



the Skyscraper

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AMATEUR ASTRONOMICAL SOCIETY OF RHODE ISLAND * 47 PEEPTOAD ROAD * NORTH SCITUATE, RHODE ISLAND 02857 * WWW.THESKYSCRAPERS.ORG

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**Skyscrapers
Board Meeting**
Saturday, March 28, 1:45pm
at North Scituate Public Library
All Members Welcome

Phases of the Moon

First Quarter Moon
March 2 19:57

Full Worm Moon
March 9 17:48

Last Quarter Moon
March 16 09:34

New Moon
March 24 09:28

Saturday, March 7, 6:00pm at North Scituate Community House

The Las Vegas Astronomical Society's Observer's Challenge and the Astronomical League's Variable Star Observing Program - Two Incentives for the Amateur Astronomer

Oftentimes, the amateur astronomer needs a little motivation to go outside with binocular or telescope. Two observing programs, the Las Vegas Astronomical Society's Observer's Challenge and the Astronomical League's Variable Star Observing Program offer such incentives. I will relate my own experiences with both and try to encourage members of the RI Skyscrapers to participate as well.

Glenn Chaple from Amateur Telescope Makers of Boston will present about Astronomical League's Variable Star Observing Program.

Glenn has been an avid amateur astronomer since the summer of 1963 when a high school friend showed him Saturn through his telescope. He received a BS degree in astronomy from UMass Amherst in 1969, and then worked for two years at the Alice G. Wallace Planetarium in Fitchburg, Mass while receiving a Master's Degree in Science Education from Fitchburg State College. From 1974 until his retirement in 2007, he was a middle school science teacher - first in the Fitchburg school system, then at Groton-Dunstable .

He co-authored, with Terence Dickin-

son and Vic Costanzo, the Edmund Mag 6 Star Atlas and wrote the books Exploring With a Telescope (Franklin Watts - 1988) and The Outer Planets (Greenwood Press - 2009). He contributed chapters on double stars to David Eicher's Deep-sky Observing With Small Telescopes (Enslow Publishers - 1989) and James Muirden's Sky Watchers Handbook (W.H. Freeman - 1993). Between 1977 and 1987, he wrote a column on double stars for Deep Sky Magazine. From 1982 until 1994, he handled the "What's Up?" column for the children's astronomy magazine Odyssey. Since 2002, he has authored the monthly "Observing Basics" column for Astronomy.

Glenn has been a member of the Amateur Telescope makers of Boston since 1980, serving as President from 2015-2018. Also in 1980, he joined the American Association of Variable Star Observers (AAVSO) and has forwarded more than 80,000 variable star estimates to that organization. In 2006, he joined the Astronomical League and has participated in several of their observing programs.



Seagrave Memorial Observatory Open Nights

Saturdays at 8:00 pm
weather & conditions permitting

President's Message

by Steve Hubbard

Tired of the same old faces?

I know I am. Our next election is rapidly approaching and we would LOVE, LOVE, LOVE to have some new faces to help to continue to make Skyscrapers the great organization that it is.

We work as a team at Skyscrapers and while I know that the idea of becoming an officer can seem intimidating at first, just know that you won't be left alone to twist in the wind. We will help to get you off the ground and the reward will be the satisfac-

tion you get from helping to make Skyscrapers one of the best Amateur Astronomy societies anywhere.

If you have any interest in running for an office or even just learning more about each position for now, just ask any of our nominating committee members, Bob Horton, Kathy Siok or Steve Siok. I'm sure they'd be glad to help you.

On another note, at our last board meeting, the officers have decided that we will be keeping all future meetings to Saturdays from this point on whenever possible. The traffic out there is getting more and more intense and travel to our meetings for both our members and speakers on Friday nights is harder than ever.

Also, starting in April, we are planning

to devote the second Saturday night of each month to member activities. If it's clear out, we will have a get together for anyone interested to bring their telescopes, binoculars or just their eyeballs out to see the night sky. If it's cloudy and the grounds are not saturated, we will plan an alternative event in the meeting hall such as streaming in a talk of Astronomical interest for example.

We are hoping to do this from April to December. Do you have suggestions of things that you as a member would like to do? Drop me a line. We're looking for more ideas and would love to hear from you. This is YOUR society, please let us know what you think and what you'd like to get out of your membership experience.

See you at our next meeting!



The Skyscraper is published monthly by Skyscrapers, Inc. Meetings are held monthly, usually on the first or second Friday or Saturday of the month. Seagrave Memorial Observatory is open every Saturday night, weather permitting.

Directions

Directions to Seagrave Memorial Observatory are located on the back page of this newsletter.

Submissions

Submissions to The Skyscraper are always welcome. Please submit items for the newsletter no later than **March 15** to Jim Hendrickson, 1 Sunflower Circle, North Providence, RI 02911 or e-mail to jim@distantgalaxy.com.

E-mail subscriptions

To receive The Skyscraper by e-mail, send e-mail with your name and address to jim@distantgalaxy.com. Note that you will no longer receive the newsletter by postal mail.

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Katherine Johnson: Spaceflight Pioneer

by Francine Jackson

When we think of pioneers, often Daniel Boone, Davy Crockett, or their contemporaries come to mind, but one group of people from the last century can be counted in this group: the “Hidden Figures,” the women computers who were instrumental in the early days of both NACA and its subsequent NASA. The last major woman to do so died February 24th, 2020, at age 101: Katherine Johnson.

Played by Taraji P. Henson, in the recent movie *Hidden Figures*, Johnson, and two of her coworkers, Dorothy Vaughan and Mary Jackson, were immortalized as

essential for their incredible minds, able to perform calculations necessary for the early Space Race, using only chalk, slide rules, and mechanical calculators. Their work was considered outstanding, despite not conforming to the “standards” of the day: black women in a sea of white males, who had to overcome such indignities as being totally ignored, and forced to use only one bathroom in the entire complex.

It was the book by Margot Lee Shetterly and subsequent movie, that brought these women to life, mainly introducing them to this generation, although Johnson, who

lived the longest, was awarded the Presidential Medal of Freedom in 2015, a year earlier, by then President Barack Obama. She, and her peers, despite their incredible mathematical prowess, were originally classified as “subprofessionals,” barely above secretaries and custodians, but it was Johnson’s call by astronaut John Glenn, who wouldn’t launch without her checking the calculations done on rudimentary computers, that helped bring her amazing ability to the forefront.

Johnson originally worked as a school teacher before being hired at Hampton, Virginia’s Langley Research Center, one of over 100 “computers,” about 1/3 black. Originally, she was hired to help determine data from plane crashes; however, the launch of Sputnik in 1957 changed everything, resulting her being a major force in the mathematics of space flight.



Francine Jackson is a NASA Solar System Ambassador, writes the weekly newsletter for Ladd

Observatory and teaches astronomy at the Community College of Rhode Island. See more at <http://theskyscrapers.org/francine-jackson>

The Birds and the Stars

by Francine Jackson

The daytime is getting longer, and probably many of you are taking a walk before the night has totally arrived. As you’re looking up at this time of the day, brilliant Venus is lighting up the southwest, Sirius is the diamond of the south, and Betelgeuse is doing its variable thing.

But, instead of looking straight up at the sky, stop a few minutes and notice the unique shapes of most of the trees. Not yet beginning to grow their springtime leaf cover, their limbs sometimes resemble scary stick figures or winding roads; but, at this time, you might notice that in some of the branches, there might be the remains of certain former occupants: nests.

At first glance, they look as if they don’t belong there, as they are merely crowds of sticks that hadn’t been blown away, but, looking carefully, many of them are a de-

light in their architecture. Meant for a growing family, they are mainly formed from small twigs, but occasionally the builder might find a piece of string, or perhaps a bit of sturdy paper. Built for a season, they might even be useful in the future.

We know that many birds leave us for warmer weather in the fall and early winter, but most do come back. In the 1960s it was realized, through research by David Meisel at the SUNY-Geneseo Planetarium, that birds have an innate sense of stellar navigation, allowing them to return, often to the tree they left behind. Does that mean they return to the exact nest they built the year before, provided another interloper hasn’t done squatters’ rights? Are they even with their former mate? It is known that many birds mate for life; if so, are they willing to build another home for themselves, in the



same tree, or do they just look for another neighborhood to raise their brood?

Next time you go outside during the early evening, to enjoy the stars popping into sight before total darkness, think about the nests that are left from the previous year, before the leaves virtually cover this season’s ornithological homesteads.

Pluto at Ninety: Discovered, Demoted, Visited

by Dave Huestis

A little more than ninety years ago, in a barred spiral galaxy named the Milky Way, a stellar system named Sol had a retinue of eight known planets revolving around it. The last one to be discovered was Neptune in September 1846. However, as time passed small perturbations in Neptune's orbit were noted, which suggested another "trans-Neptunian object" existed whose presence altered his path around our Sun. It wasn't until 1905 that a wealthy Boston astronomer, Percival Lowell, started a search for "Planet X" using his Flagstaff, Arizona, observatory. Lowell, with his mathematics background, and with the help of colleagues, tried to derive a possible orbit for a potential unknown planet. They even took photographic plates in 1906 of an area of sky where they thought planet "X" might be located, but with no results.

Unfortunately, Percival Lowell died at age 61 on November 12, 1916 and the search for the elusive "Planet X" ended. However, in 1929, the search for Pluto was resumed at the Lowell Observatory using calculations that Lowell had computed earlier. A 23 year-old Clyde W. Tombaugh was hired to meticulously image specific areas of the sky using photographic glass plates. The same star field would be exposed several days apart. Once the plates were developed, they were placed in a viewing machine called a

blink comparator that held two plates. The operator could switch back and forth from one plate to the other. This process was called "blinking."

Stars do not appreciably change position because of their vast distances from the Earth. However, an object within our solar system would show a slight shift in position given enough time had elapsed between the images. Many asteroids and comets had been discovered using the blinking process. An object in question would appear to jump from one position to another between the two images being compared. Making assumptions as to the possible distance to "Planet X," and given the length of time between exposures, one could deduce from the movement of an object where it may reside in the solar system. Clyde was responsible for the entire tedious task of exposing, developing, and blinking the glass photographic plates.

Finally, on February 18, 1930, Clyde Tombaugh discovered Lowell's distant world while comparing plates he had exposed on January 23 and January 29, 1930. As Clyde told Skyscrapers' members when he visited Seagrave Observatory in 1987, until he informed his colleague Dr. C. O. Lampland across the hall from his office and then his boss Director V.M. Slipher, for 45 minutes he was the only person in the

world who knew of the new planet's existence. After careful re-examination of the data and confirmation by other astronomers, it was determined this newly discovered body was way out beyond the orbit of Neptune. The monumental discovery was announced to the world on March 13, 1930, the anniversary of Lowell's birth.

"Planet X" was also given the more proper name Pluto, the Roman god of the underworld. (Naming astronomical bodies at that time adhered to Roman and Greek mythology.) And it is merely coincidence that the first two letters are Percival Lowell's initials.

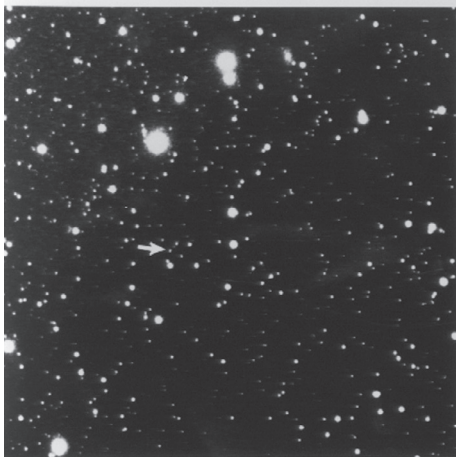
It is interesting to note that there was a link to Rhode Island in regards to Lowell's search for what would become Pluto. My research as historian for Skyscrapers revealed that the former owner of our eight-inch Clark refractor and Seagrave Memorial Observatory, Frank Evans Seagrave, was a friend of Percival Lowell.

I do not know when Lowell and Seagrave first met, but from 1915 – 1917, when Seagrave was "working" as an assistant at Harvard College Observatory, it is apparent they had become fast friends. See this link for extensive details on the Percival Lowell/Frank Seagrave connection: <http://www.theskyscrapers.org/the-conjunction-of-frank-seagrave-and-percival-lowell>. In fact, one postcard from Seagrave to Lowell said in part, "Hope you will find X."

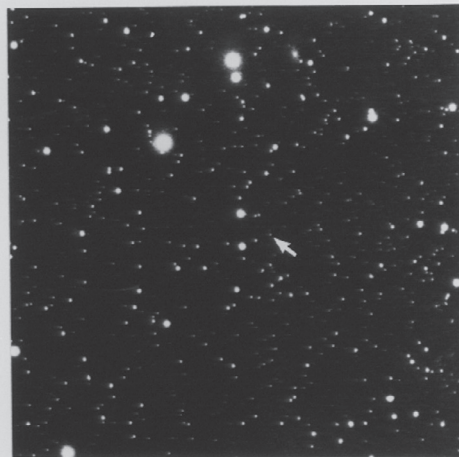
After Lowell's passing in 1916, Seagrave continued his correspondence with Dr. Slipher, the new Director of Lowell Observatory. In a postcard dated May 21, 1917, Seagrave wrote to Slipher stating, "If you should at any time find any conspicuous object that you think is 'X' please send me some positions. Dr. Lowell many times promised me that I should be the first one to work on its orbit when discovered."

Seagrave only found out about Pluto's discovery through newspapers. Now 70 years-old, Seagrave hadn't been asked to compute Pluto's orbit as had been promised by his friend Lowell. Seagrave sent off several letters to Slipher in March and April 1930 reminding him of this arrangement, saying in one of them, "The last time I was with Dr. Percival Lowell was late in September 1916...He showed me his computations in relation to the outer Neptunian planet,

DISCOVERY OF THE PLANET PLUTO



January 23, 1930



January 29, 1930

The photographic plates, taken 6 days apart with the 13 inch telescope, with which Clyde Tombaugh discovered Pluto. The arrows point to the position of Pluto on each of the two days. Lowell Observatory Archives

and said to me, 'Seagrave, if the Lowell Observatory is the Observatory that will first find this planet, you will be the first one to compute its orbit.' No writing to this effect. Only a verbal statement..."

Eventually Slipher responded to Frank Seagrave (very diplomatically of course). Briefly stated, Slipher wrote, "it seemed to me that we here should determine for it a preliminary orbit. This because it seemed best for Lowell Observatory to find it out and make it known if the object were thus shown to be less important than it had appeared. Dr. Lowell and the Observatory had put so much into the problem as to appear to justify this policy." He went on to say, "I hope you will feel that we have tried to be fair. We of course realized at the outset that you who compute orbits were better equipped to do such work, but the reasons given above decided our course."

Over the ensuing decades there was a limit to what information could be learned about so distant a world. On January 19, 2006, the New Horizons spacecraft was launched on its almost 10-year journey to explore icy planet out in the depths of our solar system.

In the meantime, other bodies beyond Pluto had also been more recently discovered, and astronomers wanted to classify these objects. During a meeting of The International Astronomical Union (IAU), an association that governs such things, decided to modify the definition for a planet. Under the new parameters Pluto no longer qualified as one. A new term, dwarf planet, was introduced. This reclassification became official on August 24, 2006 and Pluto was kicked out of the planet club.

Pluto's status may have changed, but the New Horizons spacecraft mission to explore Pluto and its moons didn't. After a 9.5-year journey New Horizons had a brief encounter with Lowell's "Planet X," cruising by this dwarf ice-ball of a world at 30,800 miles per hour, coming within 7,750 miles of its surface. Astronomers learned more from this close encounter than they had since Clyde Tombaugh discovered Pluto in 1930. If you'd like to read about New Horizons' discoveries, please check out this link: https://www.nasa.gov/mission_pages/newhorizons/main/index.html

Although Clyde Tombaugh died on January 17, 1997, at 90 years-old, before New Horizons' launch and before Pluto had been demoted to dwarf status, a part of Clyde made the epic journey to explore this distant world. Upon Tombaugh's death he was cremated. An ounce of his ashes was put in an aluminum container and placed onboard the spacecraft. The container's inscription reads in part, "Interred herein are remains of American Clyde W. Tombaugh, discoverer of Pluto..."

While Pluto is merely a tiny speck as seen through the largest of the telescopes

in Rhode Island, there are many other more prominent celestial objects to view that will impress you with their beauty. Let the volunteers at all the Rhode Island observatories help you explore the heavens during free public open nights.

Keep your eyes to the skies.



Dave Huestis is Skyscrapers Historian and has been contributing monthly columns to local newspapers for nearly 40 years. See more at <http://theskyscrapers.org/dave-huestis>



This composite of enhanced color images of Pluto (lower right) and Charon (upper left), was taken by NASA's New Horizons spacecraft as it passed through the Pluto system on July 14, 2015. This image highlights the striking differences between Pluto and Charon. The color and brightness of both Pluto and Charon have been processed identically to allow direct comparison of their surface properties, and to highlight the similarity between Charon's polar red terrain and Pluto's equatorial red terrain. Pluto and Charon are shown with approximately correct relative sizes, but their true separation is not to scale. The image combines blue, red and infrared images taken by the spacecraft's Ralph/Multispectral Visual Imaging Camera (MVIC). Credit: NASA/JHUAPL/SwRI

Outer Worlds: Take a Journey to Two Dwarf Planets

by Jim Hendrickson

When we think about dwarf planets, we often first think of Pluto, the one we had for decades known as our solar system's ninth planet, and the one we became very familiar with when New Horizons gave us our first close-up views of in July 2015. But did you know that our solar system has four other dwarf planets (and possibly more)?

You may have heard of Ceres, the largest object in the main asteroid belt, and the first asteroid to be discovered, in 1801. Ceres is the most easily observed of all the dwarf planets, remaining bright enough to be seen with binoculars most of the time. It is also the only other dwarf planet besides Pluto that we have had a good view of, courtesy of the Dawn spacecraft.

That leaves three other worlds that we call dwarf planets, and they're all trans-Neptunian objects (TNOs) which lie beyond the orbit of Pluto. They are Haumea, Makemake and Eris.

On this 90th anniversary of Pluto's discovery, let's take a journey to two of these fascinating outer worlds.

Our first destination is Makemake, a world about $\frac{2}{3}$ the diameter of Pluto, and known to have its own moon. Makemake was discovered by a team of astronomers led by Mike Brown at Palomar Observatory in 2005, and is named for the creator and fertility god of the Rapa Nui people of Easter Island.

Makemake orbits the Sun at an average distance of 45 AU, but because it is close to aphelion (2034) in its highly elliptical orbit it will be nearly 52 AU away from Earth during the next several oppositions. Its orbit is also highly inclined at 29° to the ecliptic, and it is currently close to its northernmost position in that orbit, putting it in a

very favorable position for northern hemisphere observation. Although Makemake is smaller than Pluto and significantly more distant, its somewhat higher albedo helps to keep it within range of amateur telescopes at 17th magnitude.

Makemake reaches opposition on March 26, and due to its northerly declination, is well placed for observation for several months. To locate Makemake, we turn our gaze towards Coma Berenices, just a few degrees from the north galactic pole. The chart shows the patch of sky between Diadem (alpha) and beta Comae Berenices with stars down to magnitude 17.5.

A keen-eyed observer using a 20-inch or larger telescope may be able to spot Makemake making its slow progression amongst the background stars. Up until a few years ago, only observers with access to such a large instrument could even attempt such a challenge. Nowadays, users of more modest equipment will have a much easier time exploring our solar system's distant worlds. The digital imaging revolution, and more recently, the ubiquity of affordable CMOS cameras has made tracking down faint objects attainable to users of fairly small instruments. In fact, you probably do not need a telescope any larger than 100mm aperture. The most critical piece of equipment needed is a tracking equatorial mount with proper polar alignment.

If you do attempt to observe Makemake visually, a single observation won't be enough to confirm a successful hunt. You'll need to plan follow-up observations on successive nights. Keep in mind that at this great distance, Makemake moves eastward only about one arcminute per day near opposition, and its entire retrograde loop is

just 1.8° (less than four Moon diameters) long. Match your field of view with the detail chart, and sketch the fainter objects you see. If you're observing digitally, plate-solving software such as Astrometrica should be able to quickly identify Makemake from a single FITS frame.

Makemake has one known as yet unnamed moon, a very dark object estimated to be no more than 175 kilometers across and orbiting at a distance of about 21,000 kilometers, putting it at an angular separation of about $\frac{1}{2}$ arcsecond from its parent body, too close to be resolved in amateur telescopes today.

The next stop in our journey is Haumea, named after the Hawaiian goddess of fertility. It was co-discovered at Sierra Nevada Observatory in Spain by astronomers led by José Luis Ortiz Moreno, using data from Mike Brown's team at CalTech, and announced in 2005.

Haumea, like Makemake, is in a highly inclined elliptical orbit which presently places it just a few degrees south of Arcturus in Bootes. Although Haumea's April 18 opposition is slightly closer than that of Makemake at 49.45 AU, its ellipsoidal shape makes it slightly dimmer at about magnitude 17.3. This should still be within reach of an instrument capable of detecting Makemake, but will require optimal conditions. Plan your observations for dark-of-the-Moon nights and under the best transparency. Note the times when Arcturus crosses the meridian, as these will be your best times to capture this distant dwarf planet.

Haumea is known to have a ring and two satellites. The ring is thought to be reflective enough to contribute as much as

The Dwarf Planets

Name	Discovered	Orbital Period (Y)	Diameter (km)	Diameter / Moon Dia	Known Moons	2020 Opposition			
						Date	Distance from Earth (AU)	Magnitude	Constellation
Ceres	1801	4.6	950	0.273	0	August 28	2.00	6.6	Aqr
Pluto	1930	247.9	2376	0.684	5	July 14	33.06	14.3	Sgr
Haumea	2003	284.8	1400	0.402	2	April 18	49.45	17.3	Boo
Makemake	2005	307.5	1430	0.411	1	March 26	51.70	17.0	Com
Eris	2003	557.6	2326	0.669	1	October 17	94.97	18.7	Cet

5% of Haumea's brightness, though it is far too small and faint to resolve with even the biggest telescopes and most sensitive detectors (it was discovered by stellar occultation in 2017). The larger and outermost moon, Hi'iaka, never attains a separation angle of more than 1.4 arcseconds over the course of its 49 day orbit, however, given its 300 kilometer diameter and similar surface albedo as its parent, this gives it roughly 4% the angular cross section of Haumea, which

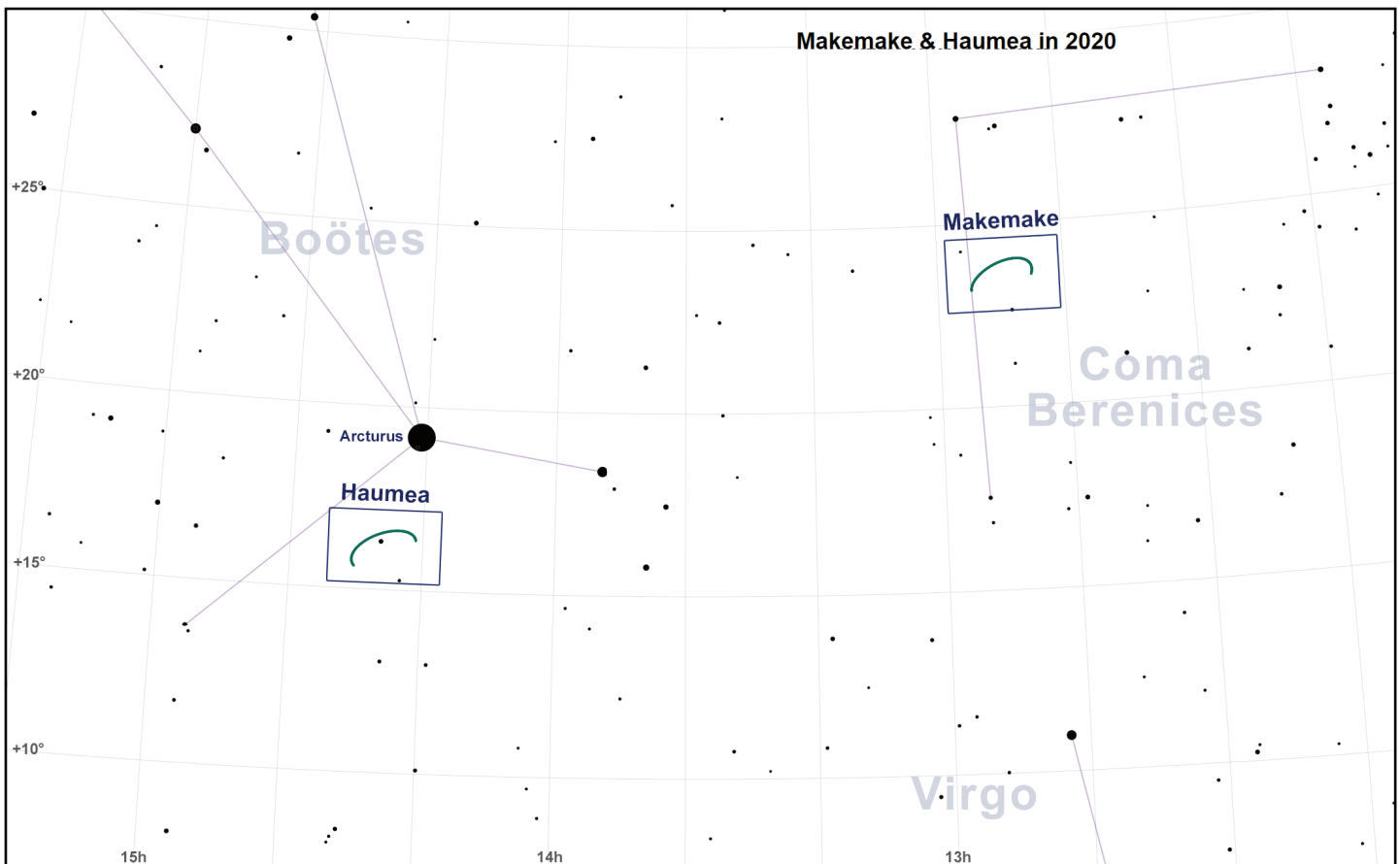
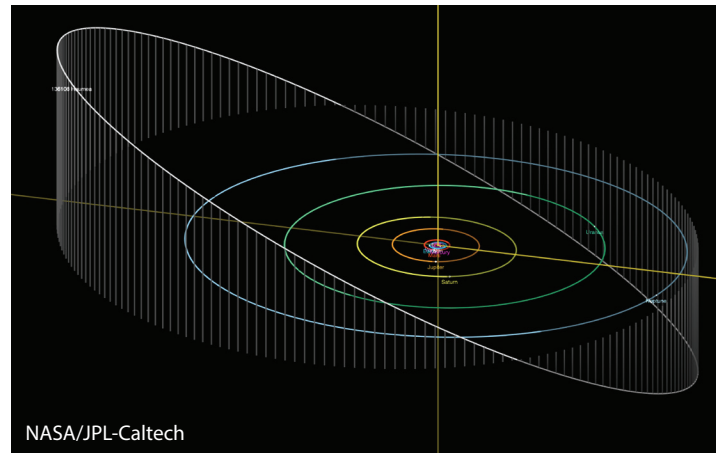
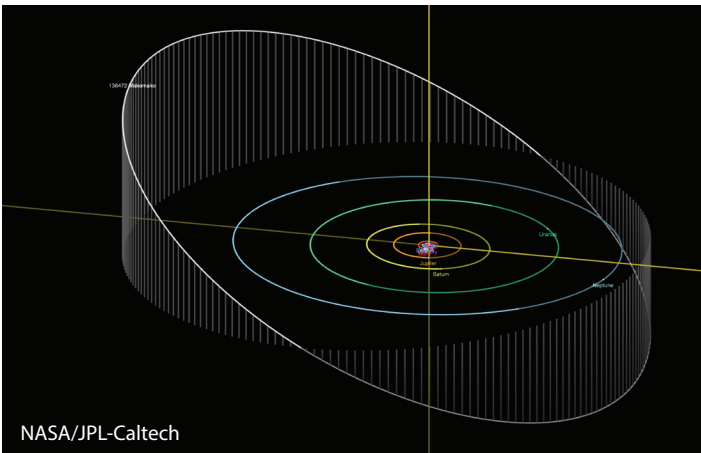
would put it at around 20th magnitude. It is reasonable to assume that detecting it will not be beyond the reach of amateur equipment sometime in the near future. Are you up to the challenge of detecting a dwarf planet's moon?

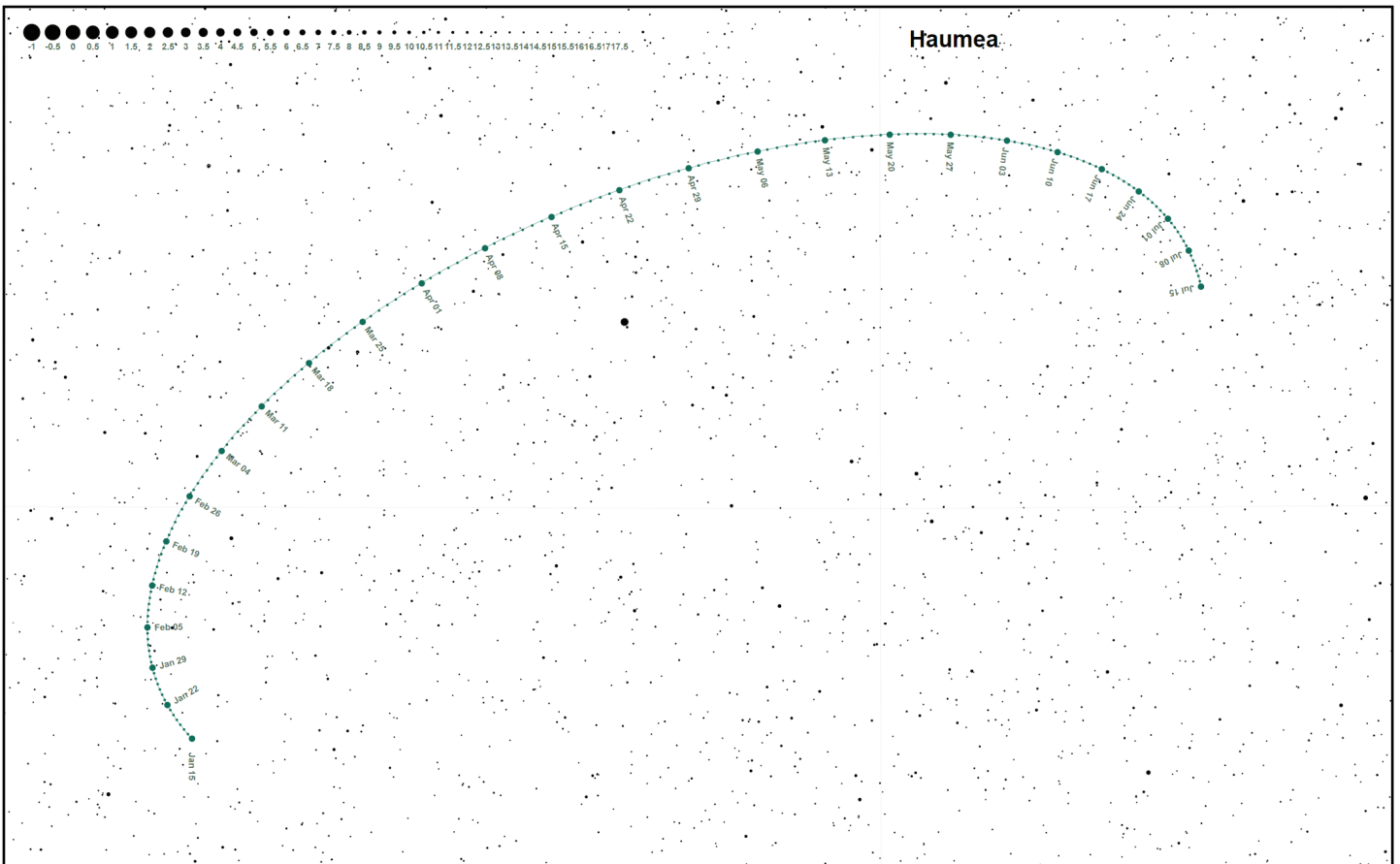
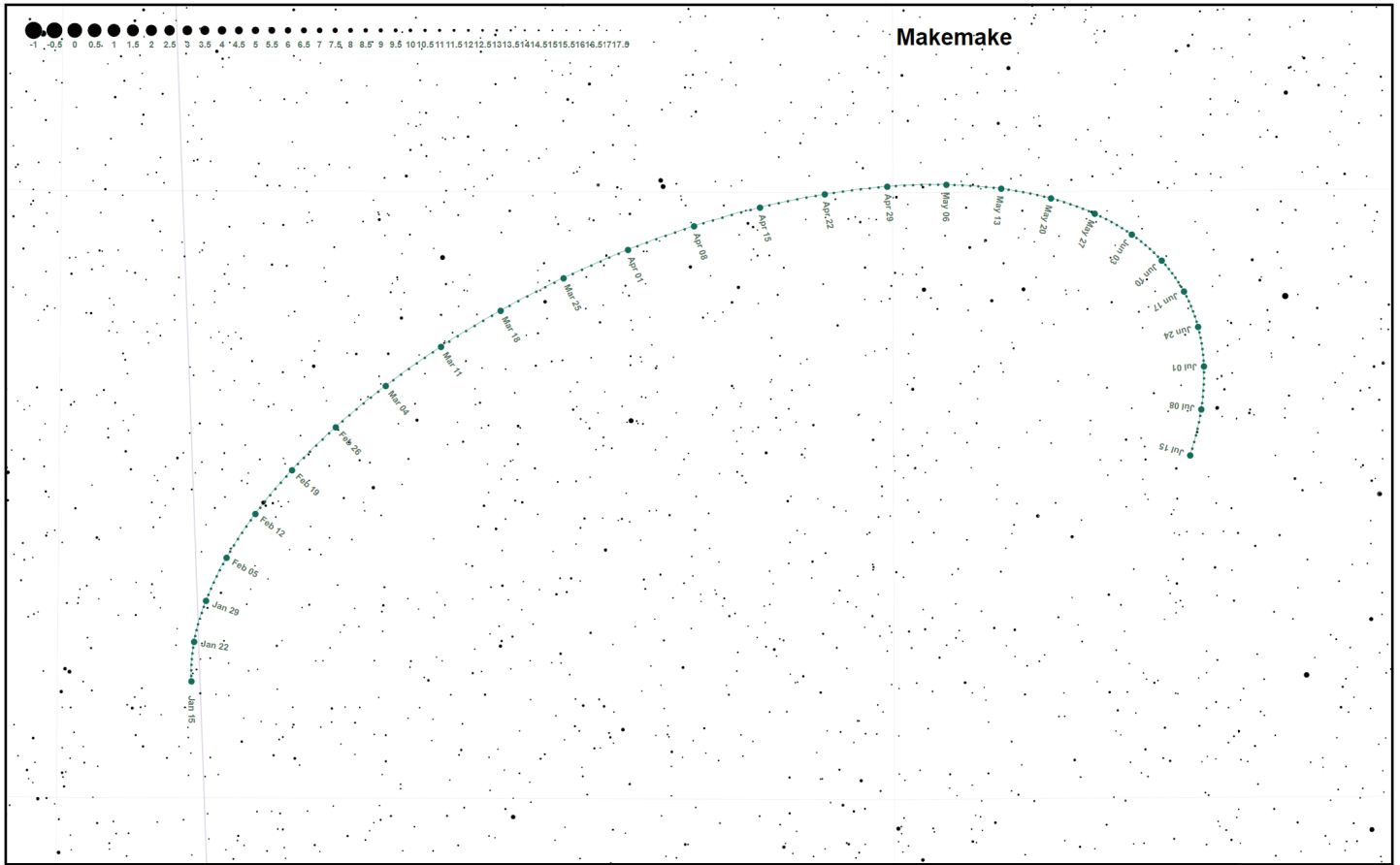
Have fun exploring the Kuiper Belt, and happy hunting. If you do record any observations of these outer worlds--or any others--please do submit your observations for publication in the newsletter. In July we'll

revisit Pluto, and in August we'll pass within 2 AU of Ceres. Eris, at 95 AU--by far our most distant dwarf planet--will have to wait for a future observing challenge.



Jim Hendrickson is newsletter and web editor and has been a member for 20 years. See more at <http://theskyscrapers.org/jim-hendrickson>

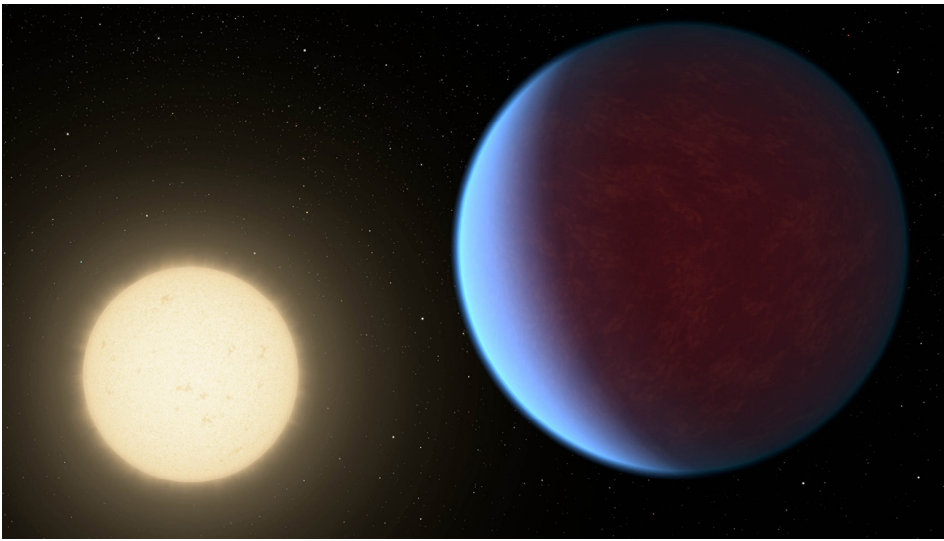




The Sun, Moon & Planets in March

This table contains the ephemeris of the objects in the Solar System for each Saturday night in February 2020. Times in Eastern Standard Time (UTC-5) through March 8, and Eastern Daylight Time (UTC-4) after March 8. Ephemeris times are for Seagrave Observatory (41.845N, 71.590W).

Object	Date	RA	Dec	Const	Mag	Size	Elong	Phase(%)	Dist(S)	Dist(E)	Rise	Transit	Set
Sun	7	23 11.7	-5 10.9	Aqr	-26.8	1934.1	-	-	-	0.99	06:10	11:57	17:44
	14	23 37.5	-2 26.2	Psc	-26.8	1930.5	-	-	-	0.99	06:58	12:55	18:52
	21	0 03.1	0 19.8	Psc	-26.8	1926.6	-	-	-	1	06:46	12:53	19:00
	28	0 28.6	3 05.0	Psc	-26.8	1922.8	-	-	-	1	06:34	12:51	19:08
Moon	7	8 49.3	20 19.8	Cnc	-12.6	1983.4	142° E	89	-	-	15:13	22:37	06:50
	14	15 29.9	-15 54.4	Lib	-12.4	1924.1	120° W	75	-	-	23:54	05:05	10:09
	21	21 47.6	-17 36.9	Cap	-10.1	1763.8	37° W	10	-	-	05:56	11:07	16:24
	28	3 00.2	12 57.5	Ari	-10.2	1794.0	39° E	11	-	-	08:51	16:01	23:21
Mercury	7	22 00.4	-9 48.7	Aqr	1.8	10.0	18° W	17	0.41	0.67	05:17	10:42	16:08
	14	22 03.4	-11 16.8	Aqr	0.8	8.9	25° W	34	0.44	0.76	05:58	11:20	16:41
	21	22 22.0	-11 01.4	Aqr	0.4	7.8	28° W	48	0.46	0.86	05:49	11:12	16:35
	28	22 50.2	-9 18.8	Aqr	0.2	7.0	27° W	58	0.47	0.96	05:43	11:13	16:44
Venus	7	1 57.2	13 40.9	Ari	-4.1	20.0	45° E	60	0.72	0.84	07:48	14:43	21:38
	14	2 25.7	16 43.9	Ari	-4.2	21.4	46° E	57	0.72	0.79	08:37	15:43	22:51
	21	2 54.0	19 29.1	Ari	-4.2	22.9	46° E	53	0.72	0.74	08:26	15:44	23:03
	28	3 21.9	21 53.5	Ari	-4.3	24.7	46° E	49	0.72	0.68	08:16	15:44	23:14
Mars	7	18 58.7	-23 15.8	Sgr	1.1	5.6	63° W	90	1.51	1.66	03:11	07:43	12:16
	14	19 19.7	-22 48.6	Sgr	1.0	5.8	66° W	90	1.50	1.61	04:02	08:37	13:12
	21	19 40.6	-22 11.7	Sgr	0.9	6.0	68° W	89	1.49	1.55	03:52	08:30	13:08
	28	20 01.3	-21 25.6	Sgr	0.8	6.3	70° W	89	1.48	1.49	03:42	08:23	13:04
1 Ceres	7	21 12.0	-22 08.2	Cap	9.2	0.3	34° W	99	2.95	3.72	05:18	09:56	14:34
	14	21 22.8	-21 34.6	Cap	9.3	0.3	38° W	99	2.95	3.67	05:59	10:39	15:19
	21	21 33.4	-21 00.9	Cap	9.3	0.3	42° W	99	2.95	3.61	05:39	10:22	15:05
	28	21 43.6	-20 27.6	Cap	9.3	0.4	47° W	98	2.95	3.55	05:20	10:05	14:50
Jupiter	7	19 29.2	-21 52.3	Sgr	-1.9	34.6	56° W	99	5.20	5.69	03:34	08:13	12:51
	14	19 34.2	-21 42.0	Sgr	-1.9	35.2	62° W	99	5.20	5.59	04:11	08:50	13:29
	21	19 38.9	-21 32.2	Sgr	-1.9	35.8	68° W	99	5.20	5.49	03:47	08:27	13:07
	28	19 43.1	-21 22.9	Sgr	-2.0	36.5	74° W	99	5.20	5.38	03:23	08:04	12:45
Saturn	7	20 03.5	-20 26.4	Sgr	0.7	15.5	48° W	100	10.03	10.66	04:02	08:47	13:31
	14	20 06.0	-20 19.3	Sgr	0.7	15.7	55° W	100	10.03	10.57	04:36	09:22	14:07
	21	20 08.4	-20 12.7	Cap	0.7	15.8	61° W	100	10.03	10.47	04:11	08:56	13:42
	28	20 10.5	-20 06.8	Cap	0.7	16.0	67° W	100	10.02	10.37	03:45	08:31	13:17
Uranus	7	2 07.4	12 23.8	Ari	5.9	3.4	47° E	100	19.81	20.47	08:02	14:49	21:37
	14	2 08.6	12 30.3	Ari	5.9	3.4	40° E	100	19.81	20.56	08:35	15:23	22:11
	21	2 09.9	12 37.2	Ari	5.9	3.4	34° E	100	19.81	20.63	08:09	14:57	21:45
	28	2 11.3	12 44.6	Ari	5.9	3.4	27° E	100	19.81	20.69	07:42	14:31	21:20
Neptune	7	23 18.7	-5 32.8	Aqr	8.0	2.2	2° E	100	29.93	30.92	06:19	12:01	17:43
	14	23 19.7	-5 26.6	Aqr	8.0	2.2	5° W	100	29.93	30.92	06:52	12:35	18:17
	21	23 20.7	-5 20.5	Aqr	8.0	2.2	12° W	100	29.93	30.91	06:25	12:08	17:51
	28	23 21.6	-5 14.5	Aqr	8.0	2.2	19° W	100	29.93	30.88	05:58	11:42	17:25
Pluto	7	19 45.8	-21 59.0	Sgr	14.4	0.2	52° W	100	33.99	34.59	03:51	08:29	13:07
	14	19 46.5	-21 58.1	Sgr	14.4	0.2	59° W	100	34.00	34.50	04:24	09:02	13:40
	21	19 47.0	-21 57.5	Sgr	14.4	0.2	66° W	100	34.00	34.39	03:57	08:35	13:13
	28	19 47.5	-21 57.1	Sgr	14.4	0.2	73° W	100	34.01	34.29	03:30	08:08	12:46



Artist concept of 55 Cancri e orbiting its nearby host star. Find details from the Spitzer Space Telescope's close study of its atmosphere at: bit.ly/spitzer55cancrie and the Hubble Space Telescope's observations at bit.ly/hubble55cancrie Credit: NASA/JPL-Caltech

NASA Night Sky Notes: Dim Delights in Cancer

By David Prosper

Cancer the Crab is a dim constellation, yet it contains one of the most beautiful and easy-to-spot star clusters in our sky: the **Beehive Cluster**. Cancer also possesses one of the most studied exoplanets: the super-hot super-Earth, **55 Cancri e**.

Find **Cancer's** dim stars by looking in between the brighter neighboring constellations of Gemini and Leo. Don't get frustrated if you can't find it at first, since Cancer isn't easily visible from moderately light polluted areas. Once you find Cancer, look for its most famous deep-sky object: the **Beehive Cluster**! It's a large open cluster of young stars, three times larger than our Moon in the sky. The Beehive is visible to unaided eyes under good sky conditions as a faint cloudy patch, but is stunning when viewed through binoculars or a wide-field telescope. It was one of the earliest deep-sky objects noticed by ancient astronomers, and so the Beehive has many other names, including Praesepe, Nubulum, M44, the Ghost, and Jishi qi. Take a look at it on a clear night through binoculars. Do these stars look like a hive of buzzing bees? Or do you see something else? There's no wrong answer, since this large star cluster has intrigued imaginative observers for thousands of years.

55 Cancri is a nearby binary star system, about 41 light years from us and faintly visible under excellent dark sky conditions. The larger star is orbited by at least five planets including **55 Cancri e**, (a.k.a. Janssen, named after one of the first telescope makers). Janssen is a "super-earth," a large rocky world 8 times the mass of our Earth, and

orbits its star every 18 hours, giving it one of the shortest years of all known planets! Janssen was the first exoplanet to have its atmosphere successfully analyzed. Both the Hubble and recently-retired Spitzer space telescopes confirmed that the hot world is enveloped by an atmosphere of helium and hydrogen with traces of hydrogen cyanide: not a likely place to find life, especially since the surface is probably scorching hot rock.

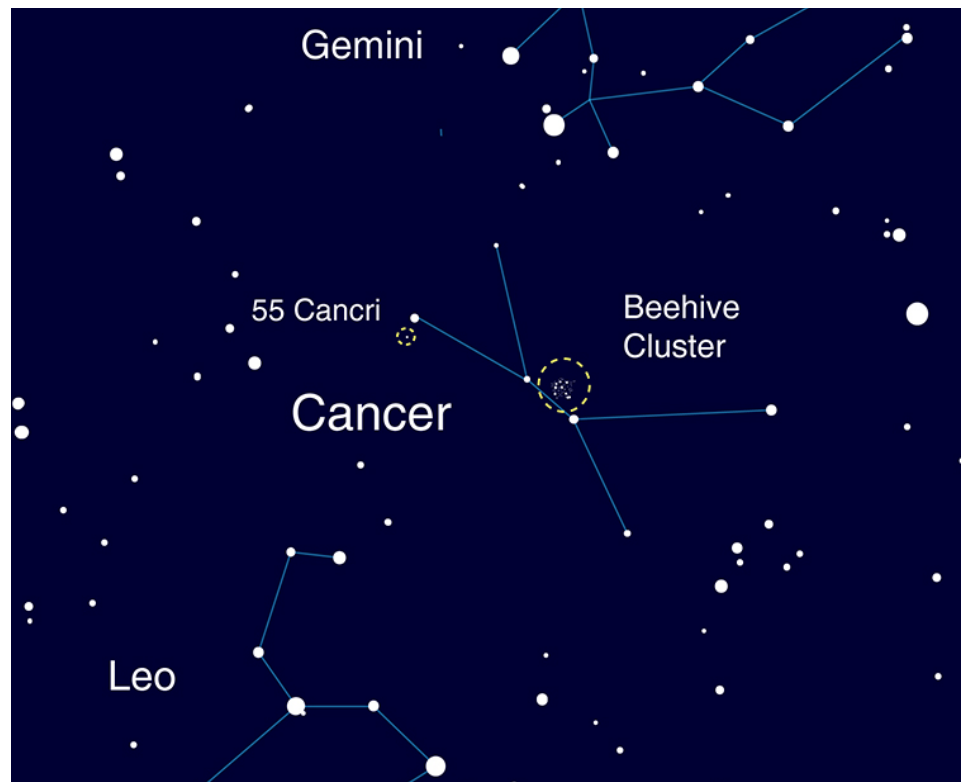
The NASA Exoplanet Catalog has more details about this and many other exoplanets at bit.ly/nasa55cancrie.

How do astronomers find planets around other star systems? The Night Sky Network's "How We Find Planets" activity helps demonstrate both the transit and wobble methods of exoplanet detection: bit.ly/findplanets. Notably, 55 Cancri e was discovered via the wobble method in 2004, and then the transit method confirmed the planet's orbital period in 2011!

Want to learn more about exoplanets? Get the latest NASA news about worlds beyond our solar system at nasa.gov.



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.gov to find local clubs, events, and more!



Look for Cancer in between the "Sickle" or "Question Mark" of Leo and the bright twin stars of Gemini. You can't see the planets around 55 Cancri, but if skies are dark enough you can see the star itself. Can you see the Beehive Cluster?

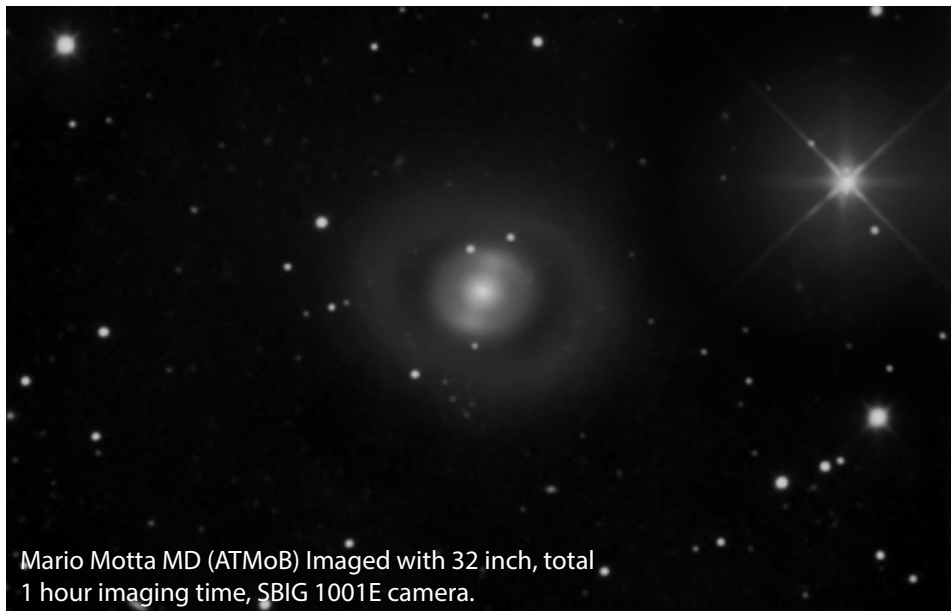
Barred Lenticular Galaxy in Leo Minor: NGC 2859

by Glenn Chaple for LVAS

Mag: 10.9 Size: 4.6' X 4.1'

Occupying a barren region between Ursa Major and Leo is the obscure constellation Leo Minor. Sky and Telescope's Pocket Sky Atlas plots a dozen galaxies within its boundaries. Among the more interesting is the 11th magnitude NGC 2859. Located at the extreme western edge of Leo Minor at coordinates 9h 24.3m, +34° 30.8', this barred lenticular galaxy is an easy star-hop from the 3rd magnitude star alpha (α) Lyncis (see accompanying finder charts).

Alpha Lyncis itself is a spectral class F7 giant that displays a striking golden yellow hue. NGC 2859 is located 40' east of this star and just 6.5' ESE of 7th magnitude HIP 46083. In his "Deep Sky Wonders" column in Sky and Telescope, Walter Scott Houston described a "sky drift" method of finding deep sky objects located at a similar declination and east of a bright star. You capture the star in the eyepiece field and wait until your target drifts into view. The technique worked perfectly for NGC 2859. I placed alpha Lyncis near the northern edge of the



Mario Motta MD (ATMoB) Imaged with 32 inch, total 1 hour imaging time, SBIG 1001E camera.

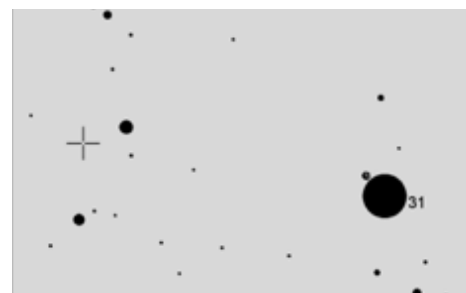
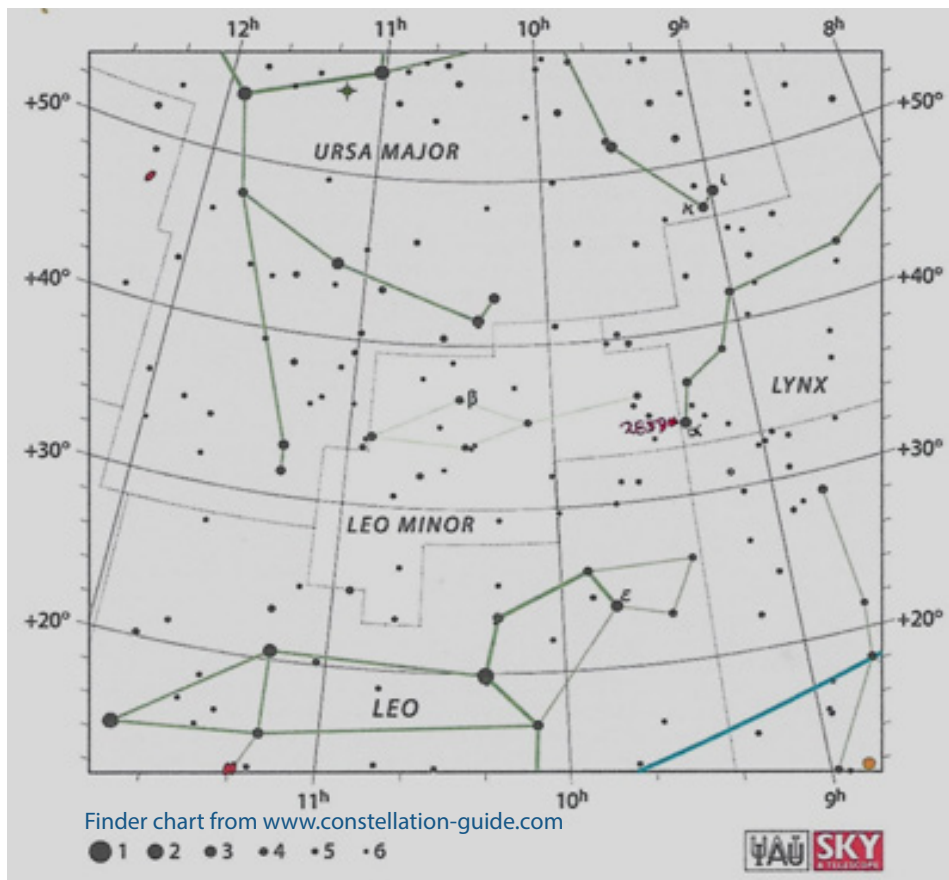
eyepiece field and waited. Lo and behold, within a few minutes HIP 46083 and then NGC 2859 glided into view!

I viewed NGC 2859 with 4.5-inch (at 150X) and 10-inch (208X) reflectors under slightly light-polluted suburban skies with a limiting magnitude of 5. The 4.5-inch revealed a concentrated, almost stellar nucleus surrounded by a haze that required averted vision. The 10-inch brightened NGC 2859, but failed to reveal two features that make this galaxy so intriguing – a pair of bars running essentially north and south of the

central core and an outer detached ring. I yearned not for a bigger scope, but for darker skies! ATMoB members Mario Motta and Doug Paul managed to image both, but can any of you visually detect them?

NGC 2859 was discovered by William Herschel on March 28, 1786. It lies some 83 million light years away, which means that the light striking your retina left when dinosaurs still ruled the earth.

The purpose of the LVAS Observer's Challenge is to encourage the pursuit of visual observing. It is open to everyone that is interested, and if you are able to contribute notes, drawings, or photographs, the LVAS will be happy to include them in our monthly summary. If you would like to contribute material, submit your observing notes, sketches, and/or images to either Roger Ivester (rogerivester@me.com) or Fred Rayworth (queex@embarqmail.com). To find out more about the LVAS Observer's Challenge or access past reports, log on to rogerivester.com/category/observers-challenge-reports-complete.



NGC 2859 finder chart, adapted by Glenn Chaple from AAVSO Variable Star Plotter (VSP). The magnitude 3.1 star (decimal omitted) is alpha (α) Lyncis. North is up in this 1 degree field.

February Reports

Skyscraper Executive Committee Meeting Sat February 8, 2020 @ Ladd Observatory, Providence 2:30 -4:00 PM

Present: Steve Hubbard, Bob Horton, Jeff Padell, Lloyd Merrill, Kathy Siok, Steve Siok, Jim Hendrickson, Bob Janus, Linda Bergemann (Jim C is having minor surgery)

1. Potential Events on calendar? Observe the Moon Day Sept 26th 2020

2. The group agreed to hold our Monthly meetings on Saturdays. Advantages include that the meeting would flow into open night and perhaps public will attend the program. The meetings could be advertised along with open nights. The starting time of the meeting should probably return to 7PM.

3. Upcoming Programs: (Sat) March 7 Glenn Chaple • (Sat) April 4 no speaker yet • (Sat) May 2 Stella Kafka (AAVSO) May 2 is also Astronomy Day (see plans below)

4. A local Scout Group will visit Seagrave on Saturday Feb 22nd (also an Open night) to work on their Astronomy Badge as a group. Jim Crawford will assist them. If it is cloudy, the alternate date is Friday Feb 21. • Details will be finalized by Feb 20th. John Thompson (former member) is the leader.

5. Annual Report for 2019

This will be a public document that provides information about the activities and status of Skyscrapers Inc. It is expected to cover a one year period and should be available after the end of the fiscal year in April. It will include several sections including: Reports on Monthly Meetings/speakers, AstroAssembly, the Observatory Committee and Open Nights, Financials and Outreach. Summaries will be required

from individuals who coordinate each area as well as the president. Many statistics are available in the Night Sky Network files that Linda Bergemann regularly updates on Skyscraper activities.

6. Outreach discussion

SCITUATE-related

Facebook: Steve Hubbard and Kathy Siok have been accepted as members of the Scituate Facebook page. Steve has been posting information about observing and meetings and has gotten responses from people in the town.

North Scituate Library: Linda Bergemann has met with the library officials and they are very enthusiastic about working with us. They already have a link to our website on their page (Linda updated the contact information) and offered us a display area in the library that would be updated regularly. They also requested some adult talks about astronomy and the history of the observatory, which Dave Huestis will be providing this spring.

Also, the library has a rotating art display each month and invited Skyscrapers to provide photos. They do not yet have a loaner telescope and we had a discussion about donating one. The cost is about \$400 and Linda will check with them about this before we purchase it.

Community bulletin boards: There was interest in finding places to post Skyscraper information in Scituate and around the state. (Markets, Schools etc)

Place an Ad in the Scituate HS Yearbook: Bob Janus suggested that Skyscrapers place an ad in the 2020 High School yearbook and it was unanimously approved. Full page will be sent in by Linda.

OTHER

Welcome New Members!

Amanda Anderson
Julius Lundy
Abdelmoniem Moustafa

Handouts: Linda Bergemann has been producing various handouts and providing them to everyone for distribution at events as outreach. The group decided to ask that an ideas or handouts go through Linda before they are distributed.

Also Linda was asked to provide a catalog of the selection of available handouts.

Local Boy and Girl Scouts:

We need to find out more about these groups

Troop 1 Boy Scouts who meet in Community Center

How many scout troops?

Merit Badge College @ RIC Who has done it recently? Kathy will ask Dave Huestis and Jim Magyar (at RIC)

Linda has had 2 requests for help with Girl Scout Merit Badge in Astronomy and will investigate further into what is involved.

Astronomy Day: Saturday, May 2

There was a discussion of possible activities and who is available. Ideas included:

Afternoon: Solar Observing in town/Village Green Farmers Market and have handouts available

Moonrise is at 2PM and might be viewed as well (No active regions in the Sun right now)

Evening: Invite public to monthly meeting talk and open telescopes

Twilight time: 8:30 no observing until

For Sale

I have been doing some astronomical spring cleaning and I have a few things I would like to sell.

Could you please put this into the newsletter.

Tele Vue Nagler 9mm eyepiece \$125

Tele Vue 24mm Wide Angle Eyepiece \$50

Orion Ultrablock 1.25" filter \$50

HighPoint 3 element 5x Barlow \$30

I have all of the parts needed to build a 10" Newtonian telescope.

A 10" f/6 full-thickness Pyrex mirror. It does need to be realuminized.

A mirror mount for the mirror

A 2.14" diagonal

A secondary mount for the diagonal

A JMI 2" eyepiece holder

I will sell all of the parts for \$150. I will not sell the parts individually.

If you are interested, please email me at cardanoc@verizon.net.

after the meeting is done

Options at open nights

Run videos in meeting hall: NASA Overview, Light Pollution, Astronomy for Beginners, others

David Levy handout Astronomical League resources

Spotting the space station video and website

ETC...

LaSalle Astronomy Club: Asked us to visit at their next meeting on Friday 2/14

Steve H will attend (about 30 kids involved) to talk to the group.

Ideas on how could we retain members

1) Make more personal contact by calling, emailing them on a regular basis?

Find interested members to keep in contact with the newer people?

Find out who the newer members are?

Call Members when member's night?

Do we need someone to keep track of newer members? Is this the New Member Steward or a committee of people?

1) Have more activities like Field Trips?

The 1st VP could coordinate this type of event with volunteers to actually run them.

1) Cookouts? New members (and exist-

ing ones too) breakfast?

2) How do we find out what people want?

7. Nominations Report (All 1 year terms)

President: Steve Siok 1st VP: Steve Hubbard 2nd VP: Ian Dell'Antonio • Secretary: Sue Hubbard Treasurer: Kathy Siok • Member at Large: Laura Landon, Matt Ouellette, Francine Jackson (2 to be elected) • Trustee: Bob Janus (3 year Term)

8. New Observatory Schedule:

The Open nights are the 1st and 3rd Saturdays of the month.

The 2nd and 4th Saturdays - informal sessions and some programs will be run by volunteers

The 5th Saturdays will be Member's Nights.

Printed materials will be provided to distribute to visitors

The portable toilet will be delivered in April (on site until November)

9. Promotion and Resources

Providence Journal Coverage

Kathy will talk to Scott MacNeill to get some information about how Frosty Drew gets coverage.

She will also investigate the ring papers

Astronomical League: Jeff wants to talk about AL at the next meeting and will also place an item in the Skyscraper. Our speaker Glenn Chapple will also mention the AL at the March meeting.

Remote telescope Use: There was discussion about different online programs that the membership might be able to use. "Slooh" has a fee that might be costly but "Microobservatory" is available for no charge.

Committees were asked to submit brief reports to Steve Hubbard to become part of the 2019 Annual Report.

10. Election Committee was appointed: Linda Bergemann will send out the ballot after the March meeting.

Jim H will make up the ballot.

11. Next Executive Committee Meeting

Saturday, March 28th at the North Scituate Library from 1:30 – 3:30 PM

Linda confirmed the date and time with the Library.

Submitted by Kathy Siok, Secretary

Astrophoto Gallery

Image of Rosette Nebula taken with Canon Ra by Bob Horton





February 24
Images of galaxy M82 (top) and planetary nebula M97 (Owl
Nebula and M82 taken February 24 by Steve Hubbard.
The Owl was a series of 2 minute exposures at a gain of
241 with my ZWO 294 and Meade 14" F8.



The Pleiades by Lloyd Merrill

Astro Telescopes 152mm @ f/5.9 refractor, HoTech 2" SCA Field Flatten, SBIG STF-8300C one-shot color camera, and Optolong L-eNhance narrowband filter, Losmandy Titan mount, guided. Acquisition, Maxim DL. Focus with Moonlight focuser controlled with FocusMax4. Automation with CCD Autopilot. All pre-processing and processing in PixInsight. All images were taken at light-polluted Windsong Observatory, Cumberland, RI. The capture was done using Maxim DL, 55x10m unbinned frames (total=9hr10m). Imager cooled set to -25C.

Pre-Processing Integration

All frames were calibrated against darks, bias, and flats in PixInsight.

GradientRemoval:

AutomaticBackgroundExtraction was applied using Division to remove the minimal gradient that remained after integration.

Color Correction:

BackgroundNeutralization and ColorCalibration were then applied.

Linear Noise Reduction:

MultiscaleLinearTransform was used to reduce noise in the image. Layer settings for threshold and strength:
Layer 1: 5.0 0.85 Layer 2: 3.5, 0.75
Layer 3: 3.0, 0.5 Layer 4: 1.0, 0.25

Stretching: HistogramTransformation

was applied to make a pleasing, bright image.

CurveTransformation applied to luminance and saturation.



Images of the waxing crescent Moon and Venus by Tracy Prell.

This image of Jupiter by Tracy Prell was from an AVI file which used Photoshop to convert 500 frames into layers to stack, align and process with Photoshop instead of using image stacking software.

Directions to Seagrave Memorial Observatory

From the Providence area:

Take Rt. 6 West to Interstate 295 in Johnston and proceed west on Rt. 6 to Scituate. In Scituate bear right off Rt. 6 onto Rt. 101. Turn right onto Rt. 116 North. Peeptoad Road is the first left off Rt. 116.

From Coventry/West Warwick area:

Take Rt. 116 North. Peeptoad Road is the first left after crossing Rt. 101.

From Southern Rhode Island:

Take Interstate 95 North. Exit onto Interstate 295 North in Warwick (left exit.) Exit to Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.

From Northern Rhode Island:

Take Rt. 116 South. Follow Rt. 116 thru Greenville. Turn left at Knight's Farm intersection (Rt. 116 turns left) and follow Rt. 116. Watch for Peeptoad Road on the right.

From Connecticut:

- Take Rt. 44 East to Greenville and turn right on Rt. 116 South. Turn left at Knight's Farm intersection (Rt. 116 turn left) and follow Rt. 116. Watch for Peeptoad Road on the right.
- or • Take Rt. 6 East toward Rhode Island; bear left on Rt. 101 East and continue to intersection with Rt. 116. Turn left; Peeptoad Road is the first left off Rt. 116.

From Massachusetts:

Take Interstate 295 South (off Interstate 95 in Attleboro). Exit onto Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.



47 Peeptoad Road
North Scituate, Rhode Island 02857