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PETERBOROUGH ASTRONOMICAL ASSOCIATION

THE REFLECTOR

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President's Message:

Welcome members of the PAA,

I am honored to be your next president of the PAA. Since joining the PAA in the winter of 1998 I have seen this association grow to what it is today. For the last three years as your Vice President I have learned a lot about the potential of the PAA. Our Past President, John Crossen, leaves big shoes to fill (I'm still trying to figure out what size they are), but I am feeling up to the challenge. My goal is to stay the course of the Association and to further our causes by promoting amateur astronomy through public outreach and to make belonging to the PAA a benefit to our members. I do not plan to do this single handedly, though. I will require assistance from all of you. No matter what you do, it will be of assistance to us all. We have all heard that "many hands make light work" and nowhere is this of greater relevance than in a club like the PAA. If we all are to enjoy the benefits of our membership then we must all do something(s) to help. There is much to be done throughout the year and as a famous Canadian Astronaut once said, "The sky is not the limit". Please consider getting involved in as many ways as you can by, selling tickets on our Astronomy Day draw, write an article for a future issue of The Reflector, donate a book to our library, help fight light pollution, come to our meetings and share an experience, learn from each other. Let's have fun and do what we all enjoy, learning about astronomy and sharing that joy with others.

Keep looking up,

Rick Stankiewicz
President, PAA

The bullets of the Orion Nebula. Image credit: Gemini

Mysteries In The Orion Nebula

The picture above is a new detailed view of the supersonic "bullets" of gas and the wakes they are creating in the Orion Nebula. It was taken by the Gemini Observatory, using new technology that corrects image distortions caused by Earth's atmosphere.

Astronomers believe these bullets were thrown out from deep within the nebula where a new cluster of massive stars has formed. They are speeding outward at about 400 km per second. That's more than a thousand times faster than the speed of sound!

For more information, go to:
http://www.gemini.edu/index.php?option=content&task=view&id=226

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Inside This Issue

April Means Observing With Binoculars And Eyes

As the nights warm, and hopefully clear, we enter the realm of spring constellations and celestial objects. Prime on the list for constellation spotters will be Leo, the lion. Leo is one constellation that really does look like its namesake. In fact its cat-like countenance has natives in South America referring to it as the Jaguar.

Leo is most easily recognized by the sickle of stars that make up the lion's head. This arc of stars ends at the bright star Regulas also known as the lion's heart. Draw a line from Regulas to the triangle of stars at the left, and that's the lion's hind quarters.

Extend your eye a bit further you will come to a misty patch in the sky that is a dim constellation known as Coma Berenices. It is said to represent the locks of Berenices, the queen of Egypt. Some also refer to it as the tuft of the lion's tail. If you have a pair of binoculars, give it a look. It should fit into a single field of view.

Now that you've connected the dots and constructed the celestial cat and the tip of its tail, let your eyes continue to prowl the heavens. Just in front of Leo is another dim constellation called Cancer the crab. If you are in a good dark sky location and there is no or little Moon you will spot a misty patch slightly dimmer than, but not unlike the Pleiades. This small gathering of stars explodes into a beautiful hive of swarming suns known as the Beehive when swept up in a pair of binoculars.

Another treat for binocular users lies near the western horizon. It is the Pleiades, a small cluster of white giant stars. Later in April they will lie between Venus and the Thin Crescent Moon just after sunset. Venus will be the brightest star-like objects in the western sky. The Crescent Moon will be gorgeous and the trio will make a great photo in a 50mm lens. I recommend a setting of 400 ISO and an exposure time of about 35 seconds. But try bracketing your shot with photos on each side of 35 seconds.

Those are the highlights for April. Here are the details on what's up on a night to night basis. Pin it to your fridge and hope for clear nights.

Leo actually does look like a lion in profile. Look for this large constellation in the East/Southeast just after sunset. The brightest star is Regulas, the lion's heart. Photo by Bill and Sally Fletcher.

April 2nd welcomes the Full Moon. Due to the Moon's elliptical orbit, this will be the smallest Full Moon of the year. From April 9th through the 12th will see the Pleiades within 3 degrees of bright Venus in the western sky. April 10th hosts the Last Quarter Moon, so the dark sky nights are beginning.

New Moon occurs on April 17th at 7:36 a.m. EDT. The Crescent Moon will form a trio with Venus and the Pleiades. .

On April 25th the Moon will pass in front of Saturn just prior to setting. This should also be a good opportunity for observing for those with binoculars or a telescope.

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The Moon Is A Harsh Witness

With binoculars, examine the rugged face of the Moon. It is pocked with thousands of impact craters from interplanetary asteroids and comets. Ever wonder why Earth, a much bigger target, apparently has so few craters? They're so rare that a pristine example, the Barringer Meteor Crater in Arizona, is actually a tourist attraction. Did Earth just get lucky and dodge the heavy artillery?

No, throughout the history of the solar system, Earth was bombarded even more than the Moon. But Earth is so geologically active that earthquakes, volcanoes, and plain old weather are continually crushing, melting, and reshaping its crust. In short, Earth is continually destroying evidence of its past, including evidence of ancient impact craters. Almost all the terrestrial craters that have been identified—only some 170 at last count—have been so eroded that essential clues have been erased.

Not so the Moon. In fact, according to Paul Spudis, a senior planetary

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Apollo 16 astronaut Charlie Duke (feet shown) drives a core sample tube into the lunar regolith.

scientist at Johns Hopkins University's Applied Physics Laboratory, one of NASA's best reasons for returning to the Moon is to learn more about Earth.
"The Moon is a witness plate for Earth," declares Spudis, borrowing an apt term from weapons research. When scientists want to measure the type, amount, and pattern of damage done by an explosion, they set up diagnostic "witness plates" of various materials nearby to register the impact of shrapnel and radiation.

"Earth and the Moon occupy the same position in the solar system," Spudis explains. "While Earth is a very dynamic planet, the Moon is a fossil world with no atmosphere. So the Moon preserves a record of the early history of the solar system that is no longer readable on Earth."

That's not just speculation. In the early 1970s, the astronauts on the last three Apollo missions (15, 16, and 17) returned deep-drill core samples from three different sites on the Moon. The cores drilled more than 2 meters into the lunar regolith (the layer of broken rock and dust covering the Moon).

"The deepest samples brought up by those drill cores were 2 billion years old, and largely unchanged since they were laid down," Spudis says. And what a surprise recent re-analysis has revealed. "The lunar regolith traps particles from the solar wind. And drill cores show that the solar wind had a different chemical composition 2 billion years ago than it does today. There's no known explanation for that in solar theory. But that discovery is crucial for understanding the formation of Earth—and also the evolution of stars."

Another big question a return to the witness-plate Moon might help answer is, What caused the sudden mass extinctions of life forms on Earth that mark the ends of different geological eras?

The most famous is the so-called K-T extinction that wiped out the dinosaurs 65 million years ago, marking the end of the Mesozoic Era (the age of reptiles) and the beginning of the Cenozoic Era (the age of mammals). Much evidence suggests that an asteroid some 10 km wide slammed into Earth, creating such catastrophic climate change that photosynthesizing green plants died, starving more than half of all living beings worldwide; indeed, ground zero has been identified on Mexico's Yucatán Peninsula as the Chicxulub Crater, 160 km across.

There's evidence in the fossil record that such impacts occur periodically, "once every 26 million years," says Spudis. "Not everyone agrees, but I think it is pretty convincing."

Why would this happen? "Some theories are wild!" There might be a dark, distant companion of the sun that periodically perturbs comets in the Oort Cloud, and the comets rain down on Earth. Or perhaps the solar system as a whole is moving in and out of the plane of the Milky Way galaxy, and this somehow triggers periodic episodes of bombardment.

Before we get carried away with theory, however, "we need to establish whether this really happens," Spudis cautions. Is Earth truly subjected to periodic bombardment? Again, the Moon holds the key: Close-up study of the floors of several hundred lunar craters could confirm or falsify a 26-million year period. "We have to sample the stuff that got melted by the shock of impact, and determine the craters' ages."

The Moon is a harsh—and reliable—witness for Earth.

Author: Trudy E. Bell
Credit: Science@NASA

Aloha#12 – Gemini Telescope (Gemini North)

Our second last observatory on the tour of Mauna Kea, is The Fredrick C. Gillett Gemini Telescope (AKA – Gemini North), which saw first light in 1999. This telescope is one of two, equally endowed telescopes with 8.1 m (26.5 ft) diameter mirrors. First, is as the name implies, Gemini North, located in the northern hemisphere (Mauna Kea, Hawaii). The second, its companion scope Gemini South, in the southern hemisphere (Cerro Pachon, Chile). This enables the observatories (between them) to observe all night and most any night. You might say, “They’ve got it covered”.

At an elevation of 13,824 ft (4,213 m), Gemini North is at an equal altitude as the University of Hawaii 2.2 m telescope (see The Reflector, March 2007, pg.3), perched above all the other scopes on the mountain. The classic dome of this telescope facility houses not only one of the largest optical mirrors at 8.1 m (26.5 ft) by 20 cm (8 in), but it also has its own mirror-coating facilities on site. They can coat the primary mirror with either aluminum or silver. It only takes 16 gm (1/2 oz) of aluminum (a little more than what goes into a pop can) to coat this mirror! For infrared use of the telescope, a silver coating gives the best performance. In this case, about 64 gm (2 oz) of silver are required. When the mirror is coated for infrared use, it

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Yet another unique aspect of the dome construction is not just the venting which opens at night to allow for quicker acclimatization, but the dome itself is silver-colored which aids in better temperature stabilization than the white domes. The vents are not open at the time of the picture being taken, but they are the horizontal bulge around the central dome area. The Canada-France-Hawaii Telescope is in the background.

performs equivalent to a mirror of 11 m (36 ft). Gemini North is the only telescope on Mauna Kea capable of such chameleon-like activity right on site.

Of course Gemini North, like most of the other scopes on Mauna Kea, uses adaptive optics to counteract the effects of our turbulent atmosphere (something the Hubble Space Telescope does not have to contend with). In the case of Gemini, numerous computer controlled palm-sized mirrors can be manipulated up to 1,000 times a second. This allows for such improved "seeing", that the separation between a cars headlights (1 m or 3 ft), could be detected 4,000 km (2,500 mi) away! Now that is performance.

Another novel thing about the design of this dome is that even though it weighs about 380 tons, it rides on hydrostatic bearings that when its inertia is overcome, a single person could move it! Those of our membership with roll-off roofs would love that I'm sure.

Did you know that the Gemini Observatories are a joint effort of seven nations? When I visited the Gemini Observatory – Northern Operations Center, back at the University of Hawaii (Hilo), there were the flags of the seven nations that are involved in this venture. There is a very limited public reception area at the Operations Center, but this facility had some of the best freely available information for the public (of which I availed myself). There were glossy booklets like the "Gemini Focus" (newsletter of the Gemini Observatory) and "Scientific Horizons at the Gemini Observatory: Exploring a Universe of Matter, Energy and Life". Plus there were free CD's that are interactive and provide a virtual tour of the facility on Mauna Kea. This is really amazing stuff. I think there are definite advantages to having a consortium of countries investing in one large project.

Unfortunately, Gemini North was one of the telescopes affected by the magnitude 6.6 earthquake of last October 16th. It appears that within a month of this occurrence many issues must have been corrected, as there does not appear to be any further reports about its condition since November of 2006.

For more information about the Gemini Observatories and all its partners, go to: http://www.gemini.edu

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Q. Can you name the seven nations from this image I took of the entrance to the Gemini Observatory - Operations Center?

A. The seven nations are the United States, Argentina, Australia, Brazil, Canada, Chile and the United Kingdom.

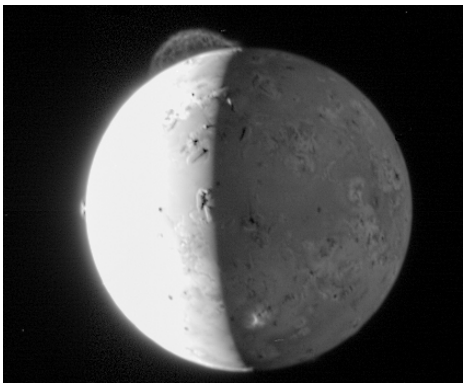
Here's A Postcard From One Of Jupiter's Moons

Pluto's downgrade may have reduced us to eight planets, but the solar system's moon count is rising rapidly. Even diminutive Pluto boasts two new moons, Hydra and Nix. This ups Pluto's moon count to three, including Charon which was discovered in 1965.

At present, our solar system is home to 162 moons. Giant Jupiter leads the pack with 63 orbiting companions. Most interesting of all its moons is Io, one of the original 4 Jovian Moons that Galileo first sighted in 1610.

NASA's New Horizons space craft swung around Jupiter a few weeks ago to acquire a gravitational turbo boost and speed up its journey to Pluto. Among a batch of photographs that New Horizons sent back was one from the Jovian moon, Io. Years ago the Galileo spacecraft identified Io (pronounced I-O) as the most volcanic area in our solar system. It's an honor the moon still holds, and New Horizons sent us a postcard of the latest eruption from volcano on Io named Tvashtar.

Photographed by an 8-inch telescope aboard the Pluto-bound spacecraft, the plum of smoke rose nearly 290km above Io. By comparison, volcanoes on Earth only spew a few kilometers into our atmosphere. Io's low gravity compared to that of Earth is the reason for its high-rise geysers. But what makes Io behave so violently? The enormous gravitational tug of Jupiter is the reason for Io's volcanic tantrums. The giant planet (1,000 times larger than Earth) tugs and pulls on Io constantly as the tiny moon orbits it. The push, pull of Jupiter's gravity on the spinning moon continually stretches it. Just as when you bend a metal strip back and forth, the point at which the bend occurs begins to heat up. The same flexing happens to Io with spectacular results.



Seen at the top left and rising 290 kilometers above Jupiter's moon Io, this huge volcanic plum far exceeds anything like it on Earth. Photo by LORRI, the Long Range Reconnaissance Imager aboard NASA's New Horizon's space craft.

Getting closer to home and Earth's Moon, the Chinese are now ready to launch their first lunar probe. Named Chang´e, the lunar probe will be launched later this year atop a Long March 3-A carrier rocket. It will orbit the Moon and take 3D topographical photographs of the lunar surface, measure the thickness of the Moon's crust and probe the Moon for usable elements for future "harvesting."

China's Moon exploration program will be executed in three phases. The orbiting probe, Chang´e is the first phase. The next phase will involve a lunar rover, and that will be followed by another rover with the capability of boring into the lunar surface and flying a chunk of the Moon home for analysis. China expects to have astronauts on the Moon's surface within the next 15 years.

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White Dwarfs, Neutron Stars and Black Holes (End Points of Stellar Evolution)

Does this title sound like University Physics 150? It is! On the evening of February 6th the Physics Department held an open lecture by Prof. Dawson on the above topic. Only four PAA members were present to hear this fascinating talk, but like previous lectures, we were not disappointed. As Prof. Dawson started by saying, the first part of his talk would be familiar to any students of first year physics. The PowerPoint slides were filled with excellent examples to illustrate the points being made and aided in the understanding of much of what was being said. However, this neophyte must admit that there was still a lot that did not sink in over the 65 minutes that was allowed for the lecture. Having said that, there was still much of interest that I made notes on. The following will give you a sense of what was discussed.

The first 40 minutes was spent on setting the stage and discussing white dwarfs. In a couple words, it became obvious that all the objects of discussion this evening could simply be called "compact objects". From another perspective, white dwarfs can be seen as the "wave of the future" because it appears to be the fate of many stars (like our own Sun).

It is estimated that up to 55% of all stars are part of binary systems (pairs or multiples of stars orbiting each other). The professor focused on Sirius B, the binary star partner of Sirius A or Alpha Canis Majoris (the star we know as Sirius – The Dog Star) in Canis Major (The Big Dog), situated so prominently on our southern sky this time of year. You may know that Sirius is the brightest star in all of the night sky, as only planets and the moon out shine it. However, in the early 1800's it was suspected that Sirius had a companion (Sirius B) and this was eventually proved to be the case in 1862. However, Sirius B is less than the diameter of Earth, but is the mass of our Sun! As a result of this compaction, Sirius B is so dense that each cubic centimeter (size of a sugar cube), weighs 2.3 metric tons! This would be like standing with a battleship balanced on your head. It would be hard to lift your leg I'm sure.

White dwarfs are like cooling embers of helium, compared to Sirius A (which is still burning it's hydrogen). It is thought that over 80% of Sirius B's

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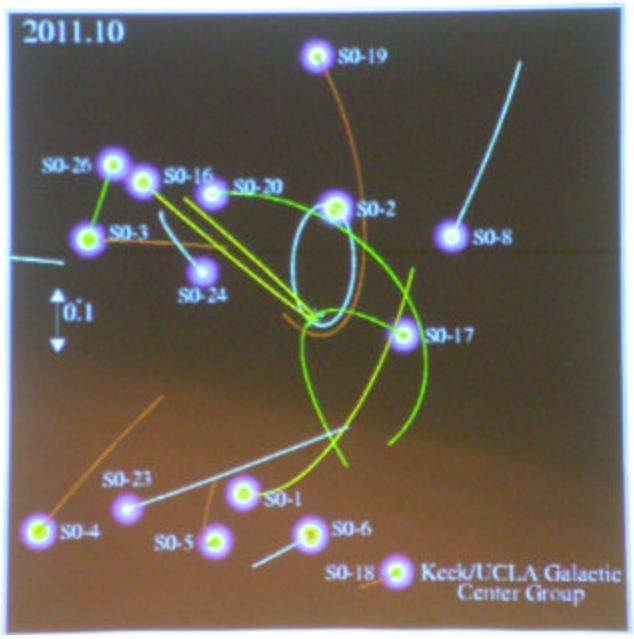

There was an amazing computer model showing nine years worth of data from the Keck Observatories at the top of Mauna Kea in Hawaii, which plotted the movement of stars around black holes. The following image shows the movement of 15 stars over the same period of time and you will notice at the centre of the model, two green orbit lines, a blue line and a brown line, that all appear to almost intersect. (Pay particular note to SO-2) There is no object shown here, but it is clear that that there must be something very powerful influencing the orbits of these stars. To watch the model move all the stars around in simulated time was quite impressive.

initial mass has been shed to date. There is a strange "inverse relationship" that applies to white dwarfs too. The greater the mass, the smaller the dwarf star will be. It is estimated that any star up to about eight solar masses, can end up as a white dwarf with an upper limit of 1.44 solar masses, but if they start bigger than this, they will end up as neutron stars or black holes. This "limit" is now referred to, as Chandrasekhar's Limit, after American astrophysicist Subrahmanyan Chandrasekhar who determined this in 1934, yet was not awarded a Nobel Prize in Physics for his work on stellar evolution, until 1983. Did you know that the Chandra X-ray Observatory that has been taking x-ray images of our universe since 1999 was named after Chandrasekhar? (http://en.wikipedia.org/wiki/Chandra_X-ray_Observatory) The following link will show an example of what it has been imaging; http://antwrp.gsfc.nasa.gov/apod/ap060810.html

By the way, he also has an asteroid named after him.

The last 20 minutes of Professor Dawson's lecture was spent talking about neutron stars and black holes. There were a number of very interesting tables and charts. Some showed the composition of a typical star's core and the order by which it burns it's fuel to stay alive. These fuels burn at different rates and intensities, so depending on the size and composition of a star it is possible to estimate the age and life of a star. The typical star has a core (in the order it will use the fuel) of hydrogen, helium, carbon, neon, oxygen, silicon and then iron.

It was a very thought provoking lecture, as always and I would recommend it to any person with a serious interest in astronomy. The price is right and we should take advantage of these opportunities when they come long. So until the next time we have a chance to be more formally educated, keep looking up.

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In Space Today

NASA's New Horizons spacecraft passed within 2.3 million kilometers of Jupiter on February 28th. That's the closest any terrestrial craft has been to the giant planet in 4 years. New Horizons is on its way to Minor Planet Pluto, but to gain speed, it swung around Jupiter for what is called a gravitational assist. If you remember what it was like to be the last person in the line playing crack the whip, you have the idea.

The gravitational assist boosted the craft's speed by 14,000 km/h to 72,000 km/h. New Horizons is one year and 800 million km into its mission. It is the fastest spacecraft NASA has launched with a speed prior to the gravitational assist of 58,000 km/h. As it swung past giant Jupiter, the craft's camera snapped a number of photographs, including one of a volcano erupting on Jupiter's moon, Io. New Horizons has 4 billion km yet to travel to rendezvous with Pluto in 2015.

The European Space Agency's Rosetta spacecraft performed a successful swing-by of Mars on February 29th. As was the reason for New Horizons' swing around Jupiter, Rosetta needed to gain speed to complete its mission on time. Rosetta is on its way to study a comet that goes by the forgettable name of 67P Churyumov-Gerasimenko. During its journey, Rosetta will also study two asteroids known as 21-Lutetia and 2867 Steins. They are in the asteroid belt between Mars and Jupiter. Asteroids and comets are the left over building blocks from our solar system's origins.

Rosetta will eventually land on the comet and is expected to add to the body of knowledge already gleaned from the Deep Impact and Star Dust missions. Its date for arrival at Comet 67P Churyumov-Gerasimenko is 2014.

Boom goes the Russian rocket and the space junk count rises to 12,000+ bits of potentially devastating debris. That's the latest tally of 4-inch and larger chunks after an abandoned Soviet Briz-M rocket's fuel cells ruptured in Earth orbit.

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There is already great concern over the growing amount of debris and the dwindling number of clear orbital paths remaining. Space debris can travel as fast as 20,000 km/h, so even a fleck of paint would spell death to a spacewalking astronaut.

Space junk of the eatable kind made the news when astronaut Sunita Williams, overshot her packaged salmon with a spicy green wasabi sauce. The sauce squirted from its tube and began floating around inside the space station. The fluid could cause damage to the instruments aboard the craft, so clean up had to be quick and complete. The sauce and its tube are now confined to a cargo bay where they will remain for the duration of the astronaut's duty tour aboard the space station.

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NASA Space Place

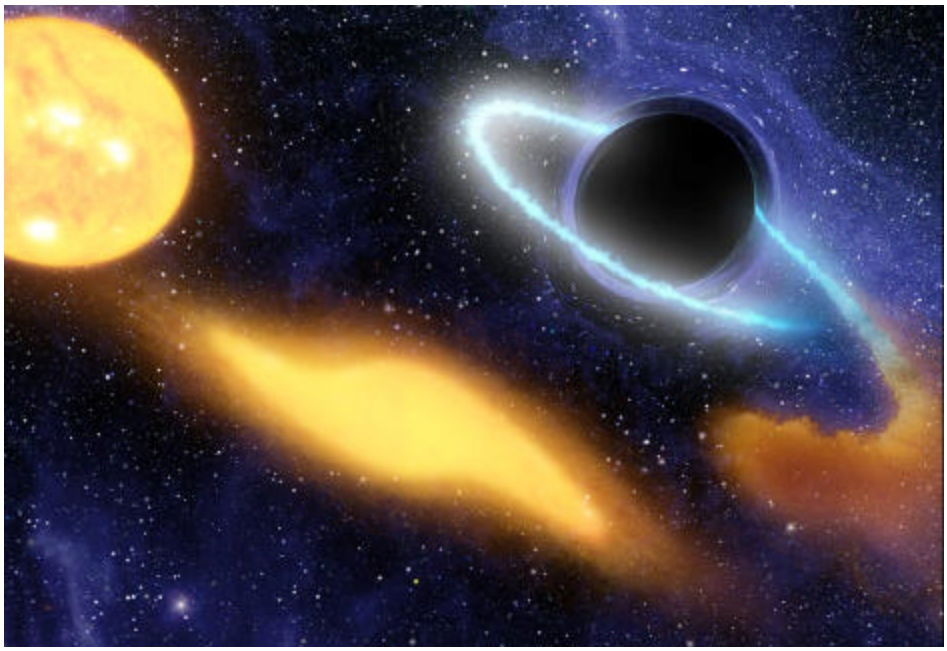
Early Bird Gets the Worm

We all know that birds eat worms. Every day, millions of birds eat millions of worms. It's going on all around you! But how often have you awakened in the morning, stalked out in the dewy grass, and actually seen a bird having breakfast? Even though we know it happens all the time, a bird gulping a worm is a rare sight.

Just like a black hole gulping a star…

Every day in the Universe, millions of stars fall into millions of black holes. And that's bad news for the stars. Black holes exert terrible tides, and stars that come too close are literally ripped apart as they fall into the gullet of the monster. A long burp of X-rays and ultraviolet radiation signals the meal for all to see.

Yet astronomers rarely catch a black hole in the act. "It's like the problem of the bird and the worm," says astronomer Christopher Martin of Caltech. "You have to be in the right place at the right time, looking in the right direction *and* paying attention."



In this artist's concept, a giant black hole is caught devouring a star that ventured too close.

A great place to look is deep in the cores of galaxies. Most galaxies have massive black holes sitting in their pinwheel centers, with dense swarms of stars all around. An occasional meal is inevitable.

A group of astronomers led by Suvi Gezari of Caltech recently surveyed more than 10,000 galactic cores—and they caught one! In a distant, unnamed elliptical galaxy, a star fell into a central black hole and "burped" a blast of ultraviolet radiation.

"We detected the blast using the Galaxy Evolution Explorer (GALEX), an ultraviolet space telescope," explains Gezari. Her team reported the observation in the December 2006 issue of *The Astrophysical Journal Letters*. "Other telescopes have seen black holes devouring stars before," she adds, "but this is the first time we have been able to watch the process from beginning to end."

The meal began about two years ago. After the initial blast, radiation diminished as the black hole slowly consumed the star. GALEX has monitored the process throughout. Additional data from the Chandra X-ray Observatory, the Canada-France-Hawaii Telescope and the Keck Telescope in Hawaii helped Gezari's team chronicle the event in multiple wavelengths

Studying the process in its entirety "helps us understand how black holes feed and grow in their host galaxies," notes Martin.

One down, millions to go.

"Now that we know we can observe these events with ultraviolet light," says Gezari, "we've got a new tool for finding more."

For more on this and other findings of GALEX, see www.galex.caltech.edu. For help explaining black holes to kids, visit The Space Place at spaceplace.nasa.gov.

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

By: Dr. Tony Phillips

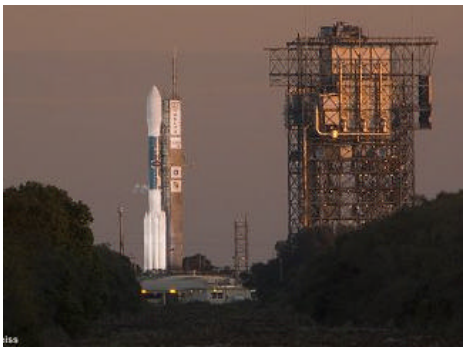
AURORA MYSTERY MISSION

Scientists have been studying auroras for centuries, and you might suppose there's no mystery left in the Northern Lights. Wrong. Sometimes, with no warning, gently shimmering pale auroras erupt in a riot of wildly-shifting colors. This is called an "auroral substorm" and no one knows what causes it.

NASA's plan is to launch a fleet of five satellites into Earth orbit. The name of the mission is "Themis" - named after the Goddess of Good Counsel and the antithesis of "Nemesis" - and its goal is to crack the mystery of the substorm. NASA is undertaking the mission to investigate what causes auroras in the Earth's atmosphere to change in appearance and dissipate. Discovering why the light of auroras can fluctuate and fade will provide scientists with important details on how the planet's protective magnetosphere works and on the sun-Earth connection. In the process, researchers hope to learn new things about Earth's magnetosphere.

Taking multitasking to new heights, NASA launched the five Themis satellites aboard a single Delta II rocket from Cape Canaveral Air Force Station in Florida at 6:01 p.m. EST, on February 17. Racing into space on the flaming power of three rocket stages and nine solid rocket motors, the Themis satellites will soon disperse around Earth to monitor auroras like the Northern Lights."

Submitted By: Mark Coady
Credit: www.spaceweather.com



Themis on the launchpad. Credit: Mike Theiss

The Sky This Month

MERCURY

Mercury is hard to view this month. It is in the morning sky but too low to the southern skies to be easily seen.

VENUS

The "evening star" is dazzling viewers in the northern hemisphere as it hovers far above the sunset horizon. It continues to climb away from the Sun, rising ever higher in the darkening sky.

MARS

Mars is in the morning sky, but still hugging the horizon until dawn. At midmonth it is in Aquarius, but appears small and is not much of a telescopic sight right now.

JUPITER

Jupiter is highest and best placed in the southern sky shortly before sunrise. It is currently in Ophiuchus,

SATURN

Currently between Cancer and Leo, near the bright star Regulus, Saturn is well placed for evening observations.

URANUS

Uranus is too close to the Sun to be readily observed.

NEPTUNE

A telescope is usually necessary to view the most distant planet in the solar system, but is also too close to the Sun to be readily observed.

METEOR SHOWERS:
Lyrids Meteors peak on April 22, with about 20 meteors per hour .

For details, see http://comets.amsmeteors.org/meteors/calendar.html.

PAA Members Are In For A Scientific Film Fest

Here's a brief rundown on the new titles that are available from your PAA library. Our librarian, Joanne Stockton is the keeper of the keys. You can reach Joanne at: joannestockton@xplornet.com or via the telephone at 705-639-5591. Reserve your movie now so she can bring it to our next meeting. There's a complete listing of the club's library contents on our website at www.peterboroughastronomy.com

Darwin. Few know that Charles Darwin lived with a horrible secret. Today we know it as Darwin's Law of Evolution. But in Darwin's time such thinking could have cost him his position as an educator and his reputation with the scientific community. So, like Galileo, he had to choose his words very carefully. This two-hour DVD delves into his personal life, highlights his moments of remarkable achievement, and gives us a glimpse into the dark world in which the man had to carefully shield the glow of his enlightened thinking. Today we see Darwin's Laws at use in creating cures for disease. Yet they are still challenged by the proponents of some religions. While the DVD never says anything directly about it, one is left with the impression that Darwin's true religion was science. Right or wrong, we are better for it.

Newton's Dark Secret. While this sounds like the headline from a tabloid, Newton was also known to dabble in the occult. Not so much because he believed in it, but because he thought that it could yield some secrets of merit. So, while the man who gave us the Newtonian telescope, the Laws of Gravity, and much more spent his daylight hours laboring in the accepted sciences, his nights were often spend exploring ancient formulas of the alchemists. Today scientists do much the same when exploring native cures and medicines because many are based on chemicals extracted from plants that grow wild in nature. But that's to

Continued...

day. Newton's world was far more dangerous for anyone who strayed beyond the boundaries established by the church. But, despite a nervous breakdown, Newton pressed on. If the church said he was possessed by a demon, then that demon was the need to know – everything.

The Best Mind Since Einstein. Richard Feynman is probably best known as the man who solved the mystery of the Challenger disaster. Yet it was almost swept aside in the political scramble to cover butts further up the food chain. Happily Feynman prevailed, the truth is now known and my opinion of engineers is even higher. Management on the other hand… But that was only one facet of the man's life. He was a modern day Michelangelo who excelled in many disciplines. He loved art. He became a proficient bongo player. His teaching and speaking skills were legend. And his thirst for knowledge resulted in some famous though somewhat odd discoveries. The most famous of these is the fact that you cannot break a stick of spaghetti into two pieces. Break it and you will have three or more pieces. Feynman and one of his students spent the night experimenting. And when the sun rose in the morning, the kitchen floor was deep with spaghetti sticks - all broken into three

pieces. This is a most enjoyable DVD with humor and science mixed in equal doses.

Saturn and Titan. This DVD chronicles the development, launch, and mission of the Cassini Mission to Saturn. On board the spacecraft was the Huygens probe which has been launched to Saturn's giant moon, Titan. Produced prior to the actual arrival at Saturn, the DVD gives viewers an insight into the incredible scope of the mission. This is the last of the old-fashioned "damn the costs, build it right" missions. And today we are reaping the benefits in a flood of information that astronomers will be studying for years to come. Beautiful computer graphics and a great tale unfold in this well produced DVD.

The Celestial Sphere. Beginners who want to find their way around the night sky will find this DVD an absolute necessity. I have never seen anything quite so useful as this "how to" on connecting the celestial dots into constellations. Produced by Starlight Theatre under the auspicious of Robert Dick, a well-known amateur astronomer and RASC member, the 57-minute DVD covers all the basics – stellar motion, Earth's rotation, why the constellations change with the seasons, and how one constellation can be used to point the way to another…and another… and more. This DVD was produced originally on film and released on videotape. Now it has been updated and in the convenient DVD format can even make the trek to the field via one of the new compact DVD players with a built-in screen. Better get a neck pillow because you'll be looking up a lot.

Death Star. Don't confuse this DVD with Death of a Star, it's the same subject, but with a very different outcome. Unfortunately it's not one that will cheer you up. In this DVD a number of noted physicists and astronomers are working on the problem of what would happen if we were to have a nearby star go supernova. It can be summed up in two words – the end. But what are the probabilities of this happening? Did this ever happen in our distant past? Last month's Sky & Telescope did an article on the possibility. As with all NOVA features, the graphics and production values are first rate. And the cast of scientists is filled with all the best. Enjoyable and enlightening, even if nobody lives happily ever after.

Runaway Universe. We all know that the universe has been expanding since the big bang. But isn't it supposed to end? Won't there be a big crunch? What's the role of the mysterious dark matter in this? And what about the dark force? This DVD doesn't have the answers, but the questions it poses will tickle your brain's tummy and wet its appetite for more, please! Runaway Universe is yet another superb NOVA production that takes you inside the finest minds of the most articulate astronomers currently working on the subject. It's for all you amateur cosmologists and armchair astronomers.

John Crossen
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J O K E ! J O K E ! J O K E ! J O K E !

NASA just disclosed details why the Rover wouldn't accept any commands. They took a picture of the Rover's built-in display which showed a Windows screen and the text, "press any key to continue".

! J O K E ! J O K E ! J O K E ! J O K E

Peterborough Astronomical Association

The Reflector is a publication of the Peterborough Astronomical Association (PAA). Founded in 1970, the PAA is your local group for astronomy in Peterborough and the Kawarthas.

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ARTICLES

Submissions for ***The Reflector*** must be received by the date listed below. E-mail or "sneaker-net" (i.e., floppy disk) submissions are preferred (Microsoft Word, ASCII and most graphics formats are acceptable). Typed or hand-written submissions are acceptable provided they are legible (and not too long). Copyrighted materials will not be published without written permission from the copyright holder. Submissions may be edited for grammar, brevity, or clarity. Submissions will be published at the editor's sole discretion. Depending on the volume of submissions, some articles may be published at a later date. Please submit any articles, thoughts, or ideas to this address:

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Please contact me first if you are sending a large file.

NEXT ISSUE'S DEADLINE IS
Apr. 15, 2007
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MEETINGS

The Peterborough Astronomical Association meets every first Friday of most months at the Peterborough **Zoo Orientation Centre** (Next to the PUC Water Treatment Plant) at **8:00 pm**.

CALENDAR OF EVENTS

April 20, 2007	**General Meeting—** To Be Announced
May 4, 2007	**General Meeting—** Rene Bowe explains how to build a telescope

Moon Phases

Full Moon	**April 2, 2007**	**May 2 & 31, 2007**
Last Quarter	**April 10, 2007**	**May 10, 2007**
New Moon	**April 17, 2007**	**May 16, 2007**
First Quarter	**April 24, 2007**	**May 23, 2007**