 also looks gray—if you can see it at all.

Ordinarily, the Trifid's central (lobed) emission cloud *should* be easily visible under dark skies in an 8- or 10-inch 'scope, and not too tough in a 6-inch (though detail may suffer in the latter). A UHC or O III filter should boost contrast noticeably.

In early July, though, my experienced observing partner and I were only *barely* able to make out the dust lanes, using a UHC on my 6-inch Newtonian at 100x (that was the best view); just a few minutes earlier, the nearby Lagoon Nebula was an easy target, with and without the filter. Rather like many galaxies, the Trifid really needs good *transparency,* along with dark skies—with our recent fires here and in the West, transparency along the Front Range has been awful on most nights. In short, if you don't have any luck with M20 over the next few weeks, don't give up on it—the problem may have as much to do with our "temporary" conditions as with anything else.

The easiest way to get to the Trifid Nebula, M20, is to *find the Lagoon Nebula, M8*—if you're familiar with the Lagoon, then you know that its bright glow is visible to the naked eye, just above the "spout" of the "teapot" in Sagittarius (if you're not familiar with this patch of sky, bear with me). M20 is just "above" or northward of M8, lying so close that the two objects share the same finderscope field. In the usual straight-through type of finderscope, with an inverted view, M20 appears as a small, hazy patch of light towards the *bottom* of your finderscope—the nebula may not be visible, but a few of the stars peeking out from within its clouds will be.

If you're not familiar with the Lagoon Nebula or Sagittarius, have a look at the August 2015 issue of the *Observer* (http://www.denverastro.org/xobserver/august2015_denverobserver.pdf). "Getting Your Bearings," on page 3, will help you become familiar with this fascinating region (it looks toward the central part of our galaxy, the Milky Way), and to recognize Sagittarius and the Summer Triangle—there's lots to look at here! M8 itself is covered in the "August Skies" column, on page 7 of that issue. (Read up on the star Polis, too, because we'll need that for our next target, below.)

Our second target, **M23,** at **17h 58m, -18° 59'**, is an open cluster in the upper, northernmost reaches of Sagittarius. Visually, it's quite bright, at magnitude +5.5; my notes from recent observations on the 6-inch record a loose, "salt-and-pepper" cluster, with "lots of stars sprinkled all over the place." M23 might remind experienced observers of M35, a well-known showpiece cluster in Gemini—M23 is only slightly dimmer.

M23 doesn't get as much attention as it should, because it's in a part of the sky dominated by even richer objects, like the Ptolemy Cluster, M7, in nearby Scorpius. That's a shame, because M23 is a lovely cluster to gaze at, and with a beautiful Milky Way background. In the 6-inch, it was already quite good at about 60x, in a 1° field, but better at about 100x—though the eyepiece field had narrowed to just less than ⅔°, the cluster still fit well enough, and the extra magnification helped. Arguably, the view was better still at 150x, though the cluster no longer fit completely, because all the

Continued on Page 8

August Skies

Continued from Page 7

stars shone brightly and the entire view was filled with stars—it was very impressive! The cluster is bright enough to take reasonable magnification well, so try different eyepieces to see what works best for you—in the end, visual observing is a subjective experience.

The hottest stars found in M23 are of class B9, still quite hot and blue—but the absence of even hotter B-class stars and all of the *really* hot O-class tells astronomers that these "missing" stars have already lived through their life spans. That suggests an age of about 300 million years, or roughly half-again the age of the brighter M7 cluster.

To get to M23, first find Polis, aka Mu (μ) Sagittarii, a magnitude +3.8 star a little less than 6° above, or northward, of the top of the teapot—you'll know it's Polis when you see that it's about as far from M8 (the Lagoon Nebula) as M8 is from the top of the Sagittarius teapot's spout. From Polis, look about 10° northwest, or "up and right" when this area is near the meridian, to find Xi (ξ) Serpentis, a slightly brighter star than Polis. Xi Ser, as it's known for short, is 6½° due east of Sabik, aka Eta (η) Ophiuchi, which we used to find our targets last month. Once you have these two stars, Polis and Xi Ser, place your Telrad halfway between them, and M23 should appear near the center of your finderscope field.

Saturn currently sits very near Polis, making the star less noticeable than usual—my observing partner a few weeks ago didn't see Polis until it was pointed out: "Look right above Saturn." Ordinarily, the star would stand out well on a similar night, but Saturn is quite a distraction—and the planet will remain within 2° of the star well through October. It's not a terrible problem, but you should know about it—and for now, you can take advantage of the situation by using Saturn, the brightest object in the area, to get you looking near Polis. Next year, Saturn will have moved eastward, towards Capricornus, and finding Polis will return to normal.

A quick *mea culpa*: Last month, I described the separation of 36 Oph C, the far member of the trinary star we toured, as more than "12 arc-seconds" away from the inner pair—I meant it to read, "12 arc-*minutes*," making for a much wider separation! (The problem is corrected in the online PDF, but the paper copies, and the previous PDF version you might have downloaded, still contain the mistake.)

—See you next month.

The Denver Astronomical Society
P.O. Box 102738
Denver, Colorado 80250