

# The Skyscraper

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The monthly publication of



Amateur Astronomical Society  
of Rhode Island

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North Scituate, RI 02857

www.theskyscrapers.org

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See back page for directions to  
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# The Skyscraper

November 2005

## November Meeting with Howard Chun

FRIDAY, NOVEMBER 4TH AT SEAGRAVE OBSERVATORY

Formerly an aerospace engineer at GE Astro Space Division is currently a high school physics teacher at Cranston East High School. He teaches physics through authentic astronomy research. The students have monitored sunspots, searched for novae in M31 and analyzed spectra from AGNs. Last October he was selected to run a pilot Spitzer Space Telescope teacher research program. His research has been in the areas of far infra red spectra of a dust cloud surrounding a super massive black hole and to hunt for infrared signatures of brown dwarfs in a cataclysmic binary star system.

## NOVEMBER 2005

4

FRIDAY

7:30PM **November Meeting**  
Seagrave Observatory

5

SATURDAY

8:00PM **Public Observing Night**  
Seagrave Observatory

12

SATURDAY

8:00PM **Public Observing Night**  
Seagrave Observatory

19

SATURDAY

8:00PM **Public Observing Night**  
Seagrave Observatory

26

SATURDAY

8:00PM **Public Observing Night**  
Seagrave Observatory

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# President's Message

Dave Huestis, President

A hearty congratulations to AstroAssembly Chairperson Ted Ferneza for an absolutely superb event! A tremendous success! I'm usually not at a loss for words, but I'd have to consult a thesaurus to use all the appropriate adjectives to describe how great AstroAssembly 2005 was.

I've heard nothing but praise from attendees and our featured guest speakers alike. One of our speakers, author Bill Sheehan, who regularly attends events like ours, thinks AstroAssembly is the best convention he has ever attended. Bill is a history buff as well, and is fascinated by the story of Frank Seagrave. I plan on keeping Bill informed of my research. Bill also told us he plans on becoming a member of Skyscrapers! What better compliment can one make.

And Story Musgrave ... what can you say. He was fantastic. I had the pleasure of providing him a tour of the Clark refractor and a short history of Frank Seagrave and Skyscrapers. He is the most inquisitive person I have ever met. He was fascinated by everything he saw. (I later remarked to Dan Lorraine that he was so inquisitive I likened him to an alien experiencing things on Earth for the first time. Little did I know that is exactly how he would start out his presentation later that evening, explaining how he was like that as a young child as well.) At one point he started moving the large observing ladder around. I was wondering what he was going to do. He placed it at the open slit overlooking the courtyard and proceeded up the ladder and popped his head out of the dome doorway! All the while I held the ladder firmly until he stepped down. I only wish I had had my camera, or someone outside had looked up at that moment!

Story's presentation was well received by everyone. Following a prolonged standing ovation, Dan Lorraine presented Story with a beautiful painting (commissioned specifically for this occasion and painted by NASA artist Ed Hengeveld from the Netherlands) of Story looking out of the space shuttle window at the Hubble Space Telescope.

In all my 30+ years as a Skyscraper attending AstroAssembly, this was the best event ever (the Clyde Tombaugh visit in 1987 runs a close second).

Thanks again to Ted as AstroAssembly Chairman, Dan Lorraine for convincing Story and Bill Sheehan to attend. Thanks to all our other afternoon speakers, Jim Head and our old friend John Briggs. Thank you to our Friday night speakers as well. Thank you to all who

attended (138 folks, not including the speakers).

And last, but certainly not least, a well deserved thank you to the Skyscraper Trustees, all the volunteers who helped prepare the grounds for this event, and all the other Skyscraper members who pitched in to help make Astro Assembly 2005 a tremendous success. A special thank you to Kathy and Steve Siok for organizing and operating the Stardust Grille, as well as the wine and cheese reception! Kathy was also responsible for producing the program brochure. Thanks also to Dolores Rinaldi for the fine Space Shuttle ice sculpture. And, thanks to our master of ceremonies and top-notch AV guru Scott Tracey for his outstanding service throughout our event.

When I became president of Skyscrapers in May I told you how proud I was to be a Skyscraper. Every member should be proud of the Skyscraper organization. And I, for one, am even more proud today!

Congratulations to everyone on a job well done.

And finally, don't forget to attend our next monthly meeting on Friday, November 4, 2005 at 7:30 pm, when Cranston East teacher Howard Chun will present a talk about his research projects with the Spitzer Space Telescope teacher research program. See you all then.

Following is a new feature for *The Skyscraper* entitled "How I Became an Amateur Astronomer". Not only do I think there are a lot of interesting stories out there to tell, but I also think this will help our members get to know each another better.

First up is a relative newcomer, Tracey Haley. I liked Tracey right from the start, and after reading his "How I Became an Amateur Astronomer" account, I realized Tracey is a "kindred spirit".

Next month long time member Bill Guca will share with us his entry into this exciting hobby. I'll soon be looking for volunteers to share their stories in the January thru March issues of *The Skyscraper*.

Enjoy!

# My Life under the Stars

*Tracey Haley*

My first memories of a star studded life, begin as a boy in the early Nineteen seventies. I came from a family of six and my father worked many hours to make ends meet. Unlike family vacations today, ours was the occasional family camping trip. The smells and tastes of roasted marshmallow smores still make my mouth water. The nights seem to always be crystal clear and the pinpoints of the stars sharp. There was no light pollution of a major city or nearby neighborhood. The nights were alive with creatures of the night, singing, croaking, and chirping. My favorite thing to do was to stay up late, wrapped up in a sleeping bag and look up at the pitch-black of night, or a luminous Moon. In an age when human missions to the lunar surface were so frequent, my dreams of flight took off.

As I grew older and the family camping trips dwindled, I would spend many nights by a fire at the beaches with my high school friends, always looking up and wondering how far life would take us. I guess I have always looked to the skies to find an inner peace that few things afforded me. Later in my twenties when I started to realize the true challenges in life, a grand event had caught my attention.

The year was 1993 and a comet had made headline news. This was no ordinary comet, but one that had ventured to close to the massive planet Jupiter. Being torn apart by the planets deadly gravitational field, it was shredded into twenty-one segments. After its orbit was calculated and all bets were on the comet plowing into the very planet that had ripped it apart on its earlier obit. This comet was named Shoemaker-Levy 9 after its founders David Levy, and Eugene and Carolyn Shoemaker. In July 1994 the comet fragments one by one plowed into Jupiter, producing huge black spots. My first looks at these black spots were through the Ladd observatory's 12-inch refractor. It was this event that changed me from occasional stargazer to amateur astronomer.

I first purchased a 60mm refractor which I was able to view the damage comet shoemaker-levy 9 had left behind. After about a year and a half of saving my money I purchased a Meade 8 inch f/6.3 Schmidt-Cassegrain Telescope. I had the equipment now but was lacking something very important. With any interest or hobby, it is always best to have someone to share it with. My family and friends had only a



look once and “that’s nice” response at the eyepiece. I knew I had to find others who felt the same calling to the night sky as I had.

On a winter day in February I spent some time at the Cormack Planetarium learning about the night sky. Upon leaving the planetarium I found a registration form for The Skyscrapers Inc., Amateur Astronomical Society of Rhode Island. I had found what I needed, a whole group of people with my interests. I sent in my registration form, and at the next monthly meeting I became an official Skyscraper.

The next year was one of new friends, new learning, and feeling of pride. With my knowledge of astronomy expanding, so had my universe. With my new marriage and a newborn baby girl, I decided to put a hold on Skyscrapers and devote my time to my new family.

Five years and three beautiful children later, the time had come to rejoin Skyscrapers. I have been an active member now for a year and a half. I have met some great new friends and attended several fantastic lectures and events. I enjoy the company of friends who share my interests in astronomy and have also introduced my two oldest girls to what I hope turns into a lifetime interest in science. Thanks to Skyscrapers for having such a wonderful impact on my life.

# Marvelous Mars

*Dave Huestis*

What immediately pops into your head when I mention Mars? If you had asked me back in the sixth grade (1964-65), I would have answered H.G. Wells' *War of the Worlds*, for it was then that I first read that great novel about Martians invading our world. From then until the early seventies I was aware we had sent several unmanned spacecraft (Mariner series) to explore our desert neighbor. Then came the Viking landers in 1976. And now I think about the Mars rovers Spirit and Opportunity who, like the Energizer Bunny, keep going and going ....

When I'm able to show a young child a great view of Mars through our 8 1/4 -inch Alvan Clark refractor telescope, I often wonder if that young person may be the first earthly explorer to set foot upon its rusty soil. They may get to visit the crash or landing sites of our earlier unmanned explorations. They'll get to see firsthand the magnificent "geological" structures explored by the rovers. This adventurer will be able to step up to a rock outcropping and pick away at the formation hoping to discover evidence of past life. (Much like I imagined doing as I watched the fantastic images transmitted to Earth from the Mars rovers.)

For this article I am not going to recount the history of Mars observations or spacecraft explorations other than to say the initial accounts of possible "canals" on Mars at the end of the 19th century captured our imagination and most assuredly hastened our spacecraft exploration of this desolate world. If you would like some historical background, visit Skyscrapers web site at <http://www.theskyscrapers.org/> and look for an article entitled "Mars History Highlights."

First, let's examine how this close approach of Mars in 2005 is different than it was in 2003. Two years ago, on August 27, 2003, Mars came closer to the Earth than it had in 60,000 years, at a distance of 34,646,418 miles. Viewing was pretty good. Most folks who looked through our telescopes at Seagrave Observatory not only saw the South Polar Cap (SPC), but also got views of many of Mars' dark surface features. Though we had many nights of fairly decent observing conditions, Mars was always very low in the sky, never quite rising above the atmospheric turbulence. 2005 will be different.

Though Mars will be almost 10,000,000 miles further away from the Earth (43,137,588 miles on the

night of October 29-30 in 2005), the god of war will be much higher in the sky. In fact, when Mars is on your meridian (due south of your location) he will be about 60 degrees off the southern horizon. This favorable placement may make up for Mars' much further distance when it comes to gleaning planetary surface details. The image will definitely be smaller than in 2003, but the hopefully steady atmosphere will provide a higher quality image.

As soon as you read this column, you should begin looking for Mars. At 9:00 pm on the night of close encounter (October 29/30), Mars will be the bright orange/red/rust colored "star" 30 degrees above the eastern horizon in the constellation Aries, very near Taurus and the Pleiades star cluster. Mars won't be this close or this bright for another 13 years, so you should make every effort to view this desolate world before winter descends upon us.

Even small backyard telescopes will still reveal detail only fleetingly glimpsed before in larger aperture scopes under the best of best conditions. So if you have your own telescope, try observing and getting your own impression of what can be seen before you read the remainder of this column, or before you reference detailed maps. (The September issue of *Sky and Telescope* magazine and the November issue of *Astronomy* magazine each contain a fine map to aid you in identifying Martian surface features.) Using the maps first may prejudice you into thinking you are seeing something when you aren't! Observe first, make a few crude drawings, and then go to the maps to see if you were right. I've provided a few web sites at the end of this column where you can find more information.

You don't have your own telescope? Then plan on visiting Seagrave Observatory some clear Saturday night through December at least (or until snow drifts close our parking lot!!) You can still prepare for your visit by reading the remainder of this column. Get ready for another close encounter of the planetary kind!

Normally Mars is quite a challenge to observe from Earth. Its usually small appearance through a telescope makes it difficult to discern much surface detail, other than a polar cap or a large feature like Syrtis Major or the Hellas Basin. However, this close encounter will provide views of surface detail that

many of us have only glimpsed during past, less favorable encounters. In fact, despite Mars' greater distance from us, the detail seen may even rival that observed in 2003.

What we will still need is some good observing conditions. The telescopic image must be steady under medium to high magnification, else the details will blur into indistinct and formless features. Your telescope and mounting must also be sturdy. Any motion of the scope under the magnifications necessary for observing Mars will be quickly transmitted to the image. A clock drive to counter the Earth's rotation is also recommended to keep Mars' image centered in the eyepiece at all times. Seagrave Observatory's telescopes meet these mechanical criteria.

Unless a global dust storm completely covers the planet by the time this article is printed, the first feature that will catch your eye will be the South Polar Cap (SPC). It is conveniently tilted towards the Earth, giving us a great view. Watch it carefully over the coming weeks. When spring began in Mars' southern hemisphere on May 5, the SPC began to melt. Summer solstice occurred on September 29, providing more sunlight to shrink the cap. You should soon notice the SPC continuing to shrink as time progresses. Ideal observing conditions may allow you to see some irregularities. During past oppositions dark rifts have isolated portions of the cap as detached segments. The SPC may even disappear entirely.

The rest of the planet will appear as a rust-colored beach ball. Several dark features can also be seen. These are the underlying rock exposed by the shifting sands during intense dust storms. On the night of close encounter, a prominent and most distinctive dark feature called Syrtis Major will be facing the Earth. This remnant of a shield volcano straddles the Martian equator and extends northward 930 miles towards the SPC. Its east/west breadth is about 620 miles.

I find it most difficult to describe this region, for the shifting sands during the changing seasons often alter its appearance. Just at the end of the 1800's Syrtis Major was known as the "Hourglass Sea" due to its shape. It can appear like a narrow tornado winding down and about to "rope out," or it can look like a broad F5 monster tornado. Some see it as a shark's fin! More often than not, to me it looks like an irregular image of the Indian sub-continent on Earth. Let me know how you view this planetary Rorschach ink blot test.

Be aware that the Martian day is 24 hours and 37 minutes long, while our day is 24 hours long. The extra 37 minutes has an effect on your observation of surface features. If you see a dark feature on Mars' central meridian (an imaginary line that bisects the planet) one evening at 12:00 midnight, the next evening it won't return to the central meridian until 12:37 am. On the following night it would arrive 37 minutes later. Therefore, to ideally observe the same piece of Martian real estate on the central meridian each successive night, you must wait an additional 37 minutes.

You should begin watching for dust storms immediately. As of this writing in early October, none have yet to be reported. If you can identify specific surface features, dust storms often begin in the Hellas Basin, a deep meteor impact basin visible just between Syrtis Major and the SPC. The global dust storm that prevented our observations of Mars in 2001 started here.

Dust storms begin as small yellow clouds that grow and grow and can eventually blanket the entire planet. Whitish water vapor clouds can also be detected, as well as bright spots of frost. These features are all possible to see, though you will probably have great difficulty observing anything more than the SPC and some of the dark surface features with a three-inch or smaller telescope.

In conclusion, be patient when observing Mars. The disk of the planet, though larger in appearance from most years, is still relatively small. Features will be easy to detect during this close encounter. Wait for steady seeing conditions. Don't try observing Mars if the stars are twinkling. Take your time in observing this fascinating planetary neighbor and your efforts will be well rewarded. If you check out the Mars JPL web site you can see where the rovers are exploring and determine if they are on the hemisphere facing the Earth. I'd imagine myself strolling right beside either of them to experience the wonders of Mars.

This column has presented only a simple introduction to Mars observing. You will not duplicate the observations of some of the late 19th century astronomers, nor will your view be anything like the electronic images recorded by astronomers you might see on television or when you surf the net. You will, however, be able to take a knowledgeable glimpse of an alien world that inspired generations of astronomers and science fiction writers alike to ponder the existence of Martian life-forms. So drag out those telescopes and expose them to the light of the universe.

One day your children or your grandchildren may set foot upon this exciting landscape.

Remember, Seagrave Observatory is open free of charge to the public every clear Saturday night. Once Mars clears the treetops to our east, our weekly focus will be on the red planet. I'd advise you to visit soon before winter settles in. Once again The Old Farmer's

Almanac has predicted a colder than average winter with above average precipitation for us. So come and take advantage of the viewing opportunities we can provide with our four major telescopes. Check our web site at <http://www.theskyscrapers.org> for further information, and always keep your eyes to the skies.

## Mediocre Meteors in November

*Dave Huestis*

Usually we can count on a few meteors to blaze across the sky during November while there is still a little warmth on an autumn evening.

Early in the month this scenario holds true for the Taurid meteor shower. Because the Taurids consist of two distinct meteor streams, its primary activity spans just over a week, from the 3rd to the 12th. Early in this time frame the Moon will be New (on the 2nd), then increasing to just past First Quarter (waxing gibbous) on the 12th. Moonlight will only slightly interfere with observing the five to ten shooting stars per hour from this minor meteor shower.

Though the Taurids are slow meteors, entering our atmosphere at only 17-miles per second, these shooting stars are also bright. More often than not they are yellow in color. Fairly frequently they become fireballs that fragment into multiple meteors. This characteristic alone makes them worth watching.

At mid-month the next major shooting star display, the Leonids, are unfortunately past their

storm level period of activity. Therefore we have to be content with the normal rates of from 15 to 20 meteors per hour at peak on the night of November 16 - 17. That would be the case if not for the bright Moon, which is Full on the 15th. Expect to see perhaps less than half of that peak number.

Leonid meteors are very bright since they blaze across the sky at an amazing speed of 44 miles per second. Most appear to be green or blue in color as they disintegrate in our upper atmosphere. About half them leave trains of dust which persist for minutes. Like the Taurids earlier in the month, Leonids often produce fireballs as well.

Fortunately there is one more astronomical object that will demand our attention for the rest of the year: Mars! This desert world is having a close encounter with the Earth on the night of October 29-30. A beginner's guide to observing Martian surface features will soon be published.

Keep your eyes to the skies!

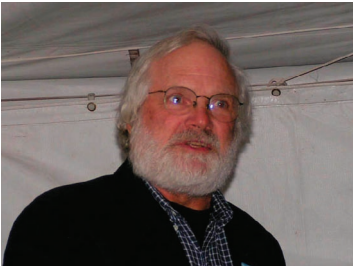
## AstroAssembly 2005

Left column, top to bottom: Author Glen Chaple giving his "under the tent" talk Friday evening. Anthony Pirera of Speculum Thin Films talks about how his company applies optical lens coatings. Dr. Peter Boyce from the Maria Mitchell Organization Author Bill Sheehan's talk on Percival Lowell and his trips to Japan were very well received. Planetary geologist Dr. Jim Head presents the latest Mars findings. Astronomer and former Skyscrapers member John Briggs giving his talk Saturday afternoon.

As always, Master of Ceremonies Scott Tracey doing an exceptional job!

Right, top: Astronaut Story Musgrave poses in front of the space shuttle ice sculpture graciously donated by Dolores Rinaldi.

Right bottom, clockwise: Story Musgrave poses with long time member Vivian Hartnett. A few of the neighborhood kids "crash" the party for the opportunity to meet a "real astronaut". William Sheehan and the relatives of E.E. Barnard. For more information on Barnard: <http://www.library.gatech.edu/barnard/history.html>. President Dave Huestis shows Story the 8.25" Alvan Clark refractor.



# A Wrinkle in Space-Time

By *Trudy E. Bell*

When a massive star reaches the end of its life, it can explode into a supernova rivaling the brilliance of an entire galaxy. What's left of the star fades in weeks, but its outer layers expand through space as a turbulent cloud of gases. Astronomers see beautiful remnants from past supernovas all around the sky, one of the most famous being the Crab Nebula in Taurus.

When a star throws off nine-tenths of its mass in a supernova, however, it also throws off nine-tenths of its gravitational field.

Astronomers see the light from supernovas. Can they also somehow sense the sudden and dramatic change in the exploding star's gravitational field?

Yes, they believe they can. According to Einstein's general theory of relativity, changes in the star's gravitational field should propagate outward, just like light – indeed, at the speed of light.

Those propagating changes would be a gravitational wave.

Einstein said what we feel as a gravitational field arises from the fact that huge masses curve space and time. The more massive an object, the more it bends the three dimensions of space and the fourth dimension of time. And if a massive object's gravitational field changes suddenly – say, when a star explodes – it should kink or wrinkle the very geometry of space-time. Moreover, that wrinkle should propagate outward like ripples radiating outward in a pond from a thrown stone.

The frequency and timing of gravitational waves should reveal what's happening deep inside a supernova, in contrast to light, which is radiated from the surface. Thus, gravitational waves allow astronomers to peer inside the universe's most violent events – like doctors peer at patients' internal organs using CAT scans. The technique is not limited to supernovas: colliding neutron stars, black holes and other exotic objects may be revealed, too.

NASA and the European Space Agency are now building prototype equipment for the first space experiment to measure gravitational waves: the Laser Interferometer Space Antenna, or LISA.

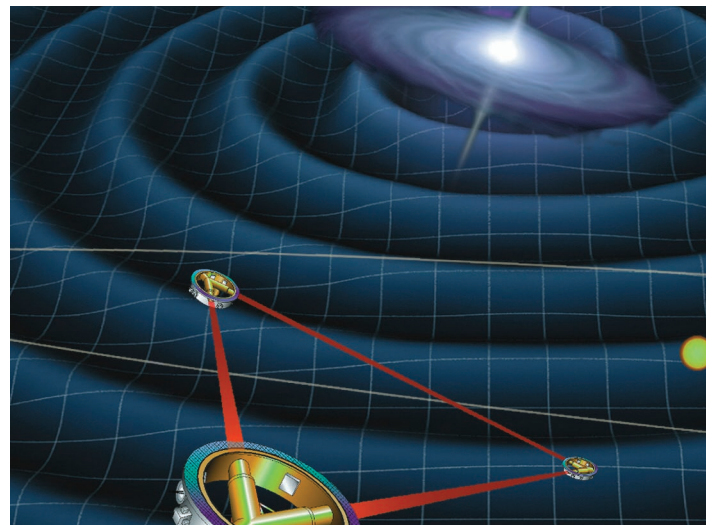
LISA will look for patterns of compression and stretching in space-time that signal the passage of a gravitational wave. Three small spacecraft will fly in a triangular formation behind the Earth, each beaming

a laser at the other two, continuously measuring their mutual separation. Although the three 'craft will be 5 million kilometers apart, they will monitor their separation to one billionth of a centimeter, smaller than an atom's diameter, which is the kind of precision needed to sense these elusive waves.

LISA is slated for launch around 2015.

To learn more about LISA, go to <http://lisa.jpl.nasa.gov>. Kids can learn about LISA and do a gravitational wave interactive crossword at <http://spaceplace.nasa.gov/en/kids/lisaxword/lisaxword.shtml>.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



LISA's three spacecraft will be positioned at the corners of a triangle 5 million kilometers on a side and will be able to detect gravitational wave induced changes in their separation distance of as little as one billionth of a centimeter.



# Secretary's Report

Joel Cohen, Secretary

Monthly Meeting - September 2, 2005

Skyscrapers Meeting Hall North Scituate, RI

Meeting Start - 7:42 PM Glenn Jackson presiding

Secretary's Report - accepted as published

Treasurer's Report - accepted as read and posted

Trustee's Report - Jack Szelka will be sending out an e-mail for a work party to spruce up the Observatory grounds before Astro Assembly.

Upcoming Speakers - Glenn Jackson announced the following speakers; November, Howard Chun, Cranston East High School, December, Dr. Barbara Welther, January, open, February Ron Dantowitz

Librarian's Report - Dan Lorraine reports that the Library is open and available for use and loans and also that there are both Meade Binoculars and telescopes available for use.

New Business - none

Old Business - none

Good of the Organization - Gerry Kimber-White mentioned the Salt Telescope coming on line and first light. It is an 11 meter telescope with 90 hexagonal panels in its mirror. Rick Lynch noted the presence of Pat Morrissey, now of JPL. Glenn noted the upcoming trip to Springfield Museum, October 8th. Glenn then asked for donations toward the refreshments for the break during the meeting. Glenn also thanked Pat Landers for keeping the bulletin board updated with current articles of interest and Tracey Haley for installing a floor plug in the front of the meeting hall and an outdoor plug on the north end of the building.

Adjournment - 8:30 PM

Our featured speaker of the evening was Dr. Marcia Bartusiak. She delivered a presentation based on her new book, Archives of the Universe. Dr. Bartusiak recounted many notable discoveries in the history of Astronomy and the people responsible for them. Interestingly enough, a number of recent discoveries were accomplished by previous guest lecturers at our own organization's monthly meetings. Dr. Bartusiak currently teaches science writing at MIT in Cambridge, MA.



Top: Skyscrapers members attended a lecture by Peter Schultz at Ladd Observatory about the latest findings from the Deep Impact mission. Left to right, back: Dan Lorraine, Dave Huestis; front, Jim Hendrickson, Peter Schultz, Dolores Rinaldi, and Bob Horton.



Skyscrapers hosted a large Scout group at Seagrave Observatory on Thursday, October 20. Photo by Jack Szelka.

# 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.
- 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, RI 02857