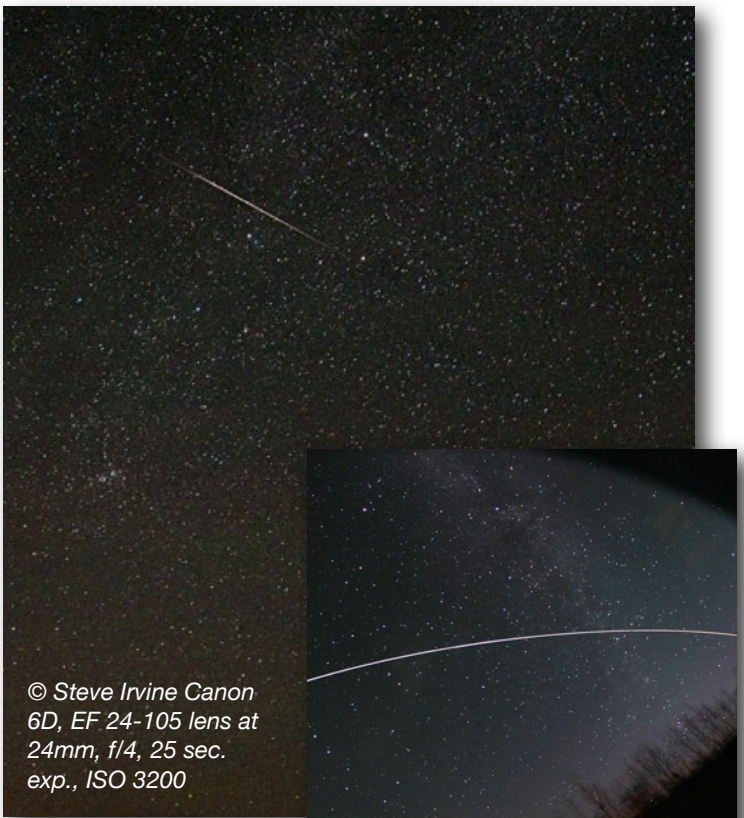
Star Gazer News

Astronomy News for Bluewater Stargazers
Vol 8 No.6 June 2014

June 2014 Contents



***Above**: Steve Irvine imaged a Camelopardalid from Big Bay at 2:50 am. **Right:** the ISS crosses over ES Fox at 3:39 am May 24.*

Various space missions and telescope projects over the last decade have been devoted to locating extra-solar planets. The number of worlds around other stars continues to climb with the current number of confirmed at 962 and an additional 3845 candidates. The most exciting news recently is that an Earth-sized planet has been discovered orbiting a red star Kepler 186. Kepler 186f has about half the mass of our Sun and is about 500 ly away in Cygnus. (See pg 9.)

Announcements like these always prompt the question about the possibility of extra-terrestrial life on these worlds. Carl Sagan used the phrase "billions upon billions" when talking about the stars in the galaxy and it is often conflated with the possibility of planets around those stars. The phrase originally appeared in his book *Cosmos* (not on the TV show) and went

> " *A galaxy is composed of gas and dust and stars—billions upon billions of stars." Cosmos p.3*

Sagan took all the misquotes and misinterpretations in good humour. In fact, some pundit subsequently defined a ***sagan*** as a unit of measurement equivalent to "a large number of anything".

Astronomy Events June 2014

Jun 3 Tue (FQ-2) **Triple Shadow Transit on Jupiter** during daylight 2:08 pm to 3:40 pm DST in N.America.

Jun 7 Sat (FQ+2) **Moon, Mars, Spica, Saturn** in loose group above southern horizon.

Jun 13 Fri (FM) ☹ Night of the **Full Moon** "Honey Moon"

Jun 21 Sat (LQ+2) Summer is starting!

Jun 24 Tue (NM-2) **Venus and Moon less than 3° apart**, Pleiades and Aldebaran nearby in morning sky. Photo op!

Jun 27 Sat (NM) ☻

BAS Events for June 2014

Jun 3 Tue (FQ-2) **Triple Shadow Transit viewing from Fox** 1:00 pm Weather permitting

Jun 4 Wed **BAS meeting**@ES Fox 7 pm **K-W Tel. Webinar**

Jun 6 Fri (FQ+1) **Public viewing** Grey Roots Museum 9 pm (Members with scopes please)

Jun 21 Sat (LQ+2) **Summer Solstice** Keppel Henge 11 am (Members with solar scopes please)

Jun 28 Sat (NM+1**) BAS viewing @Fox**@dark, regular NM viewing

BAS Executive 2014 -2015

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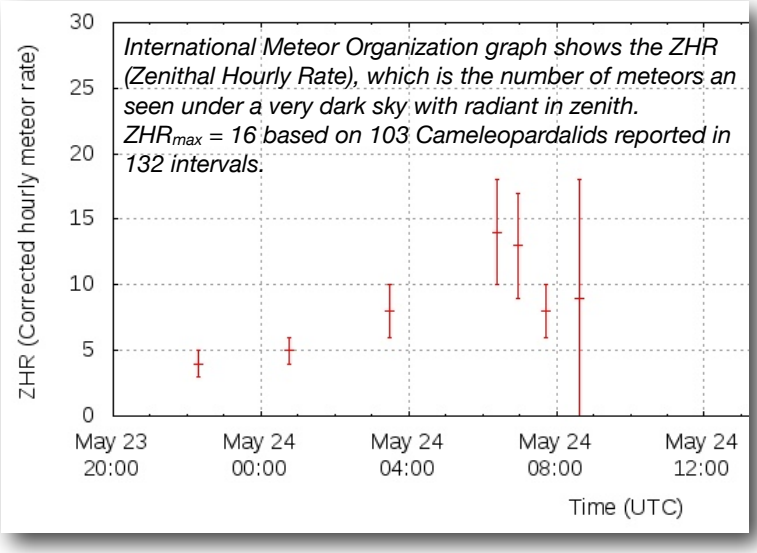
Public Outreach:	TBA	

Camelopardalids: sprinkle not shower

Early predictions of this new meteor shower raised some expectations of a major storm. However, subsequent analyses by meteor physicists including those at UWO dropped the estimates to 100 to 400, a respectable shower but not necessarily a major storm.

Friday night, May 23 weather-wise was incredible having cleared after an overcast showery morning. All of Friday night, Saturday morning and the whole weekend for that matter, was clear and calm (at least locally). A spectacular night to watch a spectacular shower.

Well, Mother Nature had other plans. That was to confound the professional scientists and leave them scratching their heads as to where their predictions went wrong. The official number of meteors observed was about 15 per hour, barely rating above background. See graph at right.



International Meteor Organization graph shows the ZHR (Zenithal Hourly Rate), which is the number of meteors an seen under a very dark sky with radiant in zenith. ZHR_{max} = 16 based on 103 Cameleopardalids reported in 132 intervals.

The event was interesting in any case. Several days before BAS members were to do a meteor watch at the Fox Observatory, I started to receive emails from two groups, both requesting permission (readily granted, of course) to set up at the Fox to do observations. Quan-zi Ye, one of the co-authors of a Camelopardalids paper and his colleague, Sebastian Bruzzone (studying daytime showers) from the UWO Meteor Group came to do some visual observations. The second group were from the Polish Meteor Society. Przemyslaw Zoladek, Mariusz Wiśniewski and Zbyszek Tyminski, planned to set up an observing station at Tobermory (with 3 cameras) and a second at the Fox with four cameras to try to record as many Camelopardalids as possible. Mariusz and Zbyszek came to the Fox and like the UWO observers and some diehard BAS observers, stayed till sunup.

A total of 12 observers took part in the meteor watch. We observed from Friday night and into Saturday morning well past the 3 am peak when unfortunately, not much materialized. Cameras "clicked" away and in one case (JH) almost 1200 images were taken - none showed any Camelopardalid meteors! Recorded were many aircraft, Iridium flares, a tumbling satellite and a 3:39 am (Saturday) spectacular -2.9 magnitude pass of the ISS, but not a single Camelopardalid! Others were luckier, including Steve Irvine who captured a trail from Big Bay that passed through Cassiopeia. **Last word:** Meteor physicists predicted a new meteor shower and got it right! And there were some nice bright Camelopardalids to see. It was a fine night (in many respects) to be out under the dark skies making meteor-watching history with our visiting experts. [See also Doug's column on pg 6. -ed]

Table below shows Quan-zi Ye's results for the night. The most interesting column is the last one showing the number of Camelopardalids seen for the time period given. For ex. from 5:54 UT to 6:13 UT (1:54 am to 2:13 DST) Ye reported 5 Camelopardalid meteors. So while the rest of us were ooh-ing and ah-ing when a brighter fireball shot across the sky, Ye was actually doing science. Nice work, Ye!

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Visual meteor observing report

// Header section
observer: Quan-Zhi, Ye
site: E.S. Fox Observatory, Canada (-81.231 E, 44.739 N

// Number section
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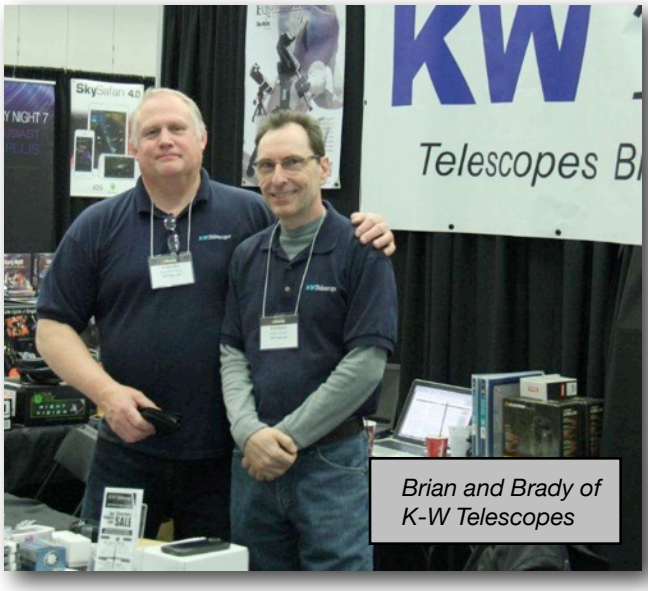
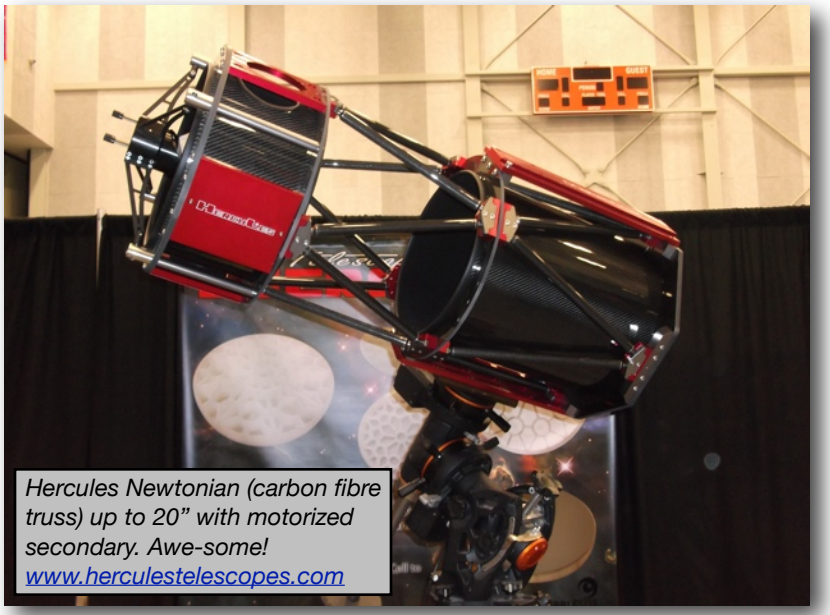
	start	stop	RA	DEC	Teff	F	Lm	CAM	
period	2014-05-24T05:37:00	2014-05-24T05:51:00	315	45	0.233	1.00	5.64	C	3
period	2014-05-24T05:54:00	2014-05-24T06:13:00	315	45	0.316	1.00	5.39	C	5
period	2014-05-24T06:17:00	2014-05-24T06:34:00	315	45	0.283	1.00	5.58	C	1
period	2014-05-24T06:34:00	2014-05-24T06:54:00	315	45	0.333	1.00	5.06	C	4
period	2014-05-24T06:54:00	2014-05-24T07:10:00	315	45	0.266	1.00	5.58	C	2
period	2014-05-24T07:10:00	2014-05-24T07:26:00	315	40	0.266	1.00	5.58	C	0
period	2014-05-24T07:28:00	2014-05-24T07:45:00	315	40	0.283	1.00	5.58	C	1
period	2014-05-24T07:47:00	2014-05-24T08:00:00	315	40	0.216	1.00	5.06	C	0

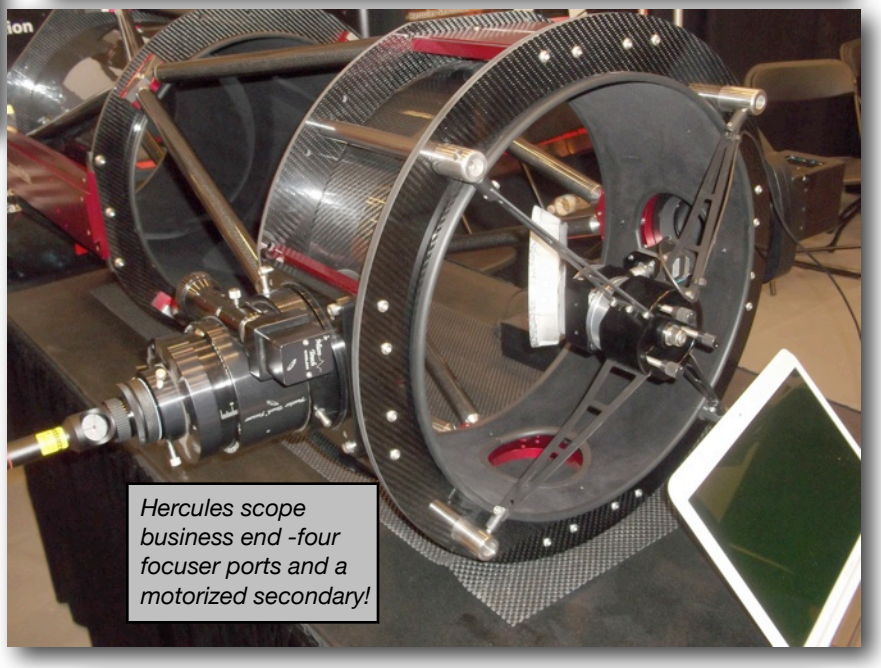
AstroCATS held its second session last May 3/4 and was attended by several BAS members both present and former. I saw 5 former members and 5 current ones on Sunday alone. Everyone I talked to had good things to say and at least two of us came away with door prizes. Images here are from Brett T. and John H. and give a variety of views of the goings-on over the weekend.



Brian and Brady of K-W Telescopes



Hercules Newtonian (carbon fibre truss) up to 20" with motorized secondary. Awe-some! www.herculestelescopes.com



Hercules scope business end -four focuser ports and a motorized secondary!

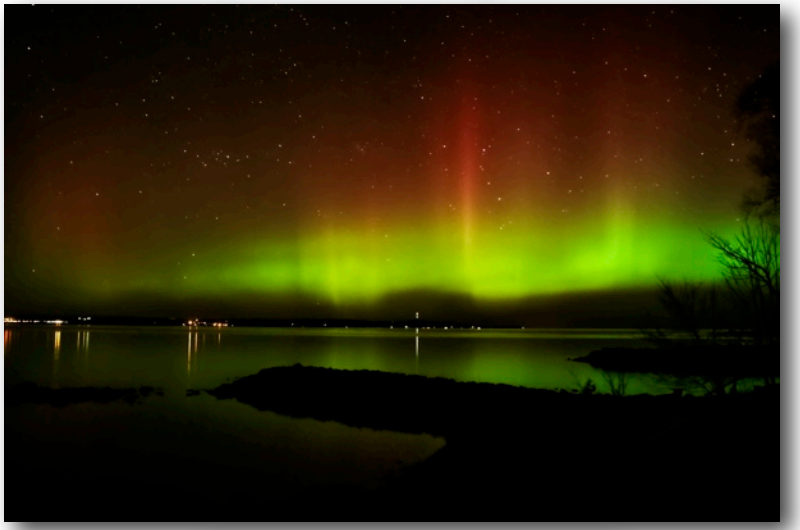
Lightweight 16" truss tube dob!

Steve Germann's Dobsonian Guiding Platform -90 min tracking!

Rock Mallin describes a 16-inch carbon fibre truss telescope for his Mallincams

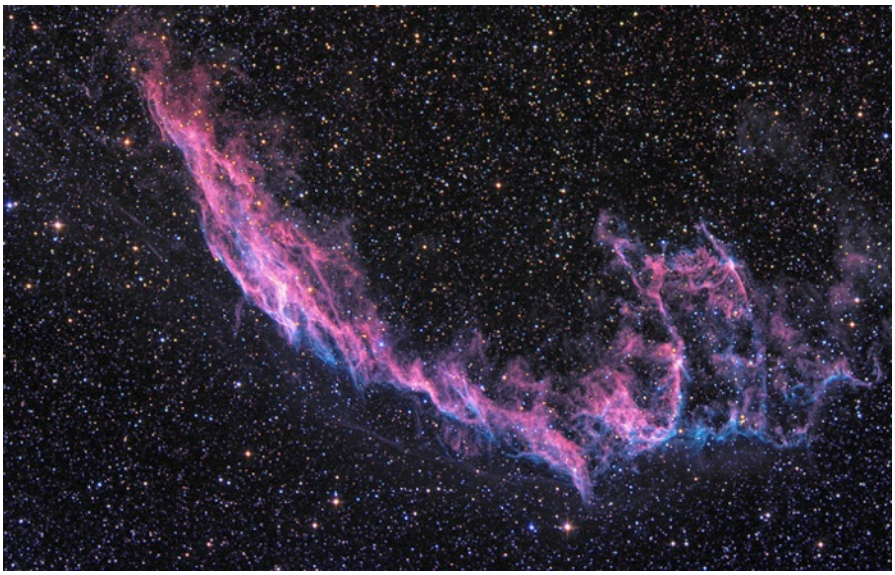
There were many excellent astrophotos that did not get the top prize in their category but deserve some recognition. Several of these are featured here as “honourable-mentions and “runners-up”. Once again thanks to the participants for sending in such great images both in variety and quality.

Brett Tatton: Andromeda Galaxy

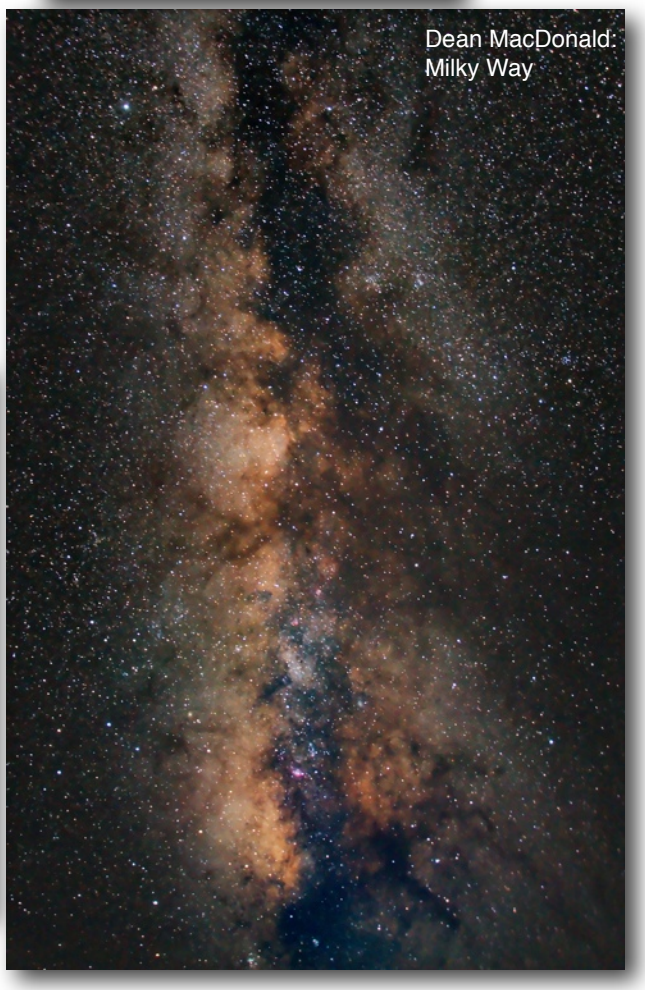


Adam Wipp:
Aurora over Bay

Greg Rodgers:
Gibbous Moon



Paul Zelichowski: Veil Nebula (“Eastern Veil”)



Dean MacDonald:
Milky Way

Sara MacIntyre: Aurora Feb 19 from Alberta

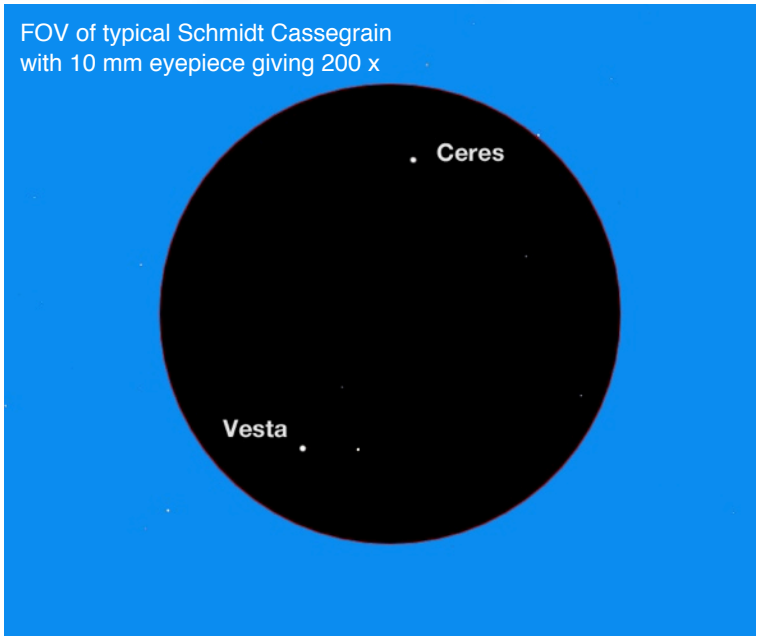
Asteroid meets Dwarf Planet

The Asteroid 4Vesta and Dwarf Planet 1Ceres (4th and 1st asteroids to be found) make a spectacular close approach to each other on July 5 after dark. Minimum separation is just over 10 minutes of arc and happens on that night. This is too close for binoculars to split so you need a telescope. Through the eyepiece, it may be possible to see the motion of each across the field of view and some hint of the separation increasing over the interval. Starry Night simulates the view at right for about 11 pm July 5 for a typical 8-inch SCT with a 10 mm eyepiece giving 200X. (Try lower power first). It is not too often that two planetary bodies are this close! Note that they set in the West around midnight so don't delay too long after dark to go searching.

According to Starry Night, Ceres magnitude is 7.36 while Vesta is 6.18. Oddly, the RASC Handbook gives Ceres magnitude as 8.4 and Vesta as 7.1 a full magnitude fainter in each case. A third source, Sky Safari 3, gives 7.1 for Vesta and Ceres as 8.4. Looks like nobody can agree on a consistent set of values for these objects.

Personally, I would trust the RASC values over the others. A quick check with a JPL site that generates ephemerides for the two asteroids agrees better with RASC than the others.

Note also that the spacecraft Dawn is approaching Ceres at this time after its mission at Vesta finished in September of 2012. At time of writing (May 27) Dawn is 12.7 Million km from its destination.



More about the Dawn mission can be found at:
http://dawn.jpl.nasa.gov/

NASA's Telescopes Find New Close Neighbor of Sun: Close and COLD!

NASA's Wide-field Infrared Survey Explorer (WISE) and Spitzer Space Telescope have discovered what appears to be the coldest "brown dwarf" known -- a dim, star-like body that, surprisingly, is as frosty as Earth's North Pole.

Images from the space telescopes also pinpointed the object's distance to 7.2 light-years away, earning it the title for fourth closest system to our sun. The closest system, a trio of stars, is Alpha Centauri, at about 4 light-years away.

Brown dwarfs start their lives like stars, as collapsing balls of gas, but they lack the mass to burn nuclear fuel and radiate starlight.

The newfound coldest brown dwarf (WISE J085510.83-071442.5) has a chilly temperature between -48 and -13 C. Previous record holders for coldest brown dwarfs, also found by WISE and Spitzer, were about room temperature.

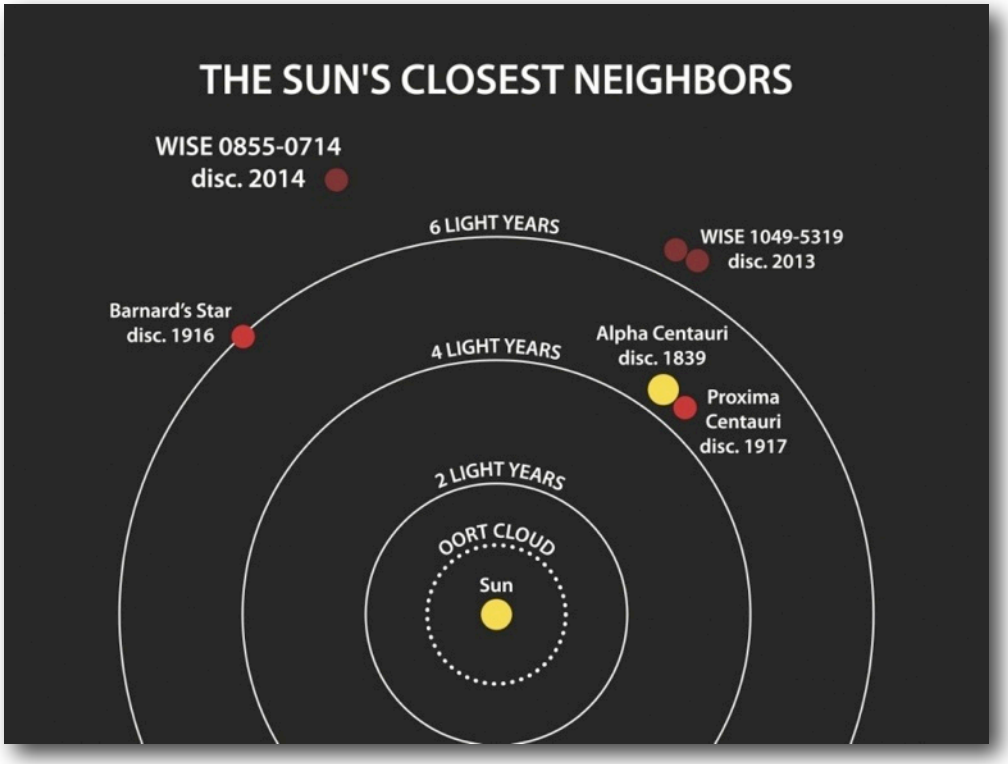
Combined detections from WISE and Spitzer, taken from different positions around the sun, enabled the measurement of its distance through the parallax effect.

"It is remarkable that even after many decades of studying the sky, we still do not have a complete inventory of the sun's nearest neighbors," said Michael Werner, the project scientist for Spitzer at NASA's JPL in Pasadena, CA which manages and operates Spitzer.

WISE J085510.83-071442.5 is estimated to be 3 to 10 times the mass of Jupiter. With such a low mass, it could be a gas giant similar to Jupiter that was ejected from its star system. But scientists estimate it is probably a brown dwarf rather than a planet since brown dwarfs are known to be fairly common. If so, it is one of the least massive brown dwarfs known.

In March of 2013, Luhman's analysis of the images from WISE uncovered a pair of much warmer brown dwarfs at a distance of 6.5 light years, making that system the third closest to the sun. His search for rapidly moving bodies also demonstrated that the outer solar system probably does not contain a large, undiscovered planet, which has been referred to as "Planet X" or "Nemesis."

More at: http://www.nasa.gov/wise



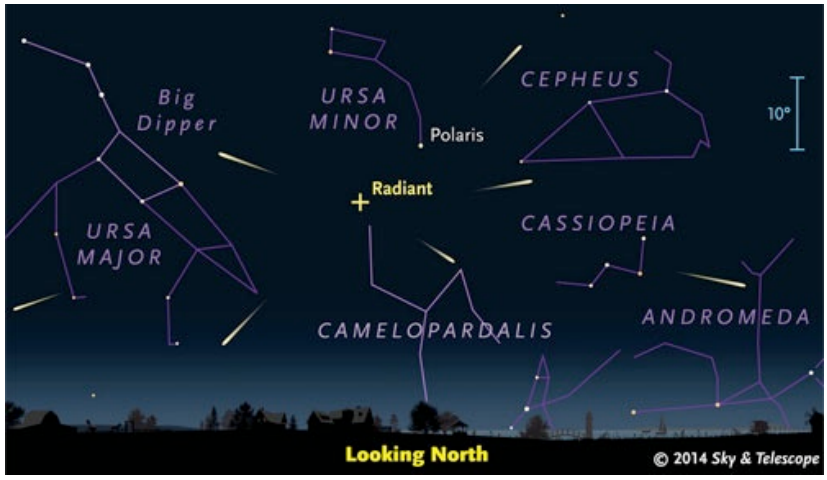
NASA graphic showing the Sun's nearest neighbours. The double star α-Centauri was not known to have a third component, an 11th magnitude star until its 1915 discovery by Robert Innes in S. Africa. It's distance was not measured until 1917 when Dutch astronomer Joan Voute found it to be in the α-Cen system.

Camelopardalid Meteor Shower Expectations

"To hunt a speck of moving haze may seem a strange pursuit, but even though we fail, the search is still rewarding, for in no better way can we come face to face, night after night, with such a wealth of riches ... " Leslie Peltier, 1965

It was 11:15 PM on Friday night, May 23rd, 2014, and our daughter, Christy, son-in-law, Shawn, along with our two granddaughters and grand-dog, arrived at our home in Lion's Head for a weekend visit. After welcoming them, and getting the family settled in their rooms, I explained that I would be leaving shortly for our cottage observatory at Little Pine Tree Harbour. I explained that, in a few hours, between 2:00 AM and 4:00 AM, we might be treated to a meteor shower when the Earth, in its passage around the Sun, intersected the the center of dust debris shredded from Comet 209P/Linear. The meteors would appear to radiate from a point in the constellation Camelopardalis, the Giraffe, and appropriately were named, the Camelopardalids. At the predicted shower peak this faint constellation would be located just below Polaris and above the northern horizon.

There had been a lot of hype about this event. In Canada, science journalists, Ivan Semeniuk and Bob McDonald, reported on the possibility of a meteor storm, with the potential to produce as many as 1,000 shooting stars per hour, but, in fairness, they also cautioned, the shower could also be a dud and produce only a few! The parent comet, 209P/Linear, was discovered in February, 2004, by the Lincoln Near-earth Asteroid Research Project. Once every 5 years, its orbit crosses the Earth's orbit and dust streams, released from the Comet's nucleus on previous visits, might strike the earth's upper atmosphere and produce those streaks of light we call meteors. Models suggested that the dust released by the comet in the late 1800's should intersect the Earth on May 24th and possibly produce an enhanced meteor shower in the early morning hours.



© Sky and Telescope

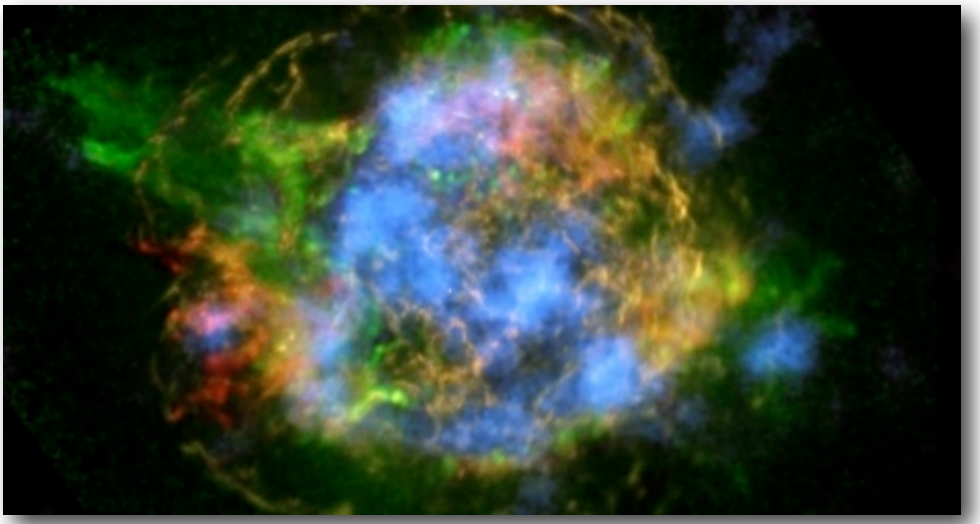
I arrived at our cottage around 12:30 AM and, after changing into warm clothes, I walked along our "Pathway to the Stars" trail which leads to the observatory. I noticed the skies were limiting magnitude 6 on that night and should be good enough to see even the faintest shooting stars. Before I could even open the Observatory door, a visually striking, magnitude 1, meteor burst into view. It was traveling from the Camelopardalis radiant toward the East. My spirits rose because, according to the best predictions, the shower maximum was yet to come.

By 2:00 AM, I had set up my computer controlled Canon 50D on a tripod on the pathway to our dock and pointed it to the region of the sky where I had seen the previous meteor. I wanted to take 10 minute sets of images, ISO 1600, with Canon's dark frame subtraction and long exposure noise reduction engaged, and then change the camera direction and repeat the exposures. There is a phenomenon called the "Cunningham-Hlynialuk Effect" [sometimes referred to as "The Great Zipper" -ed] where clouds form just when some astronomically significant event is to occur. Well, now it went into operation and tonight it was probably a dew point effect. Just when I wanted it to be clear, obscuring clouds began to form! These patchy clouds, which at times obscured 80% of the sky, were a continual problem for me until about 3:00 AM. After 3:00 AM, I imaged areas of the sky between Ursa Major, Cassiopeia, and Cygnus, and continued imaging until the moonrise and morning twilight began to brighten the sky. When I wasn't moving the FOV of the camera I was comfortably reclining in my anti-gravity chair. I saw only two other Camalopardalid meteors .. making, in total, a visual catch of only 3 shooting stars! But, they were obviously Camelopardalids and quite bright, being first magnitude streaks. I didn't capture any meteors on camera because the camera was always pointing away from the path of the 3 meteors I did see. I did get an image that morning, showing the ISS passing in front of Cassiopeia. [See image p. 1 -ed]

Well, so much for the wildly optimistic prediction of 1000 per hour. Later, after I had returned home, I learned that experienced night sky observers Terry Dickenson, Alan Dyer, Todd Carlson, and Ken Hewitt-White (who called them the Camelopardal-duds) also observed few, if any, Camelopardalids. According to Sky and Telescope's Kelly Beatty and the University of Western Ontario's meteor researcher, Peter Brown, the Camelopardalids are rich in meteors corresponding to visual magnitudes of 6 or 7. Such visually faint meteors are a reflection of the fact that the comet's dust particles are overtaking the Earth and enter the atmosphere at a relatively slow speed of 20 km per second. Combine this low energy with a low density of dust particles and you get the weak shower results we observed.

However, here is the main point! Leslie Peltier has captured it. Although he was speaking about his hunt for Comets, his remarks could equally be applied to any stargazing pursuit from watching meteor showers to hunting for supernovae. During my morning of meteor watching, I had a wonderful time under the stars. Talk about a wealth of riches. Early in the morning the frogs were vociferous. Later, I heard a pack of coyotes barking, while the beautiful center of our Milky way rose in the east. While orange Mars was setting in the west, a few bright Camelopardalids made their appearance, and the waning Moon rose as morning twilight brightened the eastern sky. And all this experienced from the comfort of an anti-gravity chair! Captivating!

NASA's NuSTAR Untangles How Stars Explode



One of the biggest mysteries in astronomy, how stars blow up in supernova explosions, finally is being unraveled with the help of NASA's Nuclear Spectroscopic Telescope Array (NuSTAR).

The high-energy X-ray observatory has created the first map of radioactive material in a supernova remnant. The results, from a remnant named Cassiopeia A (Cas A), reveal how shock waves likely rip massive dying stars apart.

"Stars are spherical balls of gas, and so you might think that when they end their lives and explode, that explosion would look like a uniform ball expanding out with great power," said Fiona Harrison, the principal investigator of NuSTAR at (Caltech) in Pasadena. "Our new results show how the explosion's heart, or engine, is distorted, possibly because the inner regions literally slosh around before detonating."

Cas A was created when a massive star blew up as a supernova leaving a dense stellar corpse and its ejected remains. The light from the explosion reached Earth a few hundred years ago, so we are seeing the stellar remnant when it was fresh and young.

Supernovas seed the universe with many elements, including the gold in jewelry, the calcium in bones and the iron in blood. While small stars like our sun die less violent deaths, stars at least eight times as massive as our sun blow up in supernova explosions. The high temperatures and particles created in the blast fuse light elements together to create heavier elements.

NuSTAR is the first telescope capable of producing maps of radioactive elements in supernova remnants. In this case, the element is titanium-44, which has an unstable nucleus produced at the heart of the exploding star.

The NuSTAR map of Cas A shows the titanium concentrated in clumps at the remnant's center and points to a possible solution to the mystery of how the star met its demise. When researchers simulate supernova blasts with computers, as a massive star dies and collapses, the main shock wave often stalls out and the star fails to shatter.

The latest findings strongly suggest the exploding star literally sloshed around, re-energizing the stalled shock wave and allowing the star to finally blast off its outer layers.

"With NuSTAR we have a new forensic tool to investigate the explosion," said the paper's lead author, Brian Grefenstette of Caltech. "Previously, it was hard to interpret what was going on in Cas A. Now that we can see the radioactive material, which glows in X-rays no matter what, we are getting a more complete picture of what was going on at core of the explosion."

The NuSTAR map also casts doubt on other models of supernova explosions, in which the star is rapidly rotating just before it dies and launches narrow streams of gas that drive the stellar blast. Though imprints of jets have been seen before around Cas A, it was not known if they were triggering the explosion. NuSTAR did not see the titanium, essentially the radioactive ash from the explosion, in narrow regions matching the jets, so the jets were not the explosive trigger.

"This is why we built NuSTAR," said Paul Hertz, director of NASA's astrophysics division in Washington. "To discover things we never knew – and did not expect – about the high-energy universe."

The researchers will continue to investigate the case of Cas A's dramatic explosion. Centuries after its death marked our skies, this supernova remnant continues to perplex.

For more information about NuSTAR and images, visit:
http://www.nasa.gov/nustar

J.D. Harrington j.d.harrington@nasa.gov

Cassiopeia-A seen for the first time in the emitted light of atoms of Iron, Silicon, Magnesium and Titanium.
Image credit: NASA/JPL-Caltech/CXC/SAO

In this image, NuSTAR data, which show high-energy X-rays from radioactive material, are colored blue. Lower-energy X-rays from non-radioactive material, imaged previously with NASA's Chandra X-ray Observatory, are shown in red, yellow and green.

The new view shows a more complete picture of Cassiopeia A, the remains of a star 11 000 ly away, that blew up in a supernova event whose light reached Earth about 350 years ago, when it could have appeared to observers as a star that suddenly brightened.

NuSTAR is the first telescope capable of taking detailed pictures with pinpoint accuracy, of the radioactive material in the Cassiopeia A supernova remnant. When massive star explode, they create many elements: non-radioactive ones like iron and calcium found in your blood and bones; and radioactive elements like titanium-44, the decay of which sends out high-energy X-ray light that NuSTAR can see.

By mapping titanium-44 in Cassiopeia A, astronomers get a direct look at what happened in the core of the star when it was blasted to smithereens. These NuSTAR data complement previous observations made by Chandra, which show elements, such as iron, that were heated by shock waves farther out from the remnant's center.

In this image, the red, yellow and green data were collected by Chandra at energies ranging from 1 to 7 kiloelectron volts (keV). The red color shows heated iron, and green represents heated silicon and magnesium. The yellow is what astronomers call continuum emission, and represents a range of X-ray energies. The titanium-44, shown in blue, was detected by NuSTAR at energies ranging between 68 and 78 keV.

The NuSTAR observations point to a possible solution to the puzzle of how stars detonate. The fact that the titanium -- which is a direct tracer of the supernova blast -- is concentrated in clumps at the core supports a theory referred to as "mild asymmetries." In this scenario, material sloshes about at the heart of the supernova, reinvigorating a shock wave and allowing it to blow out the star's outer layers.

NASA to Conduct Unprecedented Twin Experiment

April 10, 2014: Consider a pair of brothers, identical twins. One gets a job as an astronaut and rockets into space. The other gets a job as an astronaut, too, but on this occasion he decides to stay home. After a year in space, the traveling twin returns home and they reunite. Are the identical twins still … *identical*? NASA is about to find out.

In March of 2015, NASA astronaut Scott Kelly will join cosmonaut Mikhail Kornienko on a one-year mission to the ISS. Their lengthy stay aims to explore the effects of long-term space flight on the human body.

The interesting thing about Scott is, he's a twin. His brother Mark is also an astronaut, now retired. While Scott, the test subject, spends one year circling Earth at 17,000 mph, Mark will remain behind as a control.

"We will be taking samples and making measurements of the twins before, during, and after the one-year mission," says Craig Kundrot of NASA's Human Research Program at the Johnson Space Center. "For the first time, we'll be able two individuals who are genetically identical."

The experiment harkens back to Einstein's "Twin Paradox," a thought experiment in which one twin rockets to the stars at high speed while the other stays home. According to Einstein's theory of relativity, the traveling twin will return younger than his brother—strange but true.

NASA's study won't test the flow of time. The ISS would have to approach the speed of light for relativistic effects to kick in.

Here are a few examples to give the flavor of the research: "We already know that the human immune system changes in space. It's not as strong as it is on the ground," explains Kundrot. "In one of the experiments, Mark and Scott will be given identical flu vaccines, and we will study how their immune systems react."

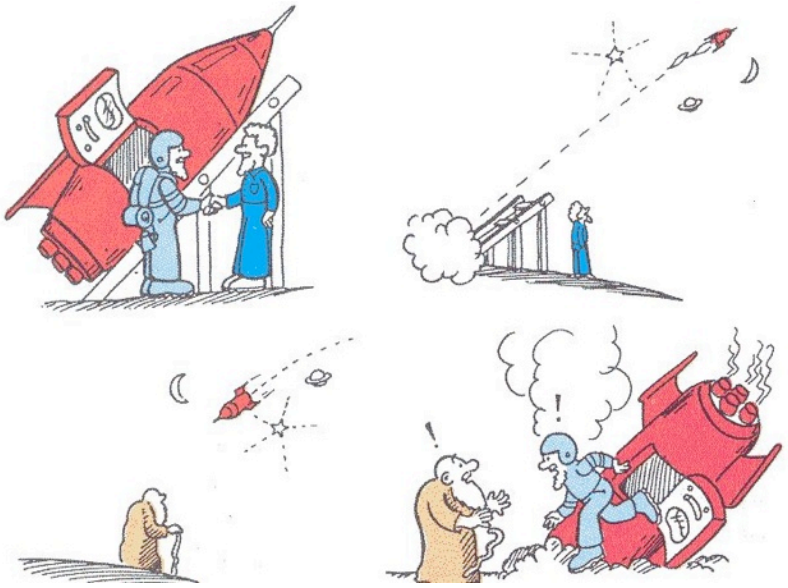
Another experiment will look at telomeres--little molecular "caps" on the ends of human DNA. Here on Earth, the loss of telomeres has been linked to aging. In space, telomere loss could be accelerated by the action of cosmic rays. Comparing the twins' telomeres could tell researchers if space radiation is prematurely aging space travelers.

Other proposals are equally fascinating. One seeks to discover why astronaut vision changes in space. "Sometimes, their old glasses from Earth don't work," notes Kundrot. Another will probe a phenomenon called "space fog"—a lack of alertness and slowing of mental gears reported by some astronauts in orbit.

Separated for a full year, Scott and Mark will make it possible for future astronauts to travel farther than ever before, and still look forward to happy reunions when they return home.

Credits: Author: Dr. Tony Phillips | Production editor: Dr. Tony Phillips | Credit: Science@NASA

NASA astronauts Mark and Scott Kelly will be taking art in a "twins experiment" to compare the effects of a year-long mission on the human body. Mark is the stay-at-home twin and Scott will rocket to the ISS in March 2015. The twins are pictured here, Mark is on the left and Scott on the right...or is that the other way around? At least they know which is which. [Scott is left -ed]



A Little Bit of Relativity

The twin paradox in relativity has a history almost as long as the theory of relativity itself. It was originally proposed by Einstein as a gedanken experiment to highlight the fact that an observer sees a moving clock going at a slower rate than a clock at rest. Because this is an entirely symmetric effect (in that each clock sees the other clock ticking slower), the paradox arises when two identical synchronized clocks are temporarily separated into different Lorentz frames and then brought back together.

Applied to twins, the paradox starts with identical twins on Earth. One of the twins then accelerates away on a rocket, moves away from Earth at a constant velocity u for a time T/2, fires rockets to accelerate again so that his velocity changes to −u, moves at the constant velocity u towards the Earth for a time T/2, and decelerates to a stop on reaching the Earth again. The acceleration times are assumed to be negligible compared to T . The paradox arises because both twins observe the other to be aging slower during the period of uniform relative motion. Are they the same age when they meet again or is one of them younger, and if so, which one and by how much?

Over the years, the paradox has been discussed extensively in many books and articles. The American Journal of Physics has carried a large number of articles on the paradox, highlighting the difficulty in conveying this concept to first-time students of relativity. It still remains one of the most puzzling aspects of the theory of relativity.

In the standard resolution, as presented in many textbooks on relativity, both twins conclude that the traveling twin (who accelerated) is younger. The argument proceeds as follows. The Earth-bound twin always remains in an inertial frame and therefore his observation that the other twin is aging slower is correct. On the other hand, the rocket-bound twin sees his brother age slowly during the time when the relative velocity is constant, but sees a sudden jump in his brother's age during the short acceleration phase when he is not in an inertial frame. Thus, the change of inertial frames results in a jump in age….

Read more: http://arxiv.org/pdf/1204.5651v1.pdf

Using NASA's Kepler Space Telescope, astronomers have discovered the first Earth-size planet orbiting a star in the "habitable zone" -- the range of distance from a star where liquid water might pool on the surface of an orbiting planet. The discovery of Kepler-186f confirms that planets the size of Earth exist in the habitable zone of stars other than our sun.

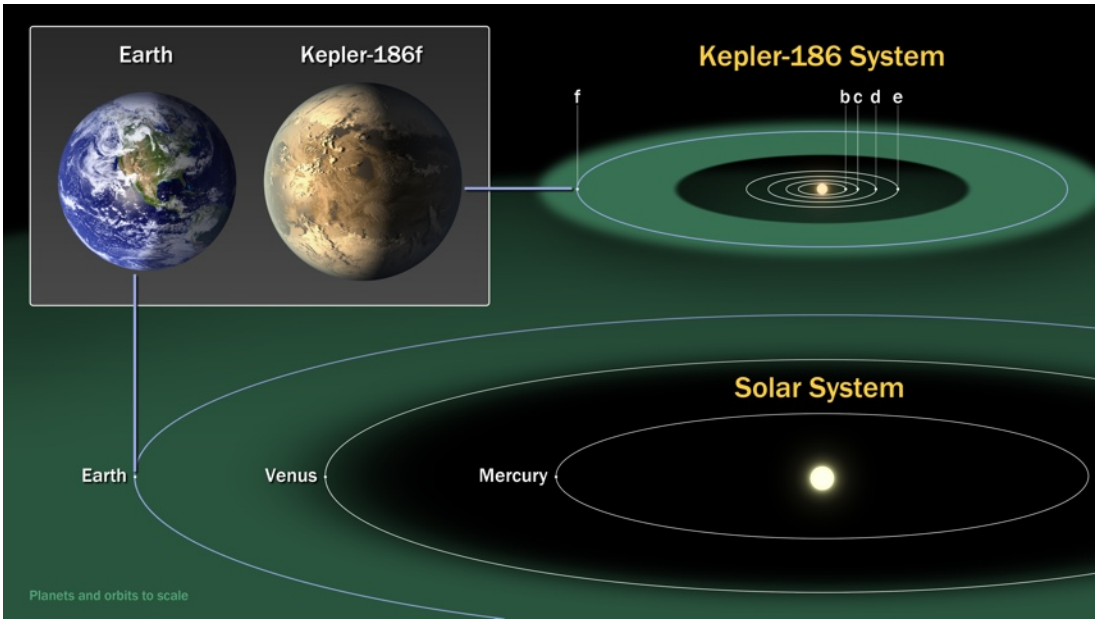
While planets have previously been found in the habitable zone, they are all at least 40 percent larger in size than Earth and understanding their makeup is challenging. Kepler-186f is more reminiscent of Earth.

"The discovery of Kepler-186f is a significant step toward finding worlds like our planet Earth," said Paul Hertz, NASA's Astrophysics Division director at the agency's headquarters in Washington. "Future NASA missions, like the Transiting Exoplanet Survey Satellite and the James Webb Space Telescope, will discover the nearest rocky exoplanets and determine their composition and atmospheric conditions, continuing humankind's quest to find truly Earth-like worlds."

Read more at: http://kepler.nasa.gov/news/nasakeplernews/index.cfm?FuseAction=ShowNews&NewsID=330

Kepler-186f, first Earth-size Planet in Habitable Zone of Another Star
Credit: NASA Ames/SETI Institute/JPL-Caltech
The artist's concept depicts Kepler-186f, the first validated Earth-size planet to orbit a distant star in the habitable zone. The size of Kepler-186f is known to be less than ten percent larger than Earth, but its mass, density and composition are not known. Previous research suggests that a planet the size of Kepler-186f is likely to be rocky. Prior to this discovery, the "record holder" for the most "Earth-like" planet went to Kepler-62f, which is 40 percent larger than the size of Earth and orbits in its star's habitable zone.

Kepler-186f orbits its star once every 130 days and receives one-third the energy that Earth does from the sun, placing it near the outer edge of the habitable zone. If you could stand on the surface of Kepler-186f, the brightness of its star at high noon would appear as bright as our sun is about an hour before sunset on Earth.
The artistic concept of Kepler-186f is the result of scientists and artists collaborating to imagine the appearance of these distant worlds.



Kepler-186 and the Solar System

The diagram compares the planets of our inner solar system to Kepler-186, a five-planet star system about 500 light-years from Earth in the constellation Cygnus. The five planets of Kepler-186 orbit an M dwarf, a star that is is half the size and mass of the sun.
The Kepler-186 system is home to Kepler-186f, the first validated Earth-size planet orbiting a distant star in the habitable zone—a range of distance from a star where liquid water might pool on the planet's surface. The discovery of Kepler-186f confirms that Earth-size planets exist in the habitable zones of other stars and signals a significant step toward finding a world similar to Earth.
The size of Kepler-186f is known to be less ten percent larger than Earth, but its mass and composition are not known. Kepler-186f orbits its star once every 130 days, receiving one-third the heat energy that Earth does from the sun. This places the planet near the outer edge of the habitable zone.
The inner four companion planets each measure less than fifty percent the size of Earth. Kepler-186b, Kepler-186c, Kepler-186d and Kepler-186, orbit every 4, 7, 13 and 22 days, respectively, making them very hot and inhospitable for life as we know it.
The Kepler space telescope infers the existence of a planet by the amount of starlight blocked when it passes in front of its star. From these data, a planet's radius, orbital period and the amount of energy received from the host star can be determined.
The artistic concept of Kepler-186f is the result of scientists and artists collaborating to imagine the appearance of these distant worlds.

Seeing "Stars" in the Daytime by Larry McNish Calgary RASC

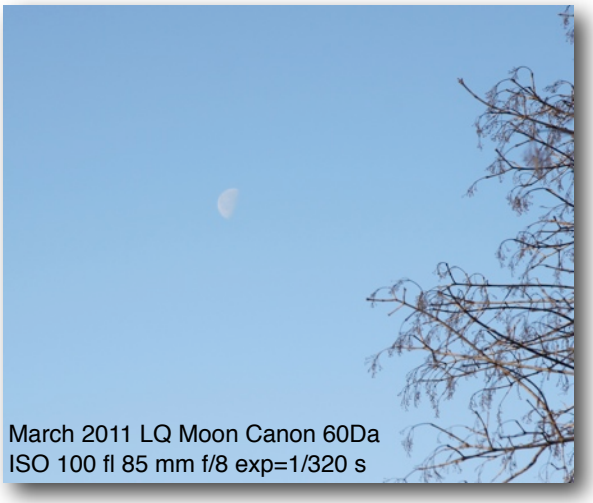
Question: Which stars and planets are bright enough to be seen in the daytime sky?
Answer: Many of them, but except for the very brightest you need to be able to point your binoculars or telescope at the right spot in the sky to see them.

With my computerized telescope I have often found bright stars and planets in the middle of the day. For non-computerized telescopes it's easiest closer to sunset.

However, it's not possible to produce a definitive list that says "always visible in daylight" or "never visible in daylight". The problem is that the "daytime" sky varies in brightness. During the early morning and late evening, the sky is darker than at Noon - i.e. between "twilight" and "full" brightness. If there is significant pollution (or aerosols) in the sky it often appears hazy or bright white instead of "clear blue". High, thin clouds may not be easily visible, but they will interfere with finding and observing objects.

Also, as the planets orbit the Sun, they oscillate between being "close and bright" and "far and dim". Venus, for instance, is often quoted as the brightest planet in the sky, but this means "when it is situated in such a way that it reflects the most light towards us". This actually occurs at points in Venus' orbit that are not the closest approach to the Earth. At closest approach we are seeing the "backside" of Venus (i.e. the side that is facing us but facing away from the Sun. This makes it very difficult or impossible to see. At other times in its orbit, Venus is actually on the far side of the Sun, appearing much smaller (due to distance) and appearing much dimmer (due to the inverse square law of light), and the fact that light is beaming at us from a significantly smaller sized disk. So yes, Venus "can be" the brightest planet - but this is only during certain special times.

However, given a "clear blue" sky with the Sun well above the horizon, there are a number of objects that can be observed given the right placement of the objects relative to the Sun. See the list at upper right. Good luck!



March 2011 LQ Moon Canon 60Da
ISO 100 fl 85 mm f/8 exp=1/320 s

Object	Magnitude	Comments
The Moon	-12.74	Easily visible except around New Moon
Venus	-4.6	Yes - most visible before or after approaching closest to Earth. It is often so bright that it can be mistaken for distant aircraft landing lights.
Jupiter	-2.94	Yes - brightest at "Opposition" when it is opposite the Sun as seen from the Earth
Mars	-2.91	Yes - but only gets this bright at Opposition during its closest approaches to Earth every few years. Its two moons are extremely tiny and dim and cannot be seen in the daytime.
Mercury	-1.9	Yes - but Mercury never strays far from the Sun. Best seen when its orbit carries it furthest from the Sun. Most often observed just after sunset low in the west, or just before sunrise low in the east.
Stars	-1.47 to -0.24	Sirius (-1.07) and Canopus (-0.72) are brighter than Saturn
Saturn	-0.24	Yes - brightest at Opposition when it is opposite the Sun as seen from the Earth. Also apparently brighter when the rings are tilted away from the Earth, reflecting more light. When the rings appear "edge-on" Saturn does not appear to have the same overall visual magnitude.
Stars	-0.04 to 4.61	Yes many - There are thousands of stars with brightness levels between Arcturus (-0.04) and Jupiter's moons.
Jupiter's moon Ganymede	4.61	Reported yes - most likely just before sunset. Brightest when Jupiter is at Opposition.
Jupiter's moon Io	5.02	Reported yes - most likely just before sunset. Brightest when Jupiter is at Opposition.
Vesta (the brightest asteroid)	5.1	Most likely not visible in daytime, unless just before sunset.
Jupiter's moon Europa	5.29	Reported yes - most likely just before sunset. Brightest when Jupiter is at Opposition.
Uranus	5.32	Most likely not visible in daytime, unless just before sunset.
Jupiter's moon Callisto	5.65	Reported yes - most likely just before sunset. Brightest when Jupiter is at Opposition.

To spot objects in the daytime successfully you need to be able to do three things:

Be able to determine their location in the sky by:
Looking up
Moon, Venus, and brighter planets are easy before sunset. It's harder earlier in the day.
For Mercury: Searching just above the east horizon just before sunrise or the west horizon just after sunset (visually or with binos)

Noting the object's Altitude (angle above the horizon) and Azimuth (angle from North) and aiming your scope there at the appointed time

Noting the object's Right Ascension and Declination relative to another brighter object (such as the Moon or Venus) and moving from the brighter to the location of the dimmer using the telescope's "setting circles"

Using a computerized telescope aligned to the sky during a previous observing session, and selecting the desired object

Aiming the telescope at the approximate position and using finder to "hunt around"

Be able to focus on the object:
The human eye does not easily focus "at infinity". It's easy to "miss" seeing Venus because your eyes focus on nearby objects instead of at infinity. Sometimes you'll wonder how you missed it after someone points it out to you.

If using binoculars, focus on the furthest horizon object then locate the star or planet.

If using a telescope, the finderscope will probably be focussed, but double-check the main scope focus before you start.

Be able to detect slight differences in brightness compared to "bright blue sky"
Objects during the daytime have much less contrast than when observed at night.
Don't search too quickly. If you are "hunting" for the object take your time and observe each view carefully.

Extended objects like Jupiter and Saturn do not "jump out at you" like the concentrated point of light from a bright star - it's easy to miss them

Caesar's Comet

By Brian Ventrudo One Minute Astronomer

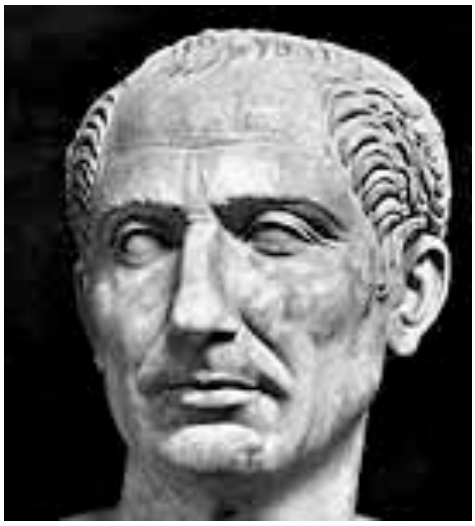
Ancient stargazers recorded the appearance of dozens of bright comets. These visiting "stars", which appeared out of nowhere and caused widespread terror, were often taken as omens and signs of doom or great change. So it was a great historical coincidence that one of the brightest comets in recorded history marked a truly traumatic event -the death of one of the most important statesmen in history, Julius Caesar, in 44 B.C.

By 44 B.C., Julius Caesar had risen through lesser offices in the Roman government to conquer and govern the province of Gaul, quell the petty squabbling and civil wars of the late Roman republic, and establish a strong central government in Rome under his control. But he had grown so powerful, many senators feared he would declare himself King. And Romans, by tradition, fiercely opposed tyrants or kings of any kind. So a small group of senators conspired against Caesar to preserve the republic. They stabbed the great man to death as he made his way to a meeting of the senate on March 15, 44 B.C. (the "Ides of March").

Caesar was immensely popular with the common people of Rome. So his death was marked by a near-riotous funeral with stirring speeches and a public cremation. It was followed four months later by traditional funeral games, the *Ludi Victoriae Caesaris*. During these games, in July 44 B.C., a shockingly bright comet appeared in the heavens. According to the Roman historian Suetonius, as celebrations commenced, "a comet shone for seven successive days, rising about the eleventh hour, and was believed to be the soul of Caesar."

This awed many common Roman citizens. Caesar himself claimed divine status and his family claimed lineage to Aeneus, the legendary founder of Rome, and to the goddess Venus herself. So the appearance of a brilliant comet in the heavens was unnerving for all, and especially for Brutus, Cassius, and the other senatorial conspirators who murdered the great Caesar.

It was also a great propaganda tool for Caesar's heir and adopted nephew Octavian. Octavian set about, over the next thirteen years, establishing his authority, dispensing with the conspirators and then, patiently and ruthlessly, assuming total control of Rome. Octavian eventually renamed himself Augustus Caesar and had a coin struck in 19 B.C. with his likeness on one side and the great comet on the other.



Modern studies of records of Roman and Chinese stargazers place this great comet in the constellations Gemini and Auriga in May, where it reached a brilliant magnitude -3 as it passed the Sun. The comet then moved northward and faded to magnitude +5 by early July. It suddenly brightened again, perhaps as material was ejected from the nucleus and set aglow by the Sun. By mid-July, during Caesar's games, the comet shone at magnitude -4 to -5 in Cassiopeia, as bright as the planet Venus and possibly visible in the daylight, making it one of the brightest comets in recorded history.

Of course, comets have marked the deaths of many notable men. French king Charles the Bald died in 877 A.D. during a comet apparition. King Harold of England was killed during the Battle of Hastings in 1066 A.D. Even Mark Twain was born and died during the apparitions of the same comet, Comet Halley, in 1835 and 1910.

The appearances of comets during these historical events are coincidences, of course. We now know comets have no divine effects on human affairs, and many spectacular comets have come and gone without any ill influence on history or geopolitics.

What an irony, then, that the vigorous opponent of superstition and scientific ignorance, the astronomer Carl Sagan, himself died during the apparition of two bright comets. Sagan passed away in late 1996, a year in which Comet Hyakatake and Comet Hale-Bopp, two of the brightest comets of recent times, blazed across the northern sky.

Nature, it seems, may have a sense of humor after all.

- See more at: http://oneminuteastronomer.com/7954/caesar-comet/#more-7954

Roman coin c. 19 B.C. showing Augustus Caesar and the great comet of 44 B.C.

It is Ovid, however, who makes the final assertion of the comet's role in Julius Caesar's deification. Ovid describes the deification of Caesar in *Metamorphoses* (8 AD):

Then Jupiter, the Father, spoke..."Take up Caesar's spirit from his murdered corpse, and change it into a star, so that the deified Julius may always look down from his high temple on our Capitol and forum." He had barely finished, when gentle Venus stood in the midst of the Senate, seen by no one, and took up the newly freed spirit of her Caesar from his body, and preventing it from vanishing into the air, carried it towards the glorious stars. As she carried it, she felt it glow and take fire, and loosed it from her breast: it climbed higher than the moon, and drawing behind it a fiery tail, shone as a star.

The "Book of Miracles" includes 26 examples of comets, including this one: "In the year 1007 A.D., a wondrous comet appeared. It gave off fire and flames in all directions. As it fell to Earth it was seen in Germany and Italy." [prob. a meteor -ed]

Canis Venatici

α-Canum Venaticorum - Cor Caroli
Y Canum Venaticorum -La Superba

This constellation is fairly difficult to identify as it consists of only two stars, the brightest (Cor Caroli) having a magnitude of only 2.8. Its two brightest stars are almost parallel with the last two stars in the handle of the Big Dipper and lie about 12° to the southwest. Cor Caroli forms one corner of the "Diamond of Virgo," a perfect diamond in the heavens formed by joining the stars Cor Caroli, Arcturus in Bootes, Spica in Virgo and Denebola in Leo. 15 Canum Venaticorum, a double star, can be separated with steadily held fieldglasses. Observe also the variable star La Superba, a beautiful flashing dark red star.

Double Stars

Star	Mag.	Sep'n (s)	Location	Remarks
α	3.2-5.7	20	125439	Pale Yellow·Lilac; easy for 2" telescope
2	5.8-8.0	12	121441	Orange-Blue; fine contrast.
Σ1615	6.0-8.2	27	121233	Yellow-Ashen.
Σ1645	7.0-7.5	10	122645	Fine pair.

Messier Objects

	Mag	Location	Remarks
M3	6.3	134029	Globular Cluster. 40,000 LY away; very unusual. 1/7 of the 1,000 stars in M3 are variable, all having a period of half a day.
M51	8.1	132847	Spiral Galaxy. The famous "Whirlpool Nebula," seen exactly broadside-on.
M 63	9.5	131442	Spiral Galaxy.
M 94	7.9	124941	Spiral Galaxy.
M 106	8.6	121748	Spiral Galaxy.

Objects of Interest in Canis Venatici (CVn)

NGC 5005 - Spiral Galaxy, magnitude 9.6, location 130937.
R Canum Venaticorum - Long period (328 days) variable, maximum magnitude 7.7. Location 134740.
V Canum Venaticorum - Long period (192 days) variable, maximum magnitude 6.8. location 131746.
Y Canum Venaticorum - "La Superba," a variable star of the 5th

Coma Berenices

Coma Berenices is a open cluster of 5th and 6th magnitude stars about 15° southwest of Canes Venatici. It should be observed on a clear and moonless night; with fieldglasses, between 20 and 30 stars can be seen, clearly suggesting the shape of a head of flowing hair. The brightest star in this group, β-Comae Berenices, has a magnitude of 4.3 and lies about 8° to the west of the main group of the cluster (see chart). Many spiral galaxies lie in this constellation. [Still more lie just across the border in Virgo -the Virgo Cluster! -ed]

Double Stars

Star	Mag.	Sep'n (s)	Location	Remarks
2	6.0·7.5	4	120222	
12	4.8·8.0	66	122026	
17	5.4·6.7	145	122626	White-Lilac
24	4.7-6.2	20	123319	Orange-Blue; beautiful contrast
35	5.2-7.4-9.0	1-29	125121	Lilac-Blue; triple
Σ1678	6.8-7.5	33	124315	

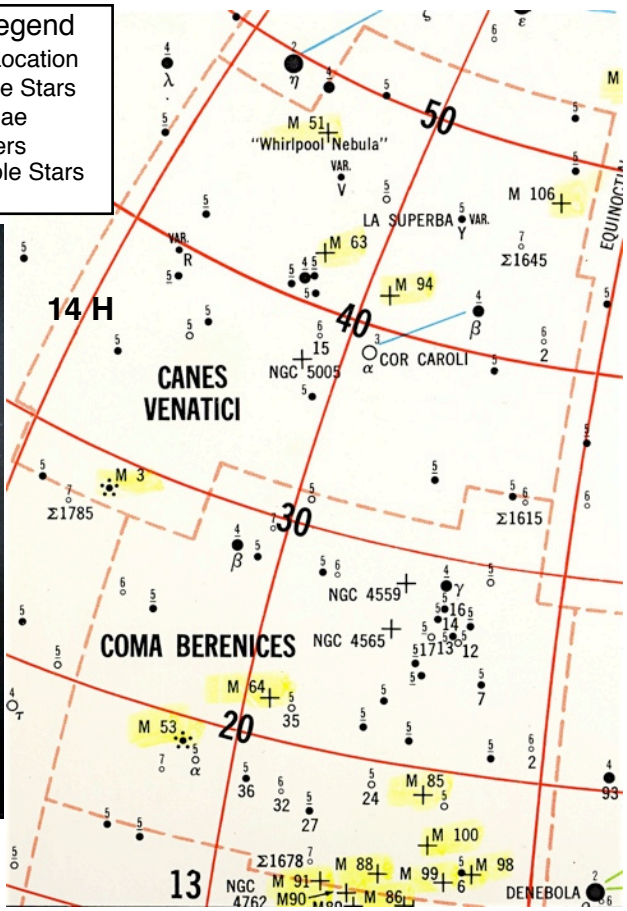
Messier Objects

	Mag	Location	Remarks
M 53	7.6	131018	Globular Cluster. [60 000 LY]
M 64	8.8	125422	Spiral Galaxy. Large and bright."Black Eye" Galaxy 20 Million LY away. See below left for more information.
M 85	9.3	122318	Spiral Galaxy.
M 88	10.2	123015	Spiral Galaxy.
M 91	10.7	124114	Prob. a comet. [Actually. NGC 4548 -ed]
M 98	10.7	121115	Spiral Galaxy.
M 99	10.1	121615	Spiral Galaxy. Large and bright.
M 100	10.6	122016	Spiral Galaxy.

Objects of Interest in Coma Berenices (Com)

NGC 4559 - Spiral Galaxy seen edge-on. Location 123428.
NGC 4565 - Spiral Galaxy. Mag. 11.0. Loc'n 123426. 31 MLY away

Chart Legend
- Star Location
- Double Stars
- + Nebulae
- ✶ Clusters
- Variable Stars
Var



Hubble's Wide Field Planetary Camera 2 (WFPC2) image of M64 -a colour composite taken through four different color filters.

M64 has a spectacular dark band of absorbing dust in front of the galaxy's bright nucleus, giving rise to its nicknames of the *Black Eye* or *Evil Eye* galaxy.

At first glance, M64 appears to be a fairly normal spiral galaxy where all of the stars are rotating in the same direction, clockwise in this image. However, studies in the 1990's found interstellar gas in the outer regions of M64 rotating counter-clockwise.

Active star formation occurs in the shear region, where pink hydrogen gas fluoresces from UV light from newly formed stars.

Astronomers believe that the oppositely rotating gas arose when M64 absorbed a satellite galaxy that collided with it, perhaps more than one billion years ago. This small galaxy has now been almost completely destroyed, but signs of the collision persist in the backward motion of gas at the outer edge of M64.

Times in DST Note: ISS flies over multiple times in 3 or 4 hour interval in June -esp. first week.

Jun 01 04:07 Jupiter 5.5°N of Moon
02 09:00 Mercury 0.2° S of M35
03 00:25 Moon at Apogee: 404 956 km
Triple Shadow Transit Jupiter 2:05-3:42 pm DST
04 13:35 Regulus 5.0°N of Moon
05 16:39 **FQ Moon** rises locally at 1:08 pm DST
07 20:44 Mars 1.6°N of Moon
08 18:05 Spica 1.8°S of Moon
10 15:11 Saturn 0.6°N of Moon: Occ'n -not visible locally
Double shadow transit on Jupiter (6:07 pm DST)
13 00:11 **Full Moon** rises locally Jun 12 at 8:36 pm DST
14 23:34 Moon at Perigee: 362 062 km
15 07:57 Jupiter 6.3°S of Pollux
19 14:39 **LQ Moon** rises locally 1:30 am DST
19 19:00 Mercury at Inferior Conjunction
21 06:52 **Summer Solstice** 6:51 am DST
23 09:00 Venus 5.6°S of Pleiades
24 08:54 Venus 1.3°N of Moon
25 02:22 Aldebaran 2.0°S of Moon
27 04:09 **NM** rises locally 6:13 am DST
28 23:00 Jupiter 5° N of Moon
30 15:09 Moon at Apogee: 405 932 km

BAS Events

Jun 3 Tue (FQ-2) **Triple Shadow Transit viewing from Fox** 1:00 pm Weather permitting

Jun 4 Wed **BAS meeting**@ES Fox 7 pm **K-W Tel. Webinar**

Jun 6 Fri (FQ+1) **Public viewing** Grey Roots Museum 9 pm (Members with scopes please)

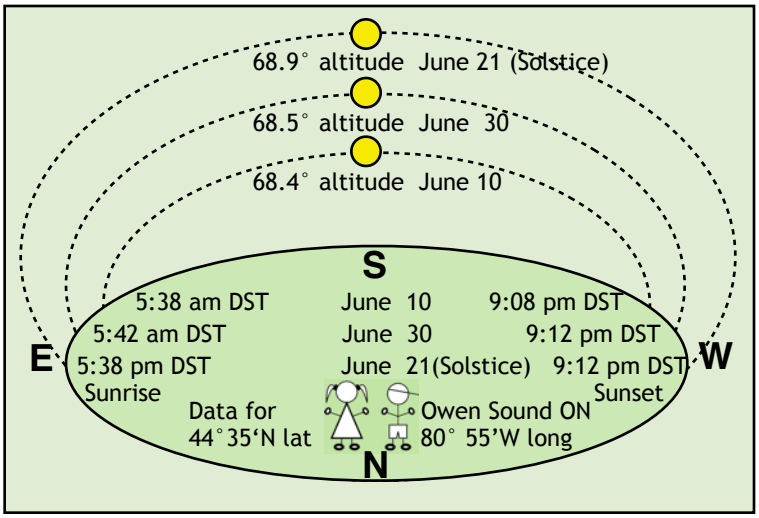
Jun 21 Sat (LQ+2) **Summer Solstice** Keppel Henge 11 am (Members with solar scopes please)

Jun 28 Sat (NM+1) **BAS viewing @Fox**@dark, regular NM viewing

Planets

MERCURY, is in the evening sky but becoming dimmer and harder to see in the first week of June. After that is is too close to the Sun to see. **VENUS,** (-3.9) is a Morning Star, low in dawn twilight and closing on the Sun. A thin last crescent Moon is less than 1.3° from Venus on June 24. **MARS** (mag. -0.3) rides high near the meridian and is well-placed for viewing all month. **JUPITER**, (-1.8) is low in the WNW sky and drops quickly. By month-end it is difficult to see. **SATURN,** (mag 0.2) rises before sunset and is well-placed in the sky all night (opposition was May 10). Ring tilt is still about 22°. Both **URANUS,** (5.9) and **NEPTUNE,** (7.9) are higher above the horizon by dawn in June and are in dark sky for a few hours. Both **asteroid, Vesta (6.8)** and **dwarf planet**, **Ceres (8.0)** are well placed but dropping in brightness, look near Mars. Charts are available on the BAS website. **PLUTO** (mag. 14) is visible in dark sky for about 4 hours in June. View in the first few days of the month after the crescent sets or during New Moon at the end of June. Pluto finder charts for 2014 are now on the BAS website.

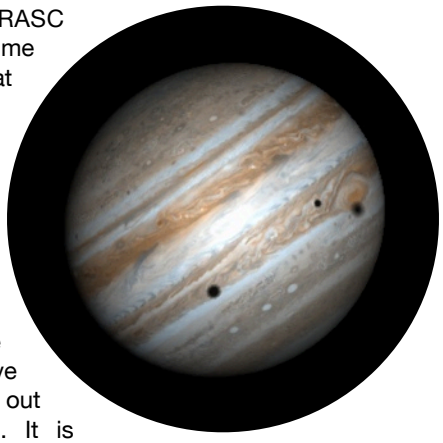
The diagram below gives the sunrise/sunset times and the Sun's altitude on three dates this month. The Sun reaches its highest point north on June 21 (Solstice at 6:51 am DST).
The June moon phase graphic below shows lunar phases for each night of the month. Times of moonrise for NM, FQ, FM and LQ are given in the Calendar listing at left.



Special Events

Daytime Triple Transit

The last triple transit of Jupiter's moons for 2014 occurs June 3. We get one more Jan 24, 2015 and then only doubles until March 20, 2032! The June 3 event is in the daytime and starts about 2:02 pm DST and runs to about 3:42 pm DST. These are times from Starry Night Pro while the RASC handbook gives 2:08 pm DST as the start time and end time at 3:43 pm DST. The image at right is from SN for about 3:15 pm DST.



Daytime viewing of Jupiter requires use of a GOTO telescope mount and so far has been proven to work by two BAS members with a Celestron NexStar and Advanced VX mount. At time of this writing, the AZ-EQ6 Skywatcher at the Fox has not been used to spot Jupiter in the daytime but it should work well since it is polar aligned very closely. The daytime view is more muted than the above rendition, but the dark shadows should stand out well against the lighter Jovian cloud tops. It is interesting to see the pale but familiar Jupiter face against a blue background! Some of the moons are bright enough to be seen in daylight -see above pg 10. BAS is planning an observing session at the ES Fox Observatory starting about 1 pm and since June 3 is a Tuesday, students are invited to have a look as well. If you plan to join us, please contact Aaron T or John H well ahead so we can send a list of BAS attendees/guests as is required during school hours.

June 2014

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5 FQ	6	7
8	9	10	11	12 FM	13	14
15	16	17	18	19 LQ	20	21
22	23	24	25	26	27 NM	28
29	30					

By permission Univ. of Texas McDonald Obs.

BAS Member Loaner Scopes

Solar H-alpha scope now out on loan.

Our Lunt solar scope can be borrowed by BAS members but there is a waiting list! Contact Aaron to get your name on it. We now have a suitable mount for it as well. A short training session will be provided on pickup.

TWO 12-inch Dobs available.

Both 12-inch loaner telescopes are available for the summer. Our two **8-inch dobsonians** are presently out on loan. Contact Brett T. or Aaron T. to check on availability. Scopes come in and out periodically so keep checking with Brett or Aaron if you are interested in a loaner.

SGN Classified Ads Section

(Now also on our website)

FOR SALE: Televue Pronto

2 element E.D. Refractor, 2.7" / 70mm diameter. f.l. 480mm, f/6.8. with 1-1/4" Star Diagonal, with 45 degree Prism diagonal (for terrestrial viewing), with TeleVue Red dot finder, complete with TeleVue Soft Case. Asking $ 700.-- Firm Anton VanDijk 519 376-9912 ravand@rogers.com

FREE: Mirror-grinding machine to a good BAS home

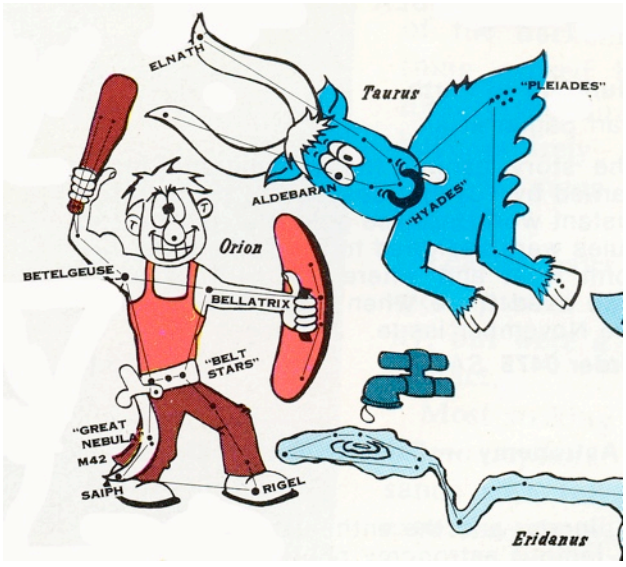
The mirror-grinding machine is still available. Note that it is not finished but plans are available from Mirror-o-Matic.com. Designed to do 12 inch mirrors but will handle smaller mirrors with some minor adjustments. BAS also has pretty much complete kits of abrasives and maybe even a mirror blank or two that we will include with the deal. Comes with documentation and a copy of Edmund Scientific Co. Mirror Grinding booklet. Note this outfit is free to current BAS members but if you are not a member, then you can purchase the unit for $120 and we will throw in a year's membership. Contact (stargazer@wightman.ca)

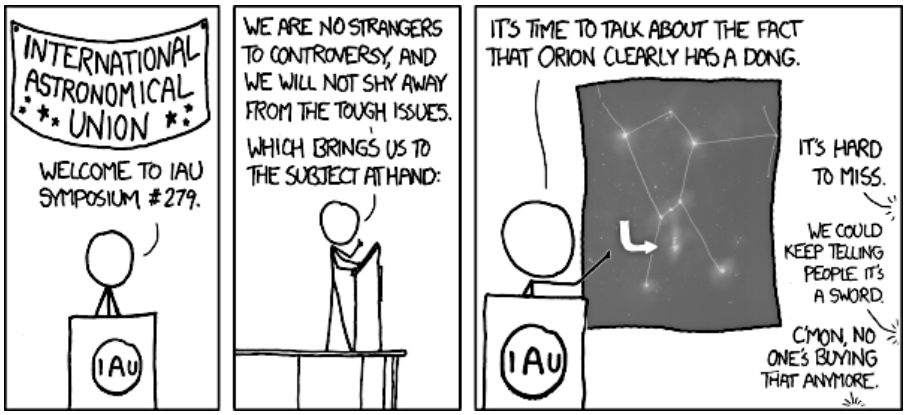
From the "Mailbag"

I had my telescope set up in the front yard once, in the middle of the afternoon, tracking the waning moon, which was nicely set in an utterly cloudless blue sky.

A neighbor comes walking by, asks what I'm looking at. (I think he believed I was peeking in someone's window, regardless of the fact the telescope was pointed up at the sky.) I tell him I'm looking at the moon, and point it out to him. He gets a "how stupid do you take me for" kind of look on his face and starts explaining to me that it's daytime. The moon "rises at night."

I again point to the moon, clearly visible overhead. He shakes his head, says something like, "mr. astrologer (yes, he said *that*) can't tell the difference between the moon and a cloud," and walked away. **[posted by "kuhnigget" on Phil Plait's blog.-ed]**





Disclaimer: The editor takes no responsibility for the sense of humour of the author of this cartoon. If you are offended please email the author. If you click "About Me" on www.xkcd.com you will get a link to the author, sort of...good luck. FYI, here's what I found the last time I tried:

> *I frequently lurk on irc.foonetic.net as 'Randall' -- if you leave a message for me there I will probably get it. If you have a general question about xkcd, you may also want to try the fora.*
> *Note: I don't use submitted comic ideas and I have already heard about every company making human hamster balls and any news story about velociraptors.*