

# Sky WAA tch



## Stormy Weather

Late last year, a new, remarkably bright storm erupted in Saturn's northern hemisphere. Amateur astronomers first spotted it in early December, with the ringed gas giant rising in planet Earth's predawn sky. Orbiting Saturn, the Cassini spacecraft was able to record this close-up of the complex disturbance from a distance of 1.8 million kilometers on December 24<sup>th</sup>. Over time, the storm has evolved, spreading substantially in longitude, and now stretches far around the planet. Credit: [Cassini Imaging Team](#), [SSI](#), [JPL](#), [ESA](#), [NASA](#); Color Composite: [Jean-Luc Dauvergne](#).

# Events for February 2011

## WAA Lectures

### “Voyager Exits the Solar System”

**Friday February 4<sup>th</sup>, 8:00pm**

**Miller Lecture Hall, Pace University  
Pleasantville, NY**

David High, a designated NASA/JPL Solar System Ambassador, will speak on the Voyager I mission as the spacecraft passes through the heliosheath, the turbulent outer shell of the sun's sphere of influence, and departs the Solar System. Free and open to the public.

## Upcoming Lectures

On March 4<sup>th</sup>, Br. Robert Novak, Ph. D., Professor of Physics at Iona College, will present a talk entitled “The Latest on Mars’ Atmosphere; Can it Support Life?” This presentation will be at the Miller Lecture Hall and will be at our new starting time of 7:30 pm.

## Starway to Heaven

**Saturday February 5<sup>th</sup>, 6:30-9:00PM**

**Meadow Picnic Area, Ward Pound  
Ridge Reservation, Cross River**

This is our scheduled Starway to Heaven observing date for February, weather permitting. Free and open to the public. The scheduled rain/cloud date is February 26<sup>th</sup>. Participants and quests should read our [General Observing Guidelines](#).

## New Members. . .

Roger Woolcott - Brewster  
The O'Rourke Family - Mamaroneck  
Bob Quigley - Eastchester

## Renewing Members. . .

Jay Friedman - Katonah  
Darryl Ciucci - Greenwich, CT  
David Butler - Lake Mohegan  
Harry Butcher- Mahopac  
Alexandros Halimou - Pleasantville

Paul Andrews - Patterson

James Steck - Mahopac

Dennis & Margot Dilmaghani - Purchase

Anthony Sarro - Scarsdale

## Members Classified

As a service to members, the WAA newsletter will publish advertisements for equipment sales and other astronomy-related purposes. Ads will only be accepted from WAA members and must relate to amateur astronomy. Please keep to 100 words, include contact info and provide by the 20<sup>th</sup> of the month for inclusion in the next issue. The newsletter is subject to space limits; so ads may be held to subsequent issues. The WAA may refuse an ad at its sole discretion. In particular, price information will not be accepted. Members and parties use this classified service at their own risk. The Westchester Amateur Astronomers (WAA) and its officers accept no responsibility for the contents of any ad or for any related transaction.

Send classified ad requests to:

[tom.boustead@westchesterastronomers.org](mailto:tom.boustead@westchesterastronomers.org)



**Call: 1-877-456-5778** (toll free) for announcements, weather cancellations, or questions. Also, don't forget to periodically visit the WAA website at:

<http://www.westchesterastronomers.org/>.

Westchester Amateur Astronomers, Inc., a 501(c)(3) organization, is open to people of all ages with the desire to learn more about astronomy. The Mailing address is: P.O. Box 44, Valhalla, New York 10595. Phone: 1-877-456-5778. Observing at Ward Pound Ridge Reservation, Routes 35 and 121 South, Cross River. Annual membership is \$25 per family, and includes discounts on *Sky & Telescope* and *Astronomy* magazine subscriptions. Officers: President: Doug Baum; Senior Vice President: Larry Faltz; Vice President Public Relations: David Parmet; Vice President Educational Programs: Pat Mahon; Treasurer: Rob Baker; Secretary/Vice President Membership: Paul Alimena; Vice President Field Events: Bob Kelly; Newsletter: Tom Boustead.

## Articles and Photos

### **Please Pass the Arsenic** by Larry Faltz

Astrobiology is “an approach to the scientific study of the living universe which seeks to understand the origin and evolution of life on earth, to determine if life exists elsewhere in the universe, and to predict the future of life on earth and in the rest of the universe” (McGraw-Hill Science and Technology Dictionary). NASA’s astrobiology efforts, funded to the tune of about \$40 million annually, comprises 4 programs: the NASA Astrobiology Institute (NAI), the Astrobiology Science & Technology for Exploring Planets (ASTEP) program, the Astrobiology Science and Technology Instrument Development (ASTID) program and the Exobiology and Evolutionary Biology (EXO) program. You can check out all of NASA’s astrobiology research and findings at <https://astrobiology.nasa.gov/>.

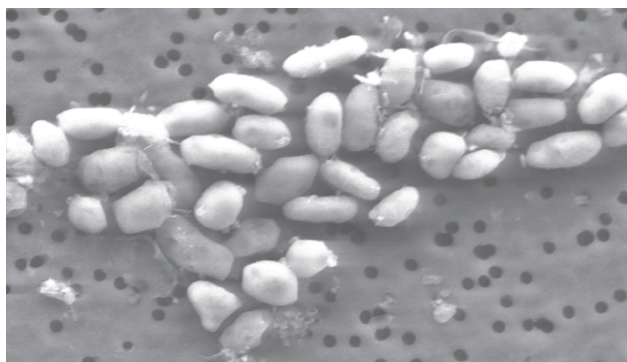
What most of us know about astrobiology comes from the Star Trek episode “Devil in the Dark”. In a famous scene, Mr. Spock mind-melds with the wounded silicon-based Horta (“Pain! Pain!”), following which Dr. McCoy treats its wounds with cement and a trowel after he utters another in his series of “I’m a doctor, not a...” lines, in this case “I’m a doctor, not a bricklayer”. The basis for the story was the long toyed-with idea in science fiction that silicon, being one level

below carbon in the Periodic Table and thus having a similar valence, could substitute for carbon in biologic systems, with the resulting creation of unique and probably bizarre forms of life. I thought about this scene when I read recent reports from NASA about experiments that a particular bacterium could substitute arsenic for phosphorus. Bearing the same relationship to each other in the Periodic Table as do carbon and silicon, phosphorus and arsenic are even closer to each other in atomic radius and electronegativity. The most common form of phosphorus in biology is phosphate ( $\text{PO}_4^{3-}$ ), which behaves similarly to arsenate ( $\text{AsO}_4^{3-}$ ) over the range of pH and electrochemical gradients found in living organisms. Nevertheless, enough arsenic is toxic to most life, because the most critical biochemical pathways can’t be sustained by arsenic, the small differences between the two atoms being sufficient to alter important reactions.

In the research reported in early December from the NAI (Wolfe-Simon, F, et. al. A Bacterium That Can Grow by Using Arsenic Instead of Phosphorus. *ScienceExpress* published on-line 2 December 2010, 10.1126/ science.1197258, see commentary in *Science* 2010; 330:1302, 3 December 2010), scientists isolated a bacterium, GFAJ-1 (a member of the Halomonadaceae family of Gammaproteobacteria, gram negative organisms that include common medically important bugs such as *E. coli* and the organisms that cause plague, cholera and typhoid fever) that grows in the very salty, alkaline mud at the bottom of California’s exotic and otherworldly Mono Lake, where concentrations of arsenic reach 200  $\mu\text{M}$ . In culture, they fed the organisms even more arsenic (up to 5 mM) but no phosphorus. The organisms flourished, with internal concentrations of arsenic rising to very high levels as phosphorus levels decreased. The researchers showed that the organism’s DNA contained arsenic (phosphorus atoms are part of the backbone of DNA).



**Captain Kirk threatened by the Horta**



**GFAJ-1 bacteria**

Although the authors presented evidence that arsenic substituted for phosphorus in at least some key biochemical sites in GFAJ-1, it isn't clear that the bugs would be viable if there was 100% substitution. There was residual phosphorus in the bacteria, and the organisms grew better in media containing phosphorus than arsenic. It also isn't clear that arsenic can substitute for phosphorus effectively in the critical energy-transfer biochemistry of oxidative phosphorylation; the evidence for arsenated analogues of NADH, acetyl-CoA and other small molecules was more indirect.

The results are suggested as evidence for alternative life chemistry, which in turn might argue for more (and more diverse) opportunities for life to arise in the universe. Whether there are any exclusively arsenic-containing (lacking phosphorus) evolutionary environments in the universe remains to be seen, but it's unlikely given what we know about the creation and distribution of these atoms by cosmic processes. In any case, the discovery of a large number of bacteria and even multicellular organisms that evolved and thrive in hostile environments on Earth is strong evidence that non-temperate environments on other worlds could be potential sites for life. Since the early 1980's many organisms have been found that don't need sunlight or the products of sunlight for their metabolism. These "extremophiles" manage their energy through unusual pathways in conditions that were previously thought to be completely hostile to life: extreme acidity or alkalinity, temperatures above boiling or below freezing, radical ionic or osmolar concentrations, nearly complete absence of water, very high pressures and even high levels of radiation. These

organisms have changed our understanding of what the biochemistry of life needs to be. So while intriguing, it is certainly not necessary to postulate alternative chemistry, although it would be the science-fiction writer's dream (and a scientist's potential Nobel Prize) to encounter a real Horta. Even a bacterial Horta.

Organic compounds are found in meteorites, but the full chemistry of life hasn't yet been detected off of Earth. The Viking landers (launched in 1975) carried experiments designed to look for organic molecules in the Martian soil; none were found. Viking's experiments to find



**Mono Lake, photo by the author using infrared film**

biologically active processes utilized carbon-14 labeled nutrients, with results generally interpreted as negative, but we know now that biochemical pathways in living extremophiles might not be detected by this type of experiment. We will have to await new experiments on landers, perhaps to Mars or Europa, to see whether more sophisticated experiments detect extraterrestrial extremophiles or even alternative chemistry organisms. I think it's likely that we will find something, for, as Dr. Ian Malcolm in the movie *Jurassic Park* (played by Jeff Goldblum) says, "Life finds a way."



### ***The Extra-Terrestrial***

Courtesy of Rick Bria, above is an image of NGC457, also known as the ET star cluster because of its resemblance to the 'phone home' Extra Terrestrial movie character. The ET Star cluster is an open cluster of stars 8000 light years distant, and contains well over 100 member stars, many that are brighter and hotter than our star the Sun. Rick used a 76mm refractor and a Canon T1i camera (30 second exposure – 6 stack).



### ***WAA Emblem***

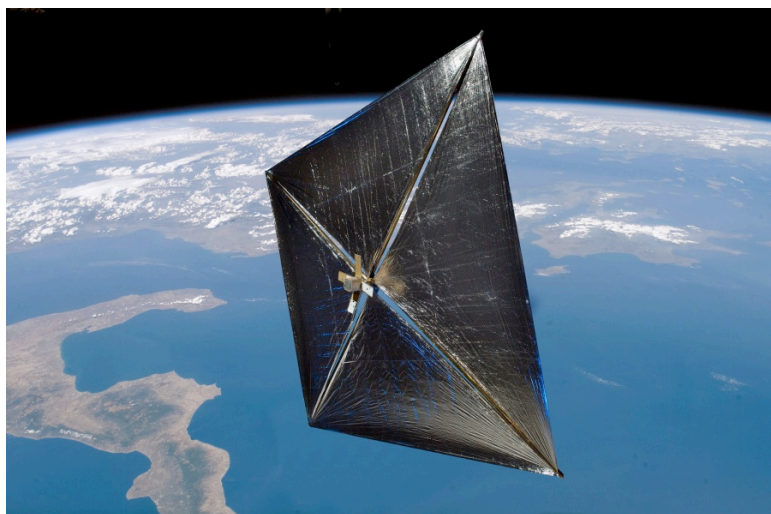
Rick Bria also took this image of Cassiopeia. Notes Rick, this constellation forms an unmistakable 'M' shape in the winter sky and a 'W' shape in the summer as it rotates around the North Star opposite the Big Dipper. From our place on Earth Cassiopeia never goes below our horizon. If a star or constellation never sets it is said to be Circumpolar. The Milky Way runs through this part of the sky, so we see countless gas clouds and star clusters here. Two star clusters (circled near the upper right of the picture) form the famous Double Cluster. Rick used a Canon T1i at ISO800, 28mm lens at F5 (a 2 minute exposure without calibration). He processed the image in PhotoshopCS5.



### ***Taurus***

Rick Bria also provided this 'picture of the zodiac constellation Taurus. Notes Rick, Taurus looks like the head of a bull and can be found by looking to the east this time of year. The bright star Aldebaran (lower right of center) is an orange giant star 65 light years away that aids in locating Taurus in the sky. Behind and to the right of Aldebaran is the star cluster Hyades. Forming the 'point' of Taurus, the Hyades is the closest star cluster to us at 150 light years distant. Even farther, the Pleiades star cluster (also known as the Seven Sisters) is in the upper right of the picture. Often mistaken for the little dipper, it is the second nearest star cluster to us at 400 light years away.

Image Technical info...4 minute exposure - AstroTrac. 28mm lens at F5. Canon T1i camera ISO-800. No calibration. Processed in PhotoshopCS5.



### **◀ Going Sailing**

Shown in this artist's illustration is NASA's NanoSail-D finally unfurled as a thin, 10 square meter reflective sail on January 20th, becoming the first solar sail spacecraft in low Earth orbit. Modern solar sail spacecraft designs, like NanoSail-D or the Japanese interplanetary spacecraft IKAROS, rely on the small but continuous pressure from sunlight itself for thrust. Glinting in the sunlight as it circles the Earth, the NanoSail-D will periodically be easily visible. In fact, sky-gazers are urged to participate in an ongoing contest to capture images of NanoSail-D. The images will help NASA monitor the satellite before it reenters the atmosphere in April or May.

Illustration Credit: courtesy [NASA](#)

# Almanac

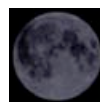
**For February 2011 by Bob Kelly**

Welcome to February, the shortest month of the year! I thought we have the mighty Roman Caesars – Julius and Augustus – to thank for that, since they mined February to make sure the months named after them were the longest. Great story, except there are calendars from before Julius Caesar's reign that show February with 28 days. As they say in football, this call will need further review.

Just three bright planets are easy to find this month. Jupiter holds sway in the evening, Saturn has midnight all to itself and Venus outshines them all in the morning. The smaller siblings, Mercury and Mars, are hiding in the solar glare. Jupiter continues its fine show, now in the southwestern sky, but it moves offstage by late evening. There's a lot to look for on Jupiter, with the slow return of its second major dark cloud belt and the faded Great Red Spot. Jupiter's moons are still casting inky shadows on its cloud tops. Uranus is still in Jupiter's neighborhood of the sky, but Jupiter is sailing away in its closer, faster orbit around the Sun, making Uranus harder to find as it gets left behind, four degrees away in early February and eight degrees by the end.

Get up early or stay up very late to see Saturn. By the end of February, Saturn's rising time will move forward to about 9pm. Saturn's new white spot is reported to have spread into a band partway around the planet. The rings are tilted about ten degrees toward us, their widest for many months to come. Saturn's fainter moons are harder to see in the glare of the rings and planet, but Titan is still easy to pick out in most telescopes. When you look at Saturn, you are seeing the top of a thick gaseous atmosphere, an icy ring only as thick as a football field is long and a moon with a surface pressure fifty percent higher than Earth's. Not bad for one glance though the eyepiece.

Venus is blazing a little less brightly this month at magnitude -4.2, and sinks lower in the morning sky, but still up before the sky starts to brighten. The minor planet Vesta passes by, closest on the 8th. I wonder how hard Vesta will be to pick out with gibbous Venus being so distracting. The dwarf planet Pluto comes within 3 degrees of Venus and Vesta in the sky, but at 14th magnitude, it will be hard for anyone to find that low in the sky. But it's a nice line-up to think about when contemplating the width and variety of objects in our solar system. If you want to think deeper, there are several of Sagittarius' Messier objects



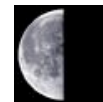
Feb 2



Feb 11



Feb 18



Feb 24

in the area; can you see their light through the long path sideways though our atmosphere?

People with a clear east-southeastern horizon and optical aid can get a last peek at Mercury for a day or two at the start of the month before it zips back into the glare of the sun, hiding out with Mars and Neptune.

For those of us with tree-lined yards and other obstructions, the evening Moon is high in the sky from the 9th through the 14th. During this waxing phase, the low shadows of lunar sunrise highlight a wide range of spectacular moonscapes from the 15,000 foot high Apennines Mountains to the 55-mile wide crater Copernicus. Nice places to visit with any kind of telescope to see the changing views of the terrain from night-to-night. Want to know more about the details? Pick up any Moon map or atlas or, online, go to the Hitchhiker's Guide to the Moon at <http://www.shallowsky.com/moon/>.

The winter constellations are front and center in the southern sky. This is Orion's moment to stand up and get your attention during TV's Prime Time hours. The Milky Way's like a see-saw balanced on the zenith of the sky. Our favorite constellation, Cassiopeia, is on the sinking side of the teeter-totter with the twins of Gemini on the upside. Perhaps Leo the lion rearing up in the east is giving the twins a push. Lots of Messier objects in the evening sky this month, as we approach Messier Marathon season, when astronomers try to bag as many as possible of Monsieur Messier's objects in a night of observing. This year, the full moon occurs during the best time to see the most objects in mid- to late-March. But you can do your own mini-marathon on February evenings.

The International Space Station overflies our area in the dawn sky though the 13th and in the dusk sky starting on the 18th. Space Shuttle Discovery moves back to Pad 39A for another launch attempt at 4:50pm on Feb. 24. The Stardust spacecraft will glide past Comet Temple-1 on the 14th, allowing a second look at the comet hit by the Deep Impact probe.

Updates and photos on my blog at <http://bkellysky.wordpress.com/>.