



# 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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## Friday, January 4, 7:00pm at North Scituate Community House

### Stepping Through the Cosmos by Diana Hannikainen

One of the most striking concepts people learn at some point or another is that the light from various objects we see in the night sky has taken years, or thousands of years, or millions of years to reach us here on Earth. It's always an interesting exercise to compare the physical distance of a source with the temporal gulf that spans in historical terms. Diana Hannikainen, observing editor from Sky & Telescope magazine, would like to take you on a journey backward in time by visiting binocular or small scope targets along the way. At each stop, we shall identify the easiest way to locate these targets, and also explore the interesting physics of the different classes of object.

Diana Hannikainen graduated from the University of Edinburgh in Scotland with a BSc in Physics and Astronomy, and then decided to she needed to explore my Finnish roots ... she therefore attended the University of Helsinki where she obtained an MSc and then a PhD in high-energy astrophysics (the latter in conjunction with the University of Sydney in Australia). Diana's research focused on modeling the accretion-ejection connection in X-ray binaries, and so she spent most of her time observing these objects in the X-rays and radio. She has always been keen on science writing and all that it entailed, and she couldn't believe her good fortune when just a little more than a year ago Sky & Telescope hired her. It's been sheer joy reconnecting with the night sky from a visual perspective.

## Phases of the Moon

**New Moon**  
January 6 01:28

**First Quarter Moon**  
January 14 06:46

**Full Wolf Moon (eclipse)**  
January 21 05:16

**Last Quarter Moon**  
January 27 21:10



# President's Message

by Steve Hubbard

Finally! We've reached the end of 2018, the year we forgot what the night sky looked like and can move on with hopeful anticipation to a better 2019.

Just to start things off, we will be treated to a very favorable total eclipse of the Moon on the night of Sunday, January 20 going into the early morning hours of the 21st. Conditions are most favorable for north and south America this time with the Moon well positioned for us. The total phase will start at a relatively early 11:41pm and go for an hour or so. If you miss this one, you won't get another chance until May 26 of 2021, so let's keep our fingers crossed for clear weather!

Later on in the year, there will be a total eclipse of the Sun on July 2. Unfortunately

it will only be visible from land in a narrow area of Chile and Argentina, but now that you know, you've got some time to make your plans.

Finally, there is another astronomical highlight to look forward to this year. On Monday, November 11 there is a rare Transit of the planet Mercury across the face of the Sun. The last time there was one that we could see was also on a Monday, May 9 2016. The next opportunity for us won't be until November of 2032 so this is also a must see. Let's hope that the skies cooperate for us!

We've got some great meetings planned for the coming year and some great events to go along with that. With 2018 being one of the cloudiest, rainiest years in memory,

let's all hope that 2019 brings some welcome changes and lets us get back to doing what we all enjoy, viewing the night sky and seeing what the universe has to offer. Happy New Year to you all and thank you for being a part of The Skyscrapers.

## Skyscrapers Food Basket

Skyscrapers has now started a food donation program! Just simply bring a canned good or two each time you visit the meeting hall or observatory; place it in the Food Donation box in the hall and they will be donated to our local food bank on a monthly basis.

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You shop. Amazon gives.

<https://smile.amazon.com/ch/05-0382371>

## Skyscrapers Library Borrowing Procedure

The catalog of available items to borrow is available at <http://www.theskyscrapers.org/library-procedures>, as well as in the meeting hall in proximity to the bookcases.

To borrow an item a member can: 1) review the list online before coming to a meeting 2) review a hard copy of the list on a meeting night.

Once a member chooses an item they can ask **Dave Huestis** or **Weston Ambrose** to retrieve it from the bookcase. The member will then sign the item out. This check out procedure will occur only between 7:00pm and 7:30pm on monthly meeting nights held at Seagrave.

Borrowed items should be returned at the next meeting unless other arrangements are made.



*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 **January 15** to Jim Hendrickson, 1 Sunflower Circle, North Providence, RI 02911 or e-mail to [jim@distantgalaxy.com](mailto: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](mailto:jim@distantgalaxy.com). Note that you will no longer receive the newsletter by postal mail.

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# Quadrantids Meteor Shower and a Total Lunar Eclipse for January

by Dave Huestis

Happy New Year everyone. I can't believe another year has come and gone. While 2018 is a blur in this stargazers' mind, I do unfortunately recall how weather conditions thwarted many of our observing sessions. After experiencing similar past depressing astronomical years I have often remarked that the new year couldn't be any worse. Then Mother Nature proves me wrong. I am hoping 2019 begins a refreshing trend towards clear and transparent skies where the beauty of the Universe can be appreciated.

In this first column of the year I usually preview the best upcoming astronomical highlights. However, because January offers two main events, I will focus on those and defer my Astronomical Highlights for 2019 until my February column.

A great new year gift is the annual Quadrantid meteor shower which peaks on the night of January 3-4. This prolific display of shooting stars can produce up to 100 meteors per hour. However, under clear and moonless skies about 60 meteors per hour is a more reasonable expectation. Why this discrepancy? The meteor stream is very narrow. Only one to two hours is required for the Earth to sweep through the densest

portion of it. So location, location, location, is the key to observing the higher rates. If time permits don't give up unless you have to. I did so one year and missed a great outburst of shooting stars. As agent Maxwell Smart would say, "Missed it by that much."

Furthermore, despite the potential for lots of meteors, many casual stargazers who live in colder regions do not place this shower high on their observing list. The August Perseids are more popular. However, I'd rather dress up for the cold than swat mosquitoes!

While these Quadrantids can appear anywhere in the sky, their radiant point (the area of sky from where the meteors appear to originate) is not far from the end star, Alkaid, of the Big Dipper's handle. From midnight till dawn, this area of sky will rise higher and higher above the northeast horizon, and by 4:00 a.m. this region of the sky will be almost at zenith (directly overhead). You'll know you've spotted a Quadrantid meteor if its dust train through the sky points back to the radiant point. A waning crescent Moon will rise at around 5:52 a.m. locally so it will not interfere with observing as many shooting stars as possible.

I still recommend that you get comfortable in a lounge chair to conduct your observing session. Just be careful that you do not get frostbite.

The Quadrantid meteors blaze across the sky at 25.5 miles per second. The majority of them are blue in color.

The grand event for January occurs on the night of January 20-21 with a total lunar eclipse. If clear skies prevail we will have the opportunity to observe this eclipse in its entirety. Totality doesn't begin until just before midnight on Sunday night, so I expect there will be some bleary-eyed folks at work on Monday morning.

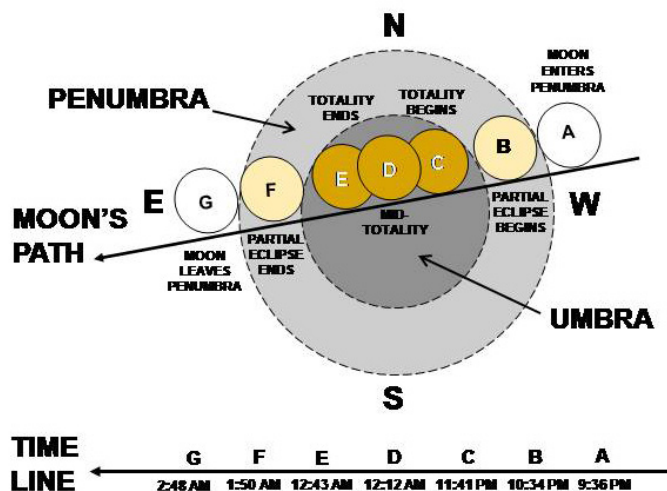
Please cut out the accompanying graphic for the times of specific "phases" of this eclipse. You can easily reference this information while you are outside enjoying the view. Beforehand you should review the following narrative to refresh your knowledge of what to expect.

For a total lunar eclipse to occur the Sun, Earth and Moon must be in alignment. With the Earth positioned in the middle of this celestial ballet, its shadow is projected onto the lunar surface. The duration of such an eclipse, particularly of totality, is determined by how precisely the three bodies are aligned. January's eclipse lasts a total of five hours and 12 minutes, with totality lasting one hour and two minutes.

The eclipse technically begins at 9:36 p.m. when the Moon slides eastward into the Earth's lighter undetectable penumbral shadow. Only as the Moon slides deeper into the shadow will a keen-eyed observer discern a subtle darkening of the lunar surface. It is just prior to the Moon entering the Earth's dark umbral shadow that one will notice that the moonlight looks somewhat subdued.

When the Moon first encounters the umbral shadow at 10:34 p.m., the partial phase of the eclipse begins. For one hour and four minutes the Moon will move deeper and deeper into the shadow, generally from left to right. Then at 11:41 p.m. totality begins when the Moon will be completely immersed in the Earth's umbral shadow.

I do not expect the Moon to disappear from view completely (as it has during past



"East" means the side of the moon closest to the Eastern horizon (left-hand side).  
 "West" means Western horizon (right-hand side).

ALL TIMES ARE EST  
 (EASTERN STANDARD TIME)

## TOTAL LUNAR ECLIPSE – January 20-21, 2019

Graphic by David A. Huestis





eclipses) for two reasons. First, it will not be sweeping through the central portion of the dark umbral shadow (see graphic). Second, no recent volcanic eruptions have spewed any dust into the Earth's upper atmosphere to significantly redden the Moon's appearance.

Enhance your view of this eclipse with binoculars or a small telescope. The colors often change as totality progresses, so watch carefully. For one hour and two minutes totality is truly a beautiful sight to observe.

Totality ends at 12:43 a.m. when the Moon begins to leave the dark shadow and sunlight returns to its surface. For one hour and seven minutes the partial phase will

continue until the Moon's face is completely illuminated once again at 1:50 a.m. For a while the Moon's light will still look somewhat subdued as the Moon will remain within the lighter penumbral shadow until 2:48 a.m. when the eclipse ends. In a dark sky you may be able to detect this shadow soon after the partial phase completes. Thereafter the remaining penumbral phase will hardly be noticeable at all.

Please note the sky in the vicinity of the Full Moon before the eclipse begins. As the eclipse progresses and the sky darkens watch as the surrounding constellations become more visible. In particular, watch as the Beehive Cluster (M44), just about eight

degrees to the upper right of the Moon emerges into visibility. Binoculars will help to reveal this beautiful open cluster of stars.

Weather prospects at this time of year are far from favorable, so let's cross our fingers that Mother Nature will cooperate. The next total lunar eclipse visible from Southern New England after this one won't be until May 15-16, 2022.

And finally, for you early risers who travel eastward during dawn's early light to begin your work day will certainly notice a bright planetary duo above the eastern horizon during January. Those astronomical beacons are Venus and Jupiter. Venus is the brighter of the two worlds. Each day they will draw closer to each other. On the morning of January 22 only 2.5 degrees will separate this pair. Thereafter they will drift apart, but on the 31st a waning crescent Moon will be positioned between them for a nice photo op!

Keep your eyes to the skies for 2019 and always.



*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>*

## Messier's Comets

by Francine Jackson

Although it is early to think about, many amateur astronomers do try to do "Messier marathons," where the entire catalog is observed in one night. This is not an easy thing to do, as the only times when this can actually be done is mid March. But, although the name Messier is known throughout astronomy, the actual person is possibly not very familiar to many.



Charles Messier was an observer who specialized in finding comets. It is said that he found a dozen within a 15-year period, and would have located a 13th, but the death of his wife caused it to be discovered by one of his rivals, Montagne de Limoges. Messier's response was heartbreaking that he had lost out on this discovery, but then added, "Ah, the poor woman!"

Although Messier claimed to discover almost two dozen comets, later research states he might have only found about 15; however, today we associate his name not necessarily with the number of comets he professed to discover, but to the number of celestial objects he located in searching for them. His first, now called the Crab nebula, came as a result of a comet he had been following in Taurus in 1758, ". . . above the southern horn and a short distance from the star Zeta Tauri." He saw it was too bright for the comet, but he placed it on his comet chart as a notation if a comet ever showed up near that spot again. However, Messier

didn't begin his actual catalog of noncometary objects until 1764, when he had over three dozen objects added to his list. His first published set of 45 objects came in 1771, in the *Memoires de l'Academie*; however, he continued to observe and record objects that could possibly be considered comets at first glance until his death in 1817. During that time, he had others trying to overtake Messier's comet discoveries, but, by compiling his list, most people know Charles Messier, not by his actual comet prowess, but by the catalog he created for astronomers to use in finding many deep-sky objects.



*Francine Jackson is Skyscrapers Public Relations Spokesperson, writes the weekly newsletter for Ladd Observatory and serves as planetarian at the University of Rhode Island. See more at <http://theskyscrapers.org/francine-jackson>*

## NASA Night Sky Notes:

# January's Evening Eclipse and Morning Conjunctions

By David Prosper

Observers in the Americas are treated to an evening **total lunar eclipse** this month. Early risers can spot some striking morning conjunctions between **Venus**, **Jupiter**, and the **Moon** late in January.

A **total lunar eclipse** will occur on **January 20th** and be visible from start to finish for observers located in North and South America. This eclipse might be a treat for folks with early bedtimes; western observers can even watch the whole event before midnight. Lunar eclipses takes several hours to complete and are at their most impressive during total eclipse, or totality, when the Moon is completely enveloped by the umbra, the darkest part of Earth's shadow. During totality the color of the Moon can change to a bright orange or red thanks to the sunlight bending through the Earth's atmosphere - the same reason we see pink sunsets. The eclipse begins at 10:34 pm Eastern Standard Time, with totality beginning at 11:41 pm. The total eclipse lasts

for slightly over an hour, ending at 12:43 am. The eclipse finishes when the Moon fully emerges from Earth's shadow by 1:51 am. Convert these times to your own time zone to plan your own eclipse watching; for example, observers under Pacific Standard Time will see the eclipse start at 7:34 pm and end by 10:51 pm.

Lunar eclipses offer observers a unique opportunity to judge how much the Moon's glare can interfere with stargazing. On eclipse night the Moon will be in **Cancer**, a constellation made up of dim stars. How many stars you can see near the full Moon before or after the eclipse? How many stars can you see during the total eclipse? The difference may surprise you. During these observations, you may spot a fuzzy cloud of stars relatively close to the Moon; this is known as the "**Beehive Cluster**," **M44**, or **Praesepe**. It's an open cluster of stars thought to be about 600 million year old and a little under 600 light years distant.

**Praesepe** looks fantastic through binoculars.

**Mars** is visible in the evening and sets before midnight. It is still bright but has faded considerably since its closest approach to Earth last summer. Watch the red planet travel through the constellation **Pisces** throughout January.

**Venus** makes notable early morning appearances beside both **Jupiter** and the **Moon** later this month; make sure to get up about an hour before sunrise for the best views of these events. First, Venus and Jupiter approach each other during the third full week of January. Watch their conjunction on the 22nd, when the planets appear to pass just under 2 ½ degrees of each other. The next week, observe Venus in a close conjunction with a crescent Moon the morning of the 31st. For many observers their closest pass - just over half a degree apart, or less than a thumb's width held at arm's length - will occur after sunrise. Since Venus and the Moon are so bright you may still be able to spot them, even after sunrise. Have you ever seen Venus in the daytime?

If you have missed **Saturn** this winter, watch for the ringed planet's return by the end of the month, when it rises right before sunrise in **Sagittarius**. See if you can spot it after observing Venus' conjunctions!

You can catch up on all of NASA's current and future missions at [nasa.gov](http://nasa.gov)



Have you ever wondered how eclipses occur? You can model the Earth-Moon system using just a couple of small balls and a measuring stick to find out! The "yardstick eclipse" model shown here is set up to demonstrate a lunar eclipse. The "Earth" ball (front, right) casts its shadow on the smaller "Moon" ball (rear, left). You can also simulate a solar eclipse just by flipping this model around. You can even use the Sun as your light source! Find more details on this simple eclipse model at [bit.ly/yardstick eclipse](http://bit.ly/yardstick eclipse)



This article is distributed by the NASA Night Sky Network, a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach. Visit [nightsky.jpl.nasa.gov](http://nightsky.jpl.nasa.gov) to find local clubs, events, stargazing info and more.



# Planetary Nebula in Taurus

## NGC 1514

by Glenn Chaple for LVAS

**Magnitude: 10.9**

**Size: 2.3' X 2.0'**

This month's Observer's Challenge changed William Herschel's idea about the construction of the universe. Early in his astronomical career, he considered all nebulae to be unresolved masses of stars much as the Milky Way when viewed with the unaided eye. This idea changed on the evening of November 13, 1790, when his systematic survey of the heavens brought him face-to-face with "a most singular phenomenon; a star of 8th magnitude with a faint luminous atmosphere of circular form." He added "Our judgement I may venture to say, will be, that the nebulosity about the star is not of a starry nature". He catalogued it as H IV-69, his 69th Class IV (Planetary Nebulae) object.

Herschel's find, better known by the New General Catalog designation NGC 1514 or its nick-name, the "Crystal Ball Nebula, lies in the northwest corner of Taurus. The finder chart shows its location about 3 degrees east and slightly south of the 3rd magnitude star zeta ( $\zeta$ ) Persei.

In the case of a typical planetary nebula like the Ring Nebula (M57), a faint central star is hidden by the surrounding nebulosity. NGC 1514 presents the opposite situation – its 9th magnitude central star overshadows the faint enveloping gaseous shell. To capture this planetary, you'll need dark skies, a 6-inch scope or larger (the Crystal Ball has been viewed with smaller apertures by experienced observers) and high magnification (100X and up). A nebula filter like an OIII will help.

NGC 1514 is bracketed to its northwest and south-southeast by a pair of 8th magnitude stars. If their images appear sharply focused while NGC 1514's central star seems somewhat fuzzy, you've hit the jackpot.

The Crystal Ball Nebula's central star is actually binary - a stellar pair with a period of over 9 years – exceptionally long for a planetary nebula. It lies an estimated 2200 light years away.

*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](mailto:rogerivester@me.com)) or Fred Rayworth ([queex@embarqmail.com](mailto:queex@embarqmail.com)).*

*To find out more about the LVAS Observer's Challenge or access past reports, log on to*



1514 (left) visible light, (right) infrared Image courtesy NASA/JPL-Caltech/UCLA/DSS

# The Sun, Moon & Planets in January

This table contains the ephemeris of the objects in the Solar System for each Saturday night in January 2019. Times in Eastern Standard Time (UTC-5). 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
<b>Sun</b>	<b>5</b>	19 02.2	-22 39.9	Sgr	-26.8	1951.8	-	-	-	0.98	07:13	11:51	16:29
	<b>12</b>	19 32.8	-21 43.4	Sgr	-26.8	1951.5	-	-	-	0.98	07:12	11:54	16:37
	<b>19</b>	20 02.9	-20 26.3	Sgr	-26.8	1950.8	-	-	-	0.98	07:09	11:57	16:45
	<b>26</b>	20 32.3	-18 50.4	Cap	-26.8	1949.5	-	-	-	0.98	07:04	11:58	16:53
<b>Moon</b>	<b>5</b>	18 08.6	-21 40.9	Sgr	-7.6	1776.9	12° W	1	-	-	06:46	11:33	16:20
	<b>12</b>	23 50.2	-6 29.1	Aqr	-11.2	1798.2	64° E	29	-	-	10:51	16:50	22:58
	<b>19</b>	5 52.4	20 24.6	Ori	-12.7	1993.9	149° E	93	-	-	15:12	22:53	06:34
	<b>26</b>	12 53.5	-0 37.5	Vir	-12.3	1913.9	114° W	70	-	-	22:28	04:37	10:36
<b>Mercury</b>	<b>5</b>	17 59.0	-23 47.9	Sgr	-0.3	5.0	15° W	92	0.46	1.34	06:19	10:49	15:20
	<b>12</b>	18 45.7	-24 07.9	Sgr	-0.4	4.8	11° W	96	0.47	1.39	06:39	11:09	15:38
	<b>19</b>	19 33.9	-23 22.9	Sgr	-0.6	4.8	7° W	98	0.46	1.42	06:56	11:29	16:03
	<b>26</b>	20 22.8	-21 27.9	Cap	-0.9	4.7	3° W	100	0.44	1.42	07:09	11:51	16:34
<b>Venus</b>	<b>5</b>	15 44.1	-16 14.2	Lib	-4.3	25.4	47° W	50	0.72	0.67	03:30	08:33	13:35
	<b>12</b>	16 13.6	-17 46.4	Sco	-4.2	23.6	47° W	53	0.72	0.72	03:39	08:35	13:31
	<b>19</b>	16 44.7	-19 07.1	Oph	-4.2	21.9	46° W	57	0.72	0.77	03:48	08:38	13:29
	<b>26</b>	17 17.1	-20 11.0	Oph	-4.1	20.5	46° W	60	0.72	0.82	03:57	08:43	13:30
<b>Mars</b>	<b>5</b>	0 10.0	0 51.1	Psc	0.5	7.2	78° E	88	1.46	1.29	10:51	16:57	23:04
	<b>12</b>	0 27.1	2 51.5	Psc	0.6	6.9	76° E	88	1.47	1.35	10:33	16:47	23:01
	<b>19</b>	0 44.4	4 50.6	Psc	0.7	6.6	73° E	88	1.48	1.41	10:16	16:37	22:58
	<b>26</b>	1 01.7	6 47.5	Psc	0.8	6.3	71° E	89	1.48	1.47	09:59	16:26	22:55
<b>1 Ceres</b>	<b>5</b>	15 27.5	-12 16.7	Lib	8.9	0.4	52° W	98	2.66	3.15	02:57	08:15	13:32
	<b>12</b>	15 37.9	-12 55.6	Lib	8.9	0.4	56° W	98	2.66	3.08	02:43	07:58	13:12
	<b>19</b>	15 47.9	-13 30.8	Lib	8.9	0.4	61° W	97	2.67	3.00	02:27	07:40	12:53
	<b>26</b>	15 57.5	-14 02.2	Lib	8.8	0.4	66° W	97	2.67	2.92	02:11	07:22	12:33
<b>Jupiter</b>	<b>5</b>	16 44.9	-21 41.0	Oph	-1.6	31.9	32° W	100	5.35	6.16	04:52	09:32	14:11
	<b>12</b>	16 51.0	-21 51.6	Oph	-1.6	32.3	37° W	100	5.35	6.09	04:32	09:10	13:49
	<b>19</b>	16 56.9	-22 01.0	Oph	-1.7	32.7	43° W	100	5.34	6.02	04:11	08:49	13:26
	<b>26</b>	17 02.5	-22 09.2	Oph	-1.7	33.1	49° W	100	5.34	5.94	03:49	08:27	13:04
<b>Saturn</b>	<b>5</b>	18 51.3	-22 25.8	Sgr	0.5	15.0	3° W	100	10.06	11.04	07:02	11:38	16:14
	<b>12</b>	18 54.9	-22 21.8	Sgr	0.5	15.0	9° W	100	10.06	11.03	06:37	11:14	15:50
	<b>19</b>	18 58.4	-22 17.5	Sgr	0.5	15.0	15° W	100	10.06	11.01	06:13	10:50	15:26
	<b>26</b>	19 01.8	-22 12.9	Sgr	0.6	15.1	21° W	100	10.06	10.97	05:48	10:25	15:03
<b>Uranus</b>	<b>5</b>	1 47.1	10 28.7	Psc	5.8	3.6	104° E	100	19.86	19.60	11:52	18:32	01:12
	<b>12</b>	1 47.1	10 29.2	Psc	5.8	3.6	97° E	100	19.86	19.71	11:24	18:04	00:45
	<b>19</b>	1 47.3	10 30.5	Psc	5.8	3.6	90° E	100	19.86	19.83	10:57	17:37	00:17
	<b>26</b>	1 47.7	10 32.8	Ari	5.8	3.5	83° E	100	19.86	19.95	10:30	17:10	23:50
<b>Neptune</b>	<b>5</b>	23 03.2	-7 07.4	Aqr	7.9	2.2	60° E	100	29.94	30.42	10:12	15:48	21:25
	<b>12</b>	23 03.8	-7 03.4	Aqr	7.9	2.2	53° E	100	29.94	30.52	09:45	15:22	20:58
	<b>19</b>	23 04.5	-6 58.9	Aqr	7.9	2.2	46° E	100	29.94	30.61	09:18	14:55	20:32
	<b>26</b>	23 05.3	-6 54.0	Aqr	8.0	2.2	39° E	100	29.94	30.70	08:51	14:28	20:05
<b>Pluto</b>	<b>5</b>	19 29.7	-21 56.8	Sgr	14.3	0.2	6° E	100	33.72	34.69	07:38	12:16	16:54
	<b>12</b>	19 30.7	-21 55.2	Sgr	14.3	0.2	1° W	100	33.72	34.70	07:11	11:49	16:27
	<b>19</b>	19 31.7	-21 53.7	Sgr	14.3	0.2	7° W	100	33.72	34.70	06:44	11:23	16:01
	<b>26</b>	19 32.7	-21 52.1	Sgr	14.3	0.2	14° W	100	33.73	34.68	06:18	10:56	15:35





Comet 46P/Wirtanen on December 7 by Conrad Cardano, using a GSO RC 6" plus Canon EOS Rebel T1i. (60 exposures at 30 seconds each).

Paine Farm, Foster. Dec 23rd by Bob Horton







Gerry Dyck demonstrates the use of his solar spectroscope to Ian Dell'Antonio and Bob Horton at the December 15 meeting.



# 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