NIGHTFALL

A PUBLICATION OF THE HUACHUCA ASTRONOMY CLUB

JULY 2024

HAC Meeting Speaker

Our own HAC member, Ted Forte, is the speaker at this month's club meeting on July 19th. Ted will speak about planetary nebulae and the Planetary Nebula Observing Program that he has coordinated for the Astronomical League since 2005. Dinner will be at Chili's in Sierra Vista at 5pm. RSVP to Jim Reese via the HACAstro forum.

Patterson Observatory - 20th Anniversary Celebration

Things are shaping up for the Patterson Observatory 20th anniversary celebration. Please mark your calendar and plan to attend the festivities on Thursday, September 5th, 2024, at 5 p.m. There will be a reception in the Judy A. Gignac Education Center (the old LRC at the U.A. Sierra Vista campus) with refreshments and a talk by famed comet hunter and author David Levy. David was the keynote speaker at Patterson's dedication two decades ago and we are pleased to have him back for this milestone anniversary.

September 5th is our regularly scheduled public night, so right after the reception everyone is invited to come observe. Weather permitting. The observing session will start at 7 p.m.

Dine Under the Stars

Dine Under the Stars is the annual scholarship fundraiser for the University South Foundation. The foundation is the owner of the Patterson Observatory. HAC has a long tradition of cooperation with the foundation and in supporting this event. Dine Under the Stars is held under a circus style tent adjacent to the observatory.

Mark your calendars for Saturday September 28. This year's event will again have live music by Desert Fever and dinner by Pizzeria Mimosa. Sherif Mark Dannels and local radio personality Jeff Davenport will emcee the event. There will be both a silent and a live auction with some pretty amazing offerings. All proceeds go toward providing scholarships for students residing in Cochise County.

This year's event will be a step up from previous ones with an expanded tent space, and plated dinners served by professional servers. Adults will be entitled to two adult beverages (wine or beer).

The Patterson Observatory will be open during the event for stargazing. HAC members are encouraged to either purchase a ticket and attend the event (bring your checkbook and please be generous) or volunteer to operate a telescope at the observatory.

Tickets this year will be $80 for adults and $45 for children under 12. All ticket sales are on-line on the foundation website. For more information, please click here: usfaz.org

Monsoon Stand-down

The club does not generally schedule outreach or observing events during the monsoon months of July and August. This includes solar Saturdays at the library and the Public Night at Patterson. We'll be back with a full schedule in September.

HACAstro on Groups.io

If you want to stay abreast of events and keep in contact with your clubmates, HACAstro is the place for you. It's the perfect way to share observation reports, sky news, and astro-photos. It is also how your HAC officers reach out with notices, cancellations and requests. You can set preferences that control how much email you get. Those that select to get all messages usually see about 1 to 5 messages a day. You can subscribe to the group by sending an email to main+subscribe@HACAstro.groups.io

"Somewhere, something incredible is waiting to be known."
Carl Sagan

President's Constellation Exploration - July 2024

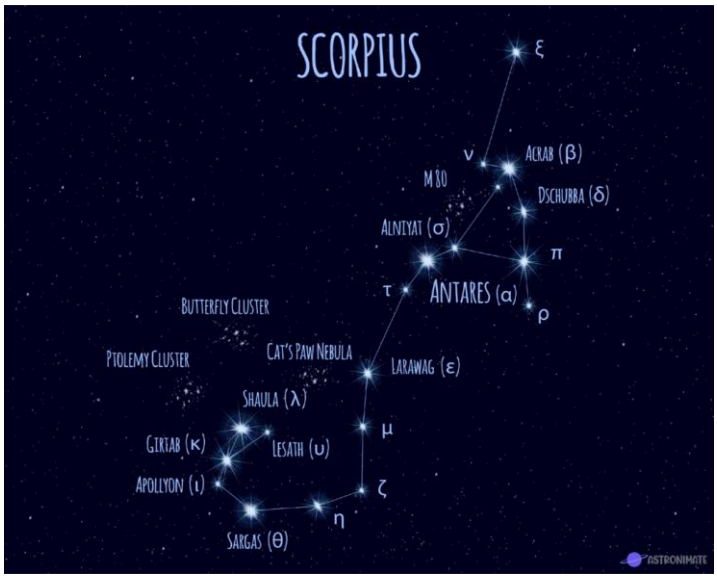
by Penny Brondum

This month let's look at the nemesis of Orion: Scorpius, also known as the Scorpion. Scorpius belongs to the Zodiac family of constellations.

The Scorpius constellation lies in the southern sky and was first catalogued by the Greek astronomer Ptolemy in the 2nd century. Scorpius pre-dates the Greeks and is one of the oldest constellations known. The Sumerians called it GIR-TAB, or "the scorpion," about 5,000 years ago.

The constellation is easy to find in the sky because it is located near the center of the Milky Way. Scorpius is the 33rd constellation in size, occupying an area of 497 square degrees. The constellation's bright stars form a pattern like a longshoreman's hook.

In Greek mythology, the constellation Scorpius was identified with the scorpion that stung Orion, the mythical hunter. The two constellations lie opposite each other in the sky, and Orion is said to be fleeing from the scorpion as it sets just as Scorpius rises. In one version of the myth, Orion tried to ravish the goddess Artemis and she sent the scorpion to do away with him. In another version, it was Gaia (mother earth) that sent the scorpion after Orion had boasted that he could defeat any wild beast.



In ancient Greek times, the constellation Scorpius was significantly larger and comprised of two halves, one with the scorpion's body and the sting, and one containing the claws. The latter was called Chelae, or "claws." In the first century BC, the Romans turned the claws into a separate constellation, Libra, the Scales. In some old descriptions the constellation of Libra is treated as the Scorpion's claws.

The Babylonians called this constellation MUL.GIR.TAB - the 'Scorpion'; the signs can be literally read as 'the (creature with) a burning sting'. The Javanese people of Indonesia call this constellation *Banyakangrem* ("the brooded swan") or *Kalapa Doyon* ("leaning coconut tree") due to the shape similarity.

In Hawaii, Scorpius is known as the demigod Maui's Fishhook or *Ka Makau Nui o Māui* (meaning *the Big Fishhook of Māui*) and the name of the fishhook was *Manaiakalani*.

Scorpius was divided into two asterisms which were used by Bugis sailors for navigation. The northern part of Scorpius was called *bintoéng lambarué*, meaning "skate stars". The southern part of Scorpius was called *bintoéng balé mangngiwéng*, meaning "shark stars".

The constellation Scorpius contains 18 named stars of which 13 have known planets. The best-known star in Scorpius is Antares (α Sco), "rival of Mars" because of its distinct reddish hue. The comparison possibly dates way back to Mesopotamian astronomers. Another theory suggests that the name Antares may have come from the name Antar or Antarah ibn Shaddad, which was the name of an Arabic warrior-hero celebrated in the *Golden Mu'allaqat*, one of the seven long Arabic pre-Islamic poems.

Antares is approximately 550 light years distant from the Sun. It is the 16th brightest star in the night sky. Antares is one of the four first magnitude stars lying within 5° of the ecliptic, along with Aldebaran in the Taurus constellation, Spica in Virgo, and Regulus in Leo. It can be occulted by the Moon and very infrequently by Venus. Antares marks the heart of the scorpion, which is also its alternative name. Antares was known under different names in various cultures. Babylonians knew it as GABA GIR.TAB, or "the breast of the scorpion," in Egypt it represented the scorpion goddess Serket, and in Persia, it was known as Satevis, one of the four "royal stars."

Scorpius contains four Messier objects – Messier 4 (M4, NGC 6121), Messier 6 (M6, NGC 6405, Butterfly Cluster), Messier 7 (M7, NGC 6475, Ptolemy Cluster) and Messier 80 (NGC 6093). As well as several Nebula, most notably the Cat's Paw Nebula and Lobster Nebula (or the War and Peace Nebula).

Messier 4 is a globular cluster and is the closest one to our solar system. It was the first globular cluster discovered in which individual stars could be resolved. M4 has an apparent magnitude of 5.9 and is approximately 7,200 light years distant from the solar system. The brightest stars in M4 have an apparent magnitude of 10.8. The estimated age of the cluster is around 12.2 billion years. M4 is about 75 light years across. It was discovered by the Swiss astronomer Philippe Loys de Chéseaux in 1746 and included in Messier's catalogue in 1764.

Messier 6 is an open cluster also known as the Butterly Cluster because its stars form a shape similar to that of a butterfly. The cluster was discovered by the Italian

astronomer Giovanni Batista Hodierna in 1654 and Charles Messier included it in his catalogue in 1764. The Butterfly Cluster has an apparent magnitude of 4.2 and is approximately 1,600 light years distant from the Sun.

Ptolemy Cluster – Messier 7 (M7, NGC 6475) is another open star cluster in Scorpius, located near the scorpion's stinger. It has an apparent magnitude of 3.3 and is easily visible to the unaided eye. It is also known as the Ptolemy Cluster because it was the Greek astronomer Ptolemy who first recorded it in 130 AD. Ptolemy believed the cluster to be a nebula. The Ptolemy Cluster contains about 80 stars, the brightest of which has a visual magnitude of 5.6. M7 is approximately 980 light years distant from the solar system. It is roughly 25 light years in diameter. The age of the cluster is estimated to be around 200 million years.

Messier 80 is a globular cluster discovered by Charles Messier in 1781. It has an apparent magnitude of 7.87 and is approximately 32,600 light years distant from the Sun. M80 is about 95 light years in diameter and contains hundreds of thousands of stars. It is one of the most densely populated clusters in our galaxy. It lies halfway between the stars Antares and Acrab. It is visible in moderate-sized amateur telescopes. It is home to a significant number of blue stragglers, blue main sequence stars that appear to be much younger because they are bluer and more luminous than stars at the main sequence turn-off point for the cluster.

The Cat's Paw Nebula is an emission nebula in Scorpius. It is a vast star-forming region and one of the most active stellar nurseries containing some of the most massive stars known in the Milky Way. It is believed to contain tens of thousands of stars. The nebula was discovered by the English astronomer John Herschel in 1837.

NGC 6357, courtesy of Leonard Amburgey. 8" RASA astrograph@ F2.1, 3 hour exposure from Benson, AZ on 5/12/24.

The Lobster Nebula (NGC 6357) is a diffuse nebula in Scorpius. It contains many protostars and young stars. It was also named the War and Peace Nebula because, when observed in infrared, the nebula's western part resembles a dove, while the eastern part resembles a skull. The nebula contains Pismis 24, an open star cluster that includes several very massive stars. One of the stars, designated Pismis 24-1, has almost 300 solar masses and it was thought to be the most massive star known until it was discovered to be a binary or multiple star system. Pismis 24-1 is one of the most luminous stars known.

During July it will be a challenge to view Scorpius with the Monsoon rains, but it is worth getting out and exploring when you can either by naked eye, telescope or via astrophotography. I look forward to reading and seeing your experiences with this fascinating constellation.

The Bucket List July 2024

by Vince Sempronio

This column highlights interesting non-seasonal nighttime, and sometimes daytime sky events that the reader may not be aware of and may wish to observe. I will also cover one-off events that are special, rare or uncommon.

All times are MST unless otherwise noted.

TERM OF THE MONTH

This month we'll learn more about the three most common temperature scales, specifically, Celsius, Kelvin, and Fahrenheit. All three scales are named after the scientist who proposed the scale. There are many other temperature scales, but these three are used the most often. All temperature scales are derived from two reference points, one representing a low value (usually zero), and an upper arbitrary value. The Celsius scale named after the Swedish astronomer, Ander Celsius, who proposed it in 1742. The unit of the scale was called centigrade, from the Latin *centi* (100) and *gradus* (steps). The scale was referred to as centigrade until 1948 when it became officially known as the Celsius scale. Originally, the scale was based on 100° being the freezing point of water and 0° as the boiling point of water at sea level. Andres submitted his paper, proposing the idea, and a year later, the scale 100° to 0° was reversed by Jean-Pierre Christin to the 0° to 100° scale which we use today. Since then, the scale has been tweaked to be more scientifically defined, but it is still based on the freezing/boiling range.

Having a scale for use in science where the values less than the freezing point of water (negative values) is cumbersome. The concept of absolute zero (the lowest temperature that can occur) was determined by Lord Kelvin to be -273.15° Celsius. Kelvin was born in Ireland, but he was a professor of Philosophy at the University of Glascow for much of his life. He proposed a new temperature scale, based on the centigrade scale, but with 0° representing the lowest possible temperature. One degree of change in the Kelvin scale is

equal to one degree of change in the Celsius scale, which makes it easy to convert between the two by offsetting using (+/-) 273.15. In 1954, 1 degree Kelvin (1°K) was officially named in his honor.

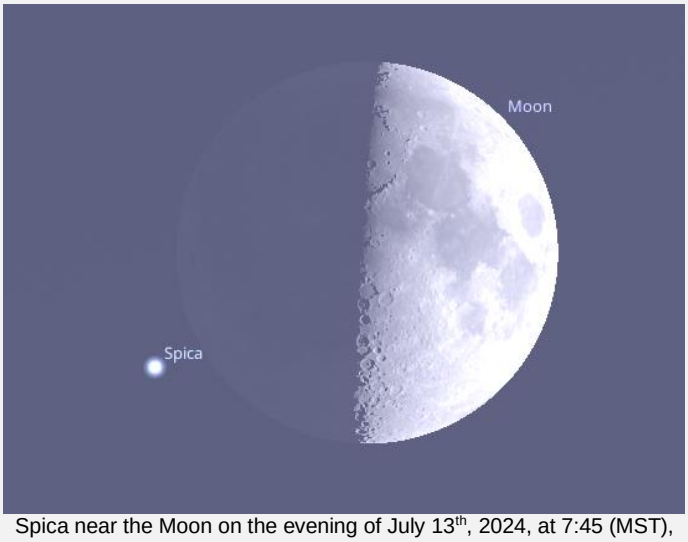
The Fahrenheit scale, named after European physicist Daniel Gabriel Fahrenheit, originally used 0° as a lower value and 90° as an upper value. The lower value was based on the temperature of a solution of water and ammonium chloride. The upper value was the average human body temperature. Eventually, the scale was modified to have 180 degrees between the freezing point of water (defined as 32° and the boiling point of water at 212° at sea level.

Around the world, most countries have adopted the Celius scale while the United States and a few other countries still use the Fahrenheit scale.

Many other proposed scales all use water as the basis of their temperature ranges. If you were to design a new temperature scale not based on water, what would you propose instead?

IN THE SKY

The highlight of the skies this month for most of North America is the occultation of the bright star Spica by the first quarter Moon. Occurring on the evening of July 13th, this event is easily visible over most of the United States, favoring the western states. The exact time of the event varies depending on one's location, but the estimated time for Sierra Vista, AZ is near 7:57pm. Depending on sky conditions, this event should be visible with the naked eye. Any optical aid will make for a very striking experience. If you read this



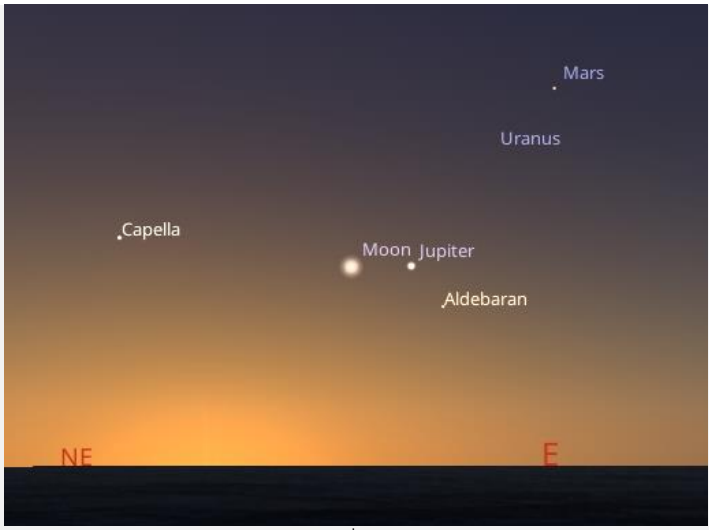
Spica near the Moon on the evening of July 13th, 2024, at 7:45 (MST), 15 minutes before the occultation. North is up. Credit: Stellarium

column in last month's Nightfall, I discussed Spica and how it is a special type of double star, a rotating ellipsoidal variable. The two stars that make up the pair are so close together that gravity stretches them, so each appears elongated. They are so close together (they orbit each other every 4 days) that when the edge of the moon blocks the light from Spica, it will appear as one event, not two.

Whether you view it without optical aid or use a telescope, it is most definitely a bucket list event!

Saturn is visible in July when it rises at 10:15pm in mid-month. Look for it halfway between the Great Square of Pegasus and the star Fomalhaut further south. The ring system is getting thinner and thinner as we get closer to the time of edge on in March 2025. Saturn will not be visible when this happens as it will be too close to the sun.

Jupiter is visible near Aldebaran in the East in the pre-dawn skies throughout the month. The thin crescent moon joins the pair the morning of July 3rd around 4:45am. Shining red, Mars should also be visible above and the right of the trio.



The morning sky on July 3rd, 4:45am. Credit: Stellarium

Insult to Injury – It is now common knowledge that Pluto is no longer identified as a planet, as it is now categorized as a dwarf planet. But changes have consequences, some we do not notice at first. Previously referred to as the ninth planet, Pluto now is also known as minor planet 134340. Talk about being demoted! The elusive Planet X (meaning 10), the yet undiscovered body that seems to be affecting the orbits of some Kuiper belt objects, is now called Planet 9. They just gave away Pluto's designation to an object that might not exist.

Back in the sky, Pluto reaches opposition on the 22nd of July in the constellation Capricorn. It transits after midnight where it is low in the southern sky. This is a good opportunity for imagers to take a series of photos, one a night, around the area of the sky near Pluto and stack them to show its motion. Pluto is now moving about 4" per hour towards the west (retrograde) and is approximately magnitude 14.5. If you attempt to image Pluto, please post your results to the HACAstro online forum.

NASA Night Sky Notes - July 2024

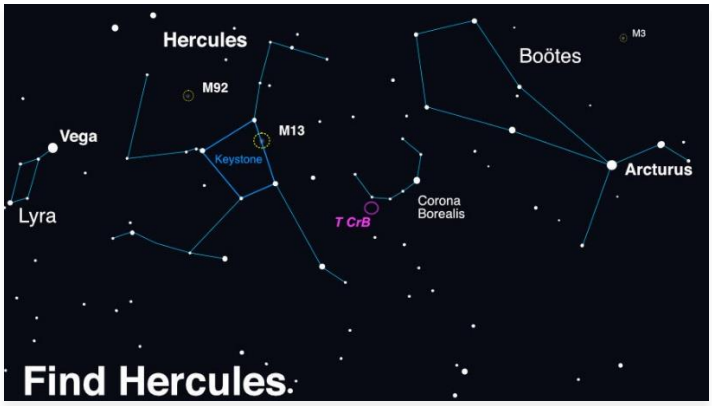
This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.org to find local clubs, events, and more!

A Hero, a Crown, and Possibly a Nova!

By Vivian White

High in the summer sky, the constellation Hercules acts as a centerpiece for late-night stargazers. At the center of Hercules is the "Keystone," a near-perfect square shape between the bright stars Vega and Arcturus that is easy to recognize and can serve as a guidepost for some amazing sights. While not the brightest stars, the shape of the hero's



torso, like a smaller Orion, is nearly directly overhead after sunset. Along the edge of this square, you can find a most magnificent jewel - the Great Globular Cluster of Hercules, also known as Messier 13.

Look up after sunset during summer months to find Hercules! Scan between Vega and Arcturus, near the distinct pattern of Corona Borealis. Once you find its stars, use binoculars or a telescope to hunt down the globular clusters M13 (and a smaller globular cluster M92). If you enjoy your views of these globular clusters, you're in luck - look for another great globular, M3, in the nearby constellation of Boötes. Image created with assistance from Stellarium: stellarium.org

Globular clusters are a tight ball of very old stars, closer together than stars near us. These clusters orbit the center of our Milky Way like tight swarms of bees. One of the most famous short stories, *Nightfall* by Isaac Asimov, imagines a civilization living on a planet within one of these star clusters. They are surrounded by so many stars so near that it is always daytime except for once every millennium, when a special alignment (including a solar eclipse) occurs, plunging their planet into darkness momentarily. The sudden night reveals so many stars that it drives the inhabitants mad.

Back here on our home planet Earth, we are lucky enough to experience skies full of stars, a beautiful Moon, and regular eclipses. On a clear night this summer, take time to look up into the Keystone of Hercules and follow this sky chart to the Great Globular Cluster of Hercules. A pair of binoculars will show a faint, fuzzy patch, while a small telescope will resolve some of the stars in this globular cluster.

A red giant star and white dwarf orbit each other in this animation of a nova similar to T Coronae Borealis. The red giant is a large sphere in shades of red, orange, and white, with the side facing the white dwarf the lightest shades. The white dwarf is hidden in a bright glow of white and yellows, which represent an accretion disk around the star. A stream of material, shown as a diffuse cloud of red, flows from the red giant to the white dwarf. When the red giant moves behind the white dwarf, a nova explosion on the white dwarf ignites, creating a ball of ejected nova material shown in pale orange. After the fog of material clears, a small white spot remains, indicating that the white dwarf has survived the explosion. NASA/Goddard Space Flight Center

Bonus! Between Hercules and the ice-cream-cone-shaped Boötes constellation, you'll find the small constellation Corona Borealis, shaped like the letter "C." Astronomers around the world are watching T Coronae Borealis, also known as the "Blaze Star" in this constellation closely because it is predicted to go nova sometime this summer. There are only 5 known nova stars in the whole galaxy. It is a rare observable event, and you can take part in the fun! The Astronomical League has issued a Special Observing Challenge that anyone can participate in. Just make a sketch of the constellation now (you won't be able to see the nova) and then make another sketch once it goes nova.

Tune into our mid-month article on the Night Sky Network page, as we prepare for the Perseids! Keep looking up!

Pareidolia

A poem by Karen Madtes

Autolycus and Aristillus
who can we possibly find to tell us
How they came to be
on the Archimedes "angel" wing?
Are they just lunar bling?
and speaking of bling...
How about that Gassendi "diamond ring"?

And see where it got us
to look at Fecunditatis
Which means "sea of fertility"
so now we know why the "hippo" is happy:)
With Goclenus as the "eye" and
Langrenus below
See if you can find
the smiling "happy hippo" ;)

Editor's Note: Pareidolia is the phenomenon where the human mind perceives familiar patterns or shapes, such as faces, animals, or objects, in random stimuli, often where none actually exist. The author asks that if anyone has other examples of pareidolia to please post them to the HACAstro forum.

Zodiac Word Search
by Vince Sempronio

Historically, there are 12 constellations that make up the Zodiac. When the boundaries of the constellations were made "official", almost 100 years ago, the ecliptic (the path of the Sun) now passes over 13 constellations. Try to find the 13 answers in this puzzle. The answers can appear in any direction including diagonally. No clues are provided!

R	T	H	F	L	P	I	S	C	E	S	R
A	T	F	S	E	I	R	A	T	I	A	J
C	A	O	O	N	S	E	Q	S	X	G	A
H	U	P	T	E	B	C	U	N	A	I	A
T	R	H	L	R	A	N	A	H	E	T	N
G	U	I	I	E	G	A	R	O	N	T	C
E	S	U	N	R	O	C	I	R	P	A	C
M	S	C	O	R	P	I	U	S	R	R	T
I	I	H	H	J	A	A	S	B	S	I	G
N	P	U	C	O	G	R	I	V	H	U	R
I	H	S	N	E	E	L	R	S	S	S	I
S	I	R	H	A	R	O	O	E	T	F	T

Book Review
by Karen Madtes

How I Killed Pluto and Why It Had It Coming

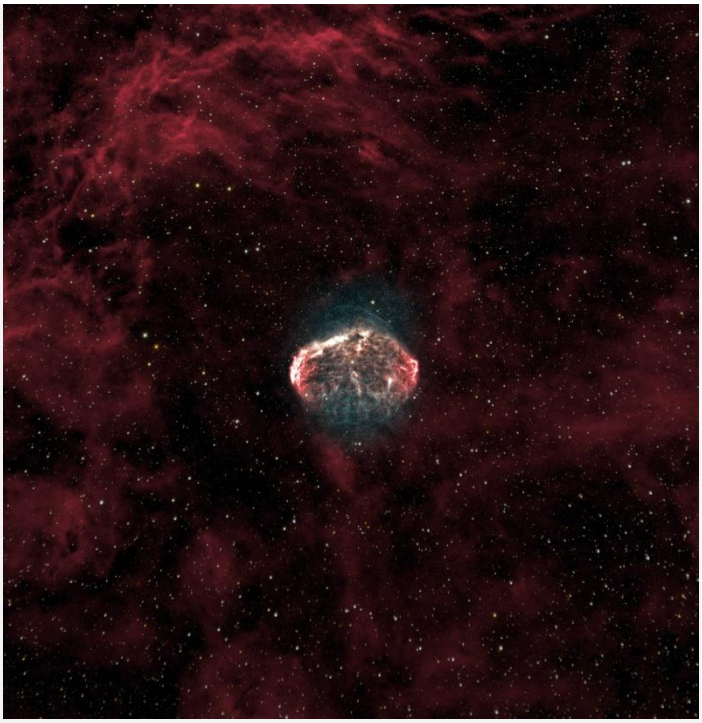
Author: Michael E. Brown
Language: English
Publication: United States / 2010
ISBN: 0-385-53108-7

This book is interesting, humorous and informative. Mike Brown gives very good information about the solar system history and how scientific discoveries involve a lot of effort and teamwork. He talks about different kinds of scopes and astrophotography. In the book, he explains why Pluto was demoted to the status of a dwarf planet after being a planet for 76 years. A recommended good read - so interesting that it goes fast. This book can be found at the Sierra Vista Public Library.

HAC Member Images

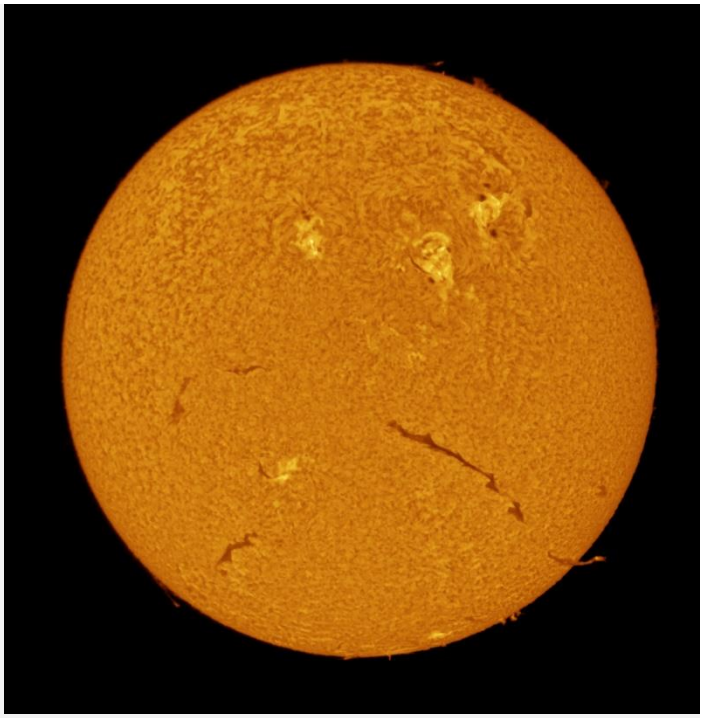
NGC-3953
Image courtesy of Glen Sanner
Telescope: Vixen 8" Visar
Mount: Vixen SXP
Camera: ZWO533MC Pro
Filter(s): Ha and RGB
Exposures: Ha - 28 x10min.(4.5hr), RGB - 54 x 10min.(9hr)
Software: Pixinsight for processing final image

This galaxy is a barred spiral in the constellation Ursa Major and is a member of the M109 group of galaxies (50+). It has a classification of SB(r)bc. This is a combined stack of 28 x10min.(4.5hr) H Alpha images taken with the ZWO 533mcpro and Ha filter and 54 x 10min.(9hr) of RGB with the same camera. NGC 3953 is the spiral at the bottom right in the image (North is down). PGC-37164 is to the upper left, and PGC-37256 is the small galaxy between these two. At least 8 other PGC galaxies are in the image, as well as many quasars from the Milliquas catalog. I used a synthetic luminance layer then did luminance stretching, HDR transformation and luminance sharpening (Chaotic Nebula.com). I was able to bring out a fair amount of detail with these techniques. NGC-3953 was seen by Pierre Mechain on March 12 ,1781 and recorded by Messier on March 24, 1781. I am using the designation NGC-3953, however some authors also refer to this galaxy as M109B and have kept NGC 3992 as M109. Much has been written about the confusion associated with this galaxy and its designation. I suggest you look up work done by Owen Gingerich, former professor of astronomy and the history of astronomy at Harvard University.



NGC-6888 – The Cresent Nebula
Image courtesy of Seven Grey
Telescope: SVBONY SV503-70ED
Mount: Sky-Watcher HEQ5
Camera: ASI533MC Pro
Filter(s): Askar C1 Ha/OIII
Stacked: 22hrs total
Other Equipment SVBONY SV165 guide scope w/ ASI120mm camera

NGC-5194 - M51 – The Whirlpool Galaxy
Courtesy of Mark Orvek
Telescope: Stellarvue SVX152T f/7.9 (F.L. 1200mm)
Mount: Paramount MX+
Camera: ATIK 16200 CCD (mono)
Filter(s): Baader LRGB
Image scale: 1.03 arc-secs / pixel
Un-cropped FOV: 1.3x1.0 degrees
Image processing: PixInsight



H-Alpha Sun
Image courtesy of Michael Borland
Telescope: Lunt DS 80.

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HAC Calendar of Events (July - August)

SU	MO	TU	WE	TH	FR	SA
30	**1 July**	**2**	**3**	**4** 	**5** **3:57 PM** Ceres Opposition	**6**
7	**8**	**9**	**10**	**11**	**12**	**13** **3:49 PM**
14	**15**	**16**	**17**	**18**	**19** HAC Meeting Room A102 Downtown 7PM	**20**
21 **3:17 AM**	**22**	**23** Pluto Opposition	**24**	**25**	**26**	**27** **7:52 PM**
28 Delta Aquariid meteors	**29** Delta Aquariid meteors	**30** Delta Aquariid meteors	**31**	**Aug 1**	**2**	**3**
4 **4:13 AM** Venus/Regulus 1.1°	**5** Venus/Moon 1.7°	**6**	**7**	**8**	**9**	**10** Spica/Moon 0.7°
11 Perseid meteors	**12** **8:19 AM** Perseid meteors	**13** Perseid meteors	**14** Antares/moon 0.0004°	**15**	**16** HAC Meeting Room A102 Downtown 7PM	**17**
18	**19** **11:26AM**	**20** Saturn/Moon 0.5°	**21**	**22**	**23**	**24**
25	**26** **2:26 AM**	**27**	**28**	**29**	**30**	

All times local MST

Join HACAstro to keep up to date with all of the Huachuca Astronomy Club events

Send an email to: HACAstro+subscribe@groups.io