

Editorial

The chilling cold weather has lingered on this February, but that hasn't stopped scientists and astronomers around the world from continuing their work. Just last month, on January 24th, the Japanese launched a new satellite for Earth observation. This satellite is called the Advanced Land Observing Satellite (ALOS), and it is capable of taking many 3-D pictures quickly and accurately.

On another note, the Otonabee Conservation Foundation is planning a presentation by Terence Dickinson at Trent's Wenjack Theatre this May 24th. That's a date you will want to mark off on your calendar!

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Mars Express Detects Unusual Terrain on Mars

Pictures taken by ESA's Mars Express spacecraft show a region on Mars called the Phlegethon Catena with a high density of pits and tectonic grabens. Geological extension of the crust forms these grabens, which are areas of land that have dropped relative to their surroundings.

The grabens of Phlegethon Catena range from one half to 10 km in length. The circular pits that run along the grabens are rimless and range from 0.3 to 2.3 km across. Scientists are unsure of the exact causes that created this unusual landscape on Mars. There are some possibilities, though. One is that the grabens may be associated with the formation of the volcano Alba Patera, or Tharsis to the south. The pits may have been caused by



A perspective view of the Phlegethon Catena region on Mars. Image credit: ESA

the collapse of the surface due to removal of subsurface materials.

The spacecraft Mars Express, that took this picture (above), is the first European mission to Mars, and also the first planetary mission operated entirely by Europe. Mars Express is designed to scan the surface and atmosphere of Mars. It reached Mars in December 2003 and has since then been searching for signs of water down to a few kilometers underground, mapping the Martian surface more accurately than ever before, and even searching for present

and past life on Mars. These are just a few things this spacecraft is capable of doing.

Mars express will perform the most detailed and complete exploration of Mars ever done. Along with all of this, it is producing high-quality images using the High Resolution Stereo Camera it has on board.

For more information, go to:
www.esa.int/SPECIALS/Mars_Express

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It's Busy Out There In Space

Anyone who thought the golden age of space exploration ended with the Apollo Missions has been living under a rock. Here's a brief review of what's up and who put it there.

Japan's mission to an asteroid is a success – so far. Japan's Hayabusa space probe has landed on near-Earth asteroid Itokawa. (Hayabusa is Japanese for falcon.) Its mission is to photograph the asteroid's surface, then scoop some material from the surface and return it to Earth for analysis. At present the refrigerator-sized Hayabusa probe has sent back some fascinating photographs of the bolder-strewn asteroid. If it is successful in returning samples of Itokawa's rocky composition to Earth, it will be the second such feat since the Apollo missions returned with lunar rock samples. Itokawa is a near-Earth asteroid and its orbit frequently brings it closer to the Earth than the Moon. Itokawa is thought to be composed of leftover material from the inner solar system's formation 4.6 billion years ago. With any luck, we'll soon know.

Exoplanet 161 discovered. But this one's no oddball. The planet's mass is estimated to be that of about 5.5 Earths. So far that's been the norm, primarily

because the high mass exoplanets are easier to detect. The only known exoplanets with a lower-than-Earth mass are four objects that are orbiting a pulsar – the collapsed core of a star that went supernova. The discovery is credited to three international astronomy groups.

Welcome home StarDust. The last time NASA visited a comet (Deep Impact), they blew a big chunk out of it. They're motive was to study the inside of the comet and analyze fresh material that had not been exposed to the harsh environment of outer space for perhaps billions of years. Now the StarDust capsule has returned with some dust from a comet's tail. The comet in this case is Comet Wild 2 and the returning StarDust capsule parachuted to the Utah desert on January 15th. During its journey the capsule was maneuvered into the tail of Comet Wild 2, and while traveling at 21,000 km/h it trapped some material from the comet's tail in a remarkable substance called aerogel. Nearly as light as air and nearly invisible, this foamed glass material collects the particles. When they hit the aerogel, the particles burrow in, making carrot-shaped tunnels. Scientists will study this material in the hopes of uncovering new clues to the birth of our solar system.

International Space Station due for an addition. New additions to the

ISS will quadruple its surface area and raise it in brightness by a factor of one magnitude. Apparently hardware for the new additions has been stacking up at Kennedy Space Centre while the U.S. gets its shuttle program back on track. Missions in 2006 and 2007 will see the delivery and installation of these materials on the ISS. In addition to giving sky-watchers a treat, the additions will extend the usefulness of the international facility..

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The Apollo Chronicles II

Thirty years ago their strange experiences were as well-known to the public as the Man in the Moon. Not anymore. Many of the best tales of Apollo have faded with the passage of time. Even NASA personnel have forgotten some of them. But with NASA going back to the moon in search of new tales and treasures, we revisit some of the old ones, with a series of Science@NASA stories called "Apollo Chronicles." This one, the second, explores moondust and puts it in a rather unusual light.

Jack Skis the Moon

Now *this* is a ski report: Clear skies, no wind, sweet slopes and deep powder – not expected to melt for at least five billion years. Grab your poles and pack your bags. Just don't forget your space-suit, because you're going to the moon.

The moon's dust-covered mountains reminded more than one Apollo astronaut of a winter wonderland: "My snowsuit's

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SPACE JUNK

Little-known facts – just for fun

1. Eighty percent of the stars that exist in the Milky Way (our galaxy) are never seen – even in backyard astronomers' telescopes. These dim little stars are categorized as red dwarfs.
2. It is estimated that there are over 8,000 significant pieces of space junk currently orbiting the Earth. The problem for the astronauts is that these chunks of junk are traveling at about 17,500 km/h. Ouch!
3. Moon dust stinks, or at least that's what the astronauts say. According to those who have had a sniff a little lunar turf, it smells like gunpowder.
4. Astronauts aboard the ISS will soon launch an empty Russian space suit into orbit. Equipped with batteries, a transmitter/receiver set up, and called SuitSat) will be a communications link between students and astronauts.

ready," joked Apollo 14 pilot Ed Mitchell after donning his spacesuit for a walk around Fra Mauro. Commander Al Shepard agreed, "You're ready to go out and play in the snow."

"Oh, boy, it's beautiful out here! Reminds me of Sun Valley (a ski resort in Idaho)," radioed Apollo 15's Jim Irwin from his landing site near the sinuous Hadley Rille. Underfoot, the soil was cushiony like "soft powder snow." Towering 11,000+ feet above him, Mount Hadley Delta strangely resembled "Dollar Mountain at Sun Valley, a practice hill with great skiing conditions." After the mission, Irwin lamented "If I'd realized that Sun Valley was going to invite me up as their guest, I would have mentioned all the other great ski areas in the world!"

"Man this is a fun ride!" exclaimed Charlie Duke, test-driving the Apollo 16 moon buggy around the Descartes Highlands. "Occasionally, the back end breaks loose," he reported, "but there's no problem." In the passenger seat, commander John Young chipped in, "It's just like driving on snow, Houston. By golly!"

Strange but true: A quarter million miles from Earth on a world where the midday sun heats the ground hotter than boiling water, Apollo astronauts couldn't stop talking about snow.

No one had the bug worse than Apollo 17 geologist Harrison "Jack" Schmitt.

"Too bad I don't have my skis!" he radioed Houston from a geology-stop in the mountain-lined Taurus-Littrow Valley.

"Jack, did you get a pan up here?" Commander Gene Cernan reminds Schmitt to photograph the site.

Schmitt: "No, I forgot. I got interested in skiing."

Cernan: "I'll get one." He does the job himself.

Jack switches to a two-footed skiing stance and makes repeated sounds of skis gliding: "Shhh. Shhh. Shhh. Shhh Shhh. Shhh. Who! Can't keep my edges. (Pause) Shhhoomp. Shhhoomp. Little hard to get a good hip rotation."

Using trial and error to refine his technique, Schmitt quickly invented a no-gear method for lunar skiing. Call it "lunar cross country skiing."

"In the moon's low gravity," he explains 35 years later, "you can ski *above* the moondust--and I did. Imagine swinging your arms and legs cross-country style. With each push of your toe, your body glides forward above ground. Swing, glide, swing, glide. The only marks you leave in the moondust are the toe-pushes."

Cernan called this "loping," and he didn't think so much of it, preferring his own "kangaroo hop" for locomotion.

But that's another story.

If he could've, Schmitt would have tried downhill skiing. "I think downhill techniques would work very well on the moon," he says. "You even have built-in moguls, the impact craters on the slopes. Lunar gravity would allow all kinds of jumps and hops that you might find difficult on Earth."

There's just one problem: Unlike true snow, "moondust is very abrasive." Apollo astronauts found this out when it got on their spacesuits. Moondust infiltrated every nook and cranny, causing air leaks, binding joints and scratching ball bearings. It was a tremendous nuisance

Moondust is abrasive because of the way it is formed--by violence. For billions of years, asteroids large and small have been hitting the moon's surface, shattering rocks and fusing topsoil into glass. The ceaseless pounding (which still goes on today) has rounded the moon's jagged mountains into ski-friendly slopes and coated the moon with a powdery residue of broken glass and sharp-edged rock--moondust.

"To ski the moon, you'd need gear that could slide over this very abrasive material. Maybe Teflon-coated skis would work," Schmitt suggests. (Teflon has the lowest coefficient of friction of any known solid material.)

It's not such a crazy idea. Here on

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Apollo 15 astronaut Dave Scott ascends the cushiony base of Mt. Hadley Delta. Photo credit: Jim Irwin

Earth, people ski on sand dunes, for instance, at the Great Sand Dunes National Park in Colorado. Ordinary skis sprayed with silicon lubricant or WD-40 shoot down the dunes as if they were groomed snow trails. Sleds fashioned from cardboard and duct tape work well, too.

But, cautions Schmitt, "moondust is much more abrasive than sand." Typical grains of Earth-sand measure 250 to 500 microns (millionths of a meter) across and have rounded edges. They easily slip, slide and roll. A typical grain of moon-dust, on the other hand, measures less than 100 microns wide and has very sharp edges. The fine grains lock together "like Velcro," says Schmitt, "and scratch anything that comes in contact with them." A Teflon ski-coating might not last long.

Time to invent a new material? NASA is going back to the moon, with a first wave of astronauts due to arrive in 2018 or so. The long-term goal is to establish a permanent outpost. Skis and sleds might come in handy for workaday transportation or weekend recreation

Schmitt wishes he could go, too. The powder is out of this world.

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Mission To Pluto Is Anything But Goofy

So who would want to visit a planet that's so far away it will take the fastest rocket we've ever built 9 years to get there? How fast is fastest? Back in the Apollo days it was a two-day trip to the Moon. This little puppy gobbled up those 400,000 km in just nine hours. That's a big bunch faster, but New Horizons (as the craft is known) still has a long, long way to go.

Pluto is 39 times farther from our Sun than Earth is – about 5 billion kilometers.

Even light traveling at 300,000km/S takes about 4.5 hours to reach Pluto. From that distance our Sun appears to be nothing more than a very bright star. In fact, chilly Pluto receives less heat from the Sun than Earth does from moonlight. What's its average temperature? Minus 213 to minus 223 degrees C is normal. So you'd better make sure the backdoor on your Dr. Dentons is latched down tight if you're going for a visit!

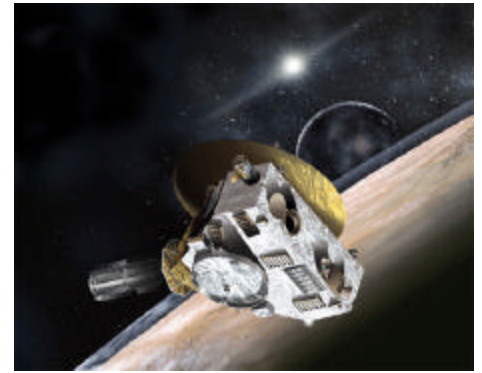
What's the point of exploring this hostile little world? It's not even as large as our Moon. As far as we can tell there is little chance that anything we'd recognize as a life form inhabits it. Plus we haven't been able to detect any water on Pluto – either at the present or in the planet's past.

Perhaps this mission isn't really just about Pluto. After all it's called New Horizons, and it seems logical to me that learning more about this part of our solar system is the real thrust of the adventure. This new and fertile area is called the Kuiper Belt, and scientists currently think we can learn a great deal about the origins of our solar system by studying it. They could be right, simply because we know so little about it.

After 75 years of observing Pluto, we have just discovered that it has two more moons. (Thanks again, Hubble Space Telescope.) At the moment these 100-km to 150-km wide satellites are known as S/2005P1 and S/2005P2. Even Pluto's first moon (Charon) wasn't discovered until 1965 – about 35 years after Clyde Tombaugh discovered the planet at Lowell Observatory in Flagstaff, Arizona.

Don't expect to see any of these new moons with your backyard telescope. They shine at magnitudes 23.1 and 23.4 respectively. Even Pluto itself is a 14th magnitude pin-prick of light that's invisible in telescopes with less than a 4-inch aperture.

So why has this chillingly cold, dark and distant part of our solar system become a real hot spot? Besides



The New Horizons spacecraft will begin photographing Pluto, Charon, and its two new moons – P1 and P2 about 5 months prior to its rendezvous with the distant world. But don't hold your breath, that'll be on July 15th, 2015. Image is courtesy of NASA.

holding possible clues to our solar system's origin, it is also a new territory to be explored. One that might also help us in exploring the 160 extra solar systems we know to be orbiting other distant suns.

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Mauna Kea – Hawaii's Sacred Mountain

Standing at 13,796 feet (4,205 m.), Mauna Kea is the tallest mountain in the whole Pacific. Technically, the summit of this mountain is higher than Mount Everest! That is if you were to measure from the base of each mountain, because Mauna Kea starts at the bottom of the Pacific Ocean about 15,000 feet (4,572 m.) below sea level. This extinct volcano last erupted about 4,500 years ago and makes up almost one quarter of the Big Island of Hawaii. With a land base 51 miles (82 km) long and 25 miles (40 km) wide, it covers almost 920 sq. mi. (1,480 sq. km.). You can see the summit from almost anywhere on the island on a clear day (that was neat). A few weeks ago my wife Valerie and I had the pleasure to visit the Hawaiian island

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Most of the observatories built around the summit of Mauna Kea, Hawaii.

chain for two weeks. It goes without saying that a tour of Mauna Kea was part of our agenda. The tour to the top of Mauna Kea was a highlight of our trip. I will attempt to give you a sense of what it was like to be at such a special place.

To the Hawaiians, Mauna Kea means literally, “White Mountain” because during the winter it does have a snow capped summit. Snow is the body form of Poli`ahu, the goddess of Mauna Kea. Mauna Kea can also be translated as “Wakea’s Mountain”. Wakea is the sky-father of the Hawaiians. Mauna Kea is a sacred and special place, you can feel it.

For those of you who may not be aware, Mauna Kea is also the highest and best observatory site in the world. In fact it is so good, that ten countries (including Canada) have built thirteen observatories around its summit, to capitalize on the near perfect observing conditions. Due to the Pacific trade winds and high altitude, they remain above the normal cloud band that exists from 7,000 to 9,000 feet (2,133 to 2,742 m.). They can count on an average of over 300 clear observing nights a year! How is that for clear skies? I guess with less atmosphere to look through they can say as they do there, that Mauna Kea is “Clearly the best”! The picture I have included here is an almost 180 degree view, a few hundred feet below the summit, looking east. If you look carefully, you will be able to spot nine of the thirteen observatories!

This trip should be an astronomer’s pilgrimage (to Mecca, so to speak) and should be attempted at least once in a lifetime, if you can (money and health permitting). On so many levels, this visit to the “White Mountain” was a religious experience for me. Only those who have stood at almost 14,000 feet, in the thin

atmosphere above the clouds and watched the sun set, can truly appreciate the feeling you get and know of what I speak. We were blessed with near perfect weather for our trip up the mountain too. At the summit, there was snow (hard as ice really), but the temperature was just below freezing and the winds were light, so the wind chill was negligible. For us, it was a trip of a lifetime and one that we will remember the rest of our lives.

Over the next year, I plan to share with you a view of Mauna Kea that is up close and personal. I hope to be able to give you an in-depth look at each observatory at the summit from the most up to date material I was able to collect while on the Big Island. I stopped into every observatory command center (either in Hilo or Waimea) to find out what information they provide to the public on their facility and did it ever vary. At one place I pushed a button and after making my request on an intercom, someone came out and handed me a few brochures. While at another, there was a miniature visitor center with interactive monitors, literature and couches to relax in. Luckily, they all had at least some information available for the amateur astronomer. Did you know that virtually none of the observatories are actually run at the summit? Instead the programmers, imagers and astronomers are up to 42 miles (67 km) away in a command center where it is nice and warm, comfortable and no one has to deal with the possible effects of altitude sickness. At the summit are a few technicians, laser spotters and other staff who keep things “operational”. Unfortunately, the public is not allowed in most of the facilities at the summit. In fact, ten minutes after the sun sets the domes start to

open and then all tours most be heading down the mountain, with only running lights on for the first few thousand feet (that was fun). So, we never got inside any of the observatories on our tour. However, it is possible to take tours that will get you inside some of the facilities, if you are there either earlier in the day or on weekends (neither worked out for us). I will share what I have with you in future issues of The Reflector.

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Let’s Move The Olympics To The Moon

Every four years the Olympic Games pop up in a new venue. Countries and large cities spend millions to attract the Olympic lords of the rings’ attention – and hopefully their patronage. Billions of tourist dollars are at stake, not to mention the expensive TV rights, commercial time, designer clothing, and lots of tacky plastic souvenirs. But, what’s in it for athletes? Why not pick a site that would let the real stars of the show excel beyond their wildest dreams.

It may sound a little crazy at first, but think about the possibilities of holding the Olympics on the Moon. With just one sixth the gravitational pull that Earth-bound athletes experience and no wind resistance, the lunar Olympics would produce results that would make today’s gold medalists look whimpy.

Ski jumpers would reach heights and distances that might have to be measured

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With just 1/6th the gravitational pull of Earth and no atmosphere to create wind resistance, the Moon would be a great place for breaking Olympic records. So would Mars, Mercury and Pluto. Venus would be about the same as Earth. The gas giants Jupiter, Saturn, Uranus and Neptune on the other hand, would definitely put all the action into slow-motion. The crater in the upper right-hand portion of the photo is Plato. The mountain range to its right is the Lunar Alps.

in kilometers. The Moon's high mountains and dusty surface would be great for down hill runs. Snowboard stunts would be nothing short of amazing – anyone for a quadruple flying back-flip with a half twist thrown in?

Slap shots would almost reach the speed of sound, and the rink would have to be lengthened by a factor of about six to accommodate the distance a shot could travel. Of course taking a good solid check could land you in the cheap seats of the nose-bleed section.

There's even a lunar link to our present Olympics. Instead of the Italian Alps, we'd have to settle for the lunar alpine range – it's there, honest. And if you want to pay homage to the Greeks who originated the Olympic Games centuries ago, there's a crater named Plato that's conveniently near the Alps.

Unfortunately we'd all have to hold our breath for two weeks because the Moon has no atmosphere. So, while there wouldn't be any wind resistance for the skiers, ski-jumpers, and bobsledders to put up with, you and I would be turning blue from lack of oxygen.

Of course we could move the whole event to gigantic Jupiter with 318 times the mass of planet Earth. Imagine trying to do anything athletic on a planet the tug

of gravity is so great that raising a Quarter Pounder to your mouth might earn a gold medal.

All of this is just to remind us that, in addition to being very different from dear old Earth in their composition, the planets would also exert different forces on us. So let the games begin.

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Bargain Hunters Discover Astronomy Book Deals

Mark and Susan Coady have a reputation for digging up the deals at yard sales. Now they've turned their attention to astronomy books, and the PAA Library is the benefactor. The latest additions courtesy of the Coadys include: *A Child's First Library of Learning – Sky and Earth*, *the Neptune File*, *How to Use An Astronomical Telescope* and *the Search For Extraterrestrial Life*.

Mark reports that *A Child's First Library of Learning* is an excellent book for children. It uses a simple

question and answer format to take young readers through the most frequently asked questions about the Earth and sky. The book also has many helpful hints for parents and grandparents that will help them in assisting their young charges to better understand our home planet and the universe we live in. Our bargain hunters pried this one loose from Value Village for a skinny \$2.99!

The Neptune File gives readers on an intriguing look into astronomical rivalry and the pioneers of planet hunting. There still remains a great deal of controversy as to who first discovered Neptune and should have gotten credit for it. Originally published in 2000 by Berkley Books, *The Neptune File* drained our heroes' pockets to the tune of \$3.99 at Dixon's Used Bookstore.

If you're new to the world of telescopes, *How to Use an Astronomical Telescope* from *A Beginner's Guide to Observing the Cosmos* is precisely what you're looking for. Written by James Muirden for the Linden Press in 1985, it is current enough to cover all the popular telescope designs in use today. Mark and Susan popped it off the shelf from the Scholar Used Bookstore on Water Street for the humble sum of \$12.00.

The Peterborough Square's used book store was the last shop to receive a visit from our wheeler-dealer duo. There they scored *Extraterrestrial Life and How to Find It*, a fascinating recounting of the search for life beyond Earth from early man through Fermi's Paradox and Frank Drake's formula for the possibility of life elsewhere in the universe. Grand total for this visit - \$10.00.

Happily for us, Mark and Susan have donated the books to our club library. But just in case you're interested in owning a copy of any of the above mentioned books, you know where to find them and how many pennies to shake out of the pig. According to Mark and Susan, frequent visits are recommended because these stores are constantly rotating stock and new titles show up weekly.

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NASA Space Place

Moving a Mountain of a Dish

Your first reaction: "That's impossible!" How on earth could someone simply pick up one of NASA's giant Deep Space Network (DSN) antennas—a colossal steel dish 12 stories high and 112 feet across that weighs more than 800,000 pounds—move it about 80 yards, and delicately set it down again?

Yet that's exactly what NASA engineers recently did. One of the DSN dishes near Madrid, Spain, needed to be moved to a new pad. And it had to be done gingerly; the dish is a sensitive scientific instrument full of delicate electronics. Banging it around would not do.

"It was a heck of a challenge," says Benjamin Saldua, the structural engineer at JPL who was in charge of the move. "But thanks to some very careful planning, we pulled it off without a problem!"

The Deep Space Network enables NASA to communicate with probes exploring the solar system. Because Earth is constantly rotating, a single antenna on the ground can communicate with a probe for only part of the day, when the probe is overhead. By placing large dishes at three locations around the planet—Madrid, California, and Australia—

NASA can maintain contact with spacecraft around the clock.

To move the Madrid dish, NASA called in a company from the Netherlands named Mammoet, which specializes in moving massive objects. (Mammoet is the Dutch word for "mammoth.")

On a clear day (bad weather might blow the dish over!), they began to slowly lift the dish. Hydraulic jacks at all four corners gradually raised the entire dish to a height of about 4.5 feet. Then Mammoet engineers positioned specialized crawlers under each corner. Each crawler looks like a mix between a flatbed trailer and a centipede: a flat, load-bearing surface supported by 24 wheels on 12 independently rotating axes, giving each crawler a maximum load of 194 tons!

One engineer took the master joystick and steered the whole package in its slow crawl to the new pad, never exceeding the glacial speed of 3 feet per minute. The four crawlers automatically stayed aligned with each other, and their independently suspended wheels compensated for unevenness in the ground.

Placement on the new pad had to be perfect, and the alignment was tested with a laser. To position the dish, believe it or not, Mammoet engineers simply followed a length of string tied

to the pad's center pivot where the dish was gently lowered.

It worked. So much for "impossible."

Find out more about the DSN at <http://deepspace.jpl.nasa.gov/dsn/>. Kids can learn about the amazing DSN antennas and make their own "Super Sound Cone" at The Space Place, <http://spaceplace.nasa.gov/en/kids/tmodact.shtml>.

By Patrick L. Barry

Did You Know....

- ◆ Right now scientists are tracking a giant electrical storm on the surface of Saturn. The storm is the size of the United States and the most powerful of its type ever seen. They are sending the Cassini probe in closer to Saturn, so in the next few weeks we will have a better view.
- ◆ ESA's Mars Express spacecraft detected evidence of auroras over the night time side of Mars. These auroras are similar to what we see here on Earth. Mars doesn't have a magnetic field, so this discovery came as a surprise. Mars does, however, have magnetic regions. These are the remnants of an old planetary magnetic field.
- ◆ Scientists from the Ohio State University believe they know what created the famous "Man on the Moon" feature. They think that a large object impacted the moon on the far side, sending a shock wave through its core and fractured the opposite side. The team mapped the Moon's interior, and the data shows that the asteroid was so catastrophic, the resulting scar passes clear through the Moon's mantle and core.



One of NASA's giant Deep Space Network antennas.

The Sky This Month

MERCURY

Mercury sets after sunset and will reach its greatest eastern elongation on the 24th of February. After the 24th, Mercury changes position and approaches the sunset.

VENUS

Venus rises in the sky early, before sunrise. By the end of the month it will have brightened to a magnitude of about 4.5.

MARS

Mars has moved into Taurus and will dim to about 1.3 in magnitude.

JUPITER

Jupiter is an early morning object found in Libra.

SATURN

Saturn is still in Cancer and has a magnitude of 1.1.

URANUS

Uranus is located in the center of Aquarius. At a magnitude of about 6.0, it is at the limits of naked eye visibility.

NEPTUNE

Neptune is in the constellation Capricornus, but is a low 8.0 magnitude. A finder chart like that published in S&T or the RASC Observer's Handbook is required to locate this faint bluish planet.

PLUTO

Pluto is in Serpentis, but has a magnitude of 14, making it well beyond the site of all but the best telescopes.

METEOR SHOWERS:

There are no major meteor showers this month.

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

Meeting Notes

January 20, 2006

Despite the weather-weasel's prediction of freezing rain and snow, the night's meeting was well attended.

The PAA Website is coming along nicely. Peter McMahon is designing the site and expects to have it up and running in another week or so. This site can be accessed via www.peterboroughastronomy.com That's a whole lot easier to fiddle up on the computer than the old geocities, mumble, jumble, slash, underline, address. Just remember peterborough and astronomy and you've got!

Four new DVD titles joined the club's library. "Welcome to Mars," "Hubble. 15 Years of Discovery," "The Dream is Alive," and "Space Station" comprise our latest additions. Crossen then went on to mention that "John Dobson, Sidewalk Astronomer" will also be joining the club's video archives in the very near future.

Mark Coady updated us on his latest light pollution battle. He recently spent the night at the Smith Ennismore Town Council meeting updating the Reeve and council members on the environmental and economic benefits of implementing a light pollution abatement program. John and Deb Crossen also attended and I'm happy to say that Mark's comments were well received, and council seemed sincere in their commitment to adopting a phase-in policy for streetlights as well as extending their noise pollution bylaw to cover light pollution. To add a bit of fuel to the fire, Mark's comments also received a write-up in the Lakefield Her-

ald, and a congratulatory note from Rob Dick, LPA executive for the RASC. Nice work Mark and Susan!

Space Station was the DVD feature for the evening. The DVD is part of the IMAX series. It was both shot and scripted by the International Space Station crew. It was fascinating to see things from their points of view. Because it was an international crew we also visited Star City in Russia and witnessed the launch of the first portion of the space station. They didn't mention it in the movie, but the Russians got the job because NASA didn't have a rocket big enough to boost the payload into orbit. Also represented in the space station's crew were Canada, Japan and Italy. And, yes, there were tons of photos with the Canada Arm in it!

Colin Cross launched us to Gemini, Canis Minor, and Monoceros for a tour of the NGC, IC and Messier objects of interest. I for one was surprised at the number of star clusters that populate this chunk of the winter sky. Then again, it is one of the more star-rich segments of the Milky Way.

Wanted: Someone to be the PAA Secretary. It would be most welcome if someone who regularly attends the club meetings could take on the task of writing up a page on what transpired at the event. We're about to enter a very busy time – LPA Spring Cottage Launch, Frank Hancock Award, International Astronomy Day, and my time is going to become very squeezed.

February 3, 2006

John Crossen opened the meeting with a quick discussion of the upcoming Terry Dickenson talk. The Ontonabee Conservation Club is sponsoring Terry and wondered if we'd be interested in helping them promote the event. The vote was quick and unanimous – Yes!

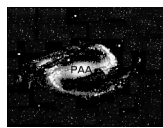
But Mr. Dickenson isn't the only speaker we have to promote. Our own Talk to the Stars guest speaker series features Professor David Patton, Dr. Graham Wilson, Peter McMahon and Brett Hardy.

Continued...

The group then viewed a brief video snip of a wilderness observing project that Peter McMahon is working on. The 3-minute clip left everyone hungry for more. Hopefully it will soon all come together.

The feature event for the night was the DVD "Welcome to Mars" which chronicled the two-year adventure of the rovers Spirit and Opportunity as they searched for evidence of water on the parched Martian surface. It was a venture filled with ups and downs as Spirit ran into computer problems and seemed at first to be marooned on its landing platform. But enough backup fault protection was engineered into the rovers that the problems were solved and the two soldiered on to discover certain evidence that a substantial quantity of water did at one time exist on Mars.

As I write this, the two rovers are still prowling the Martian surface in search of possible life forms or fossilized evidence that microbes may have once existed on the planet. But whether they find it or not, they represent the most successful mission NASA and JPL have yet to enjoy. Expected to survive for just 90 Martian Sols (the Martian day is 24 hours and 40 minutes long) the two are now past celebrating the 2-year birthdays. Go rovers go!



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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Professor Patton at Class Connections on February 17th.

February 17, 2006

Despite the hazardous country road conditions, a large group of PAA stalwarts made the trek to our temporary home at Class Connections. Joining us were a two students from Trent U. and an additional couple from the BHO mailing list. So the room was comfortably filled with astronomy enthusiasts anxiously awaiting Professor Patton's presentation for the night.

Prior to introducing Professor Patton, it was announced that our next observing session – March 3 – would be at Jaan Teng's house. If it's cloudy, we'll be treated to a talk Jaan will be delivering in Europe later this year. If it's clear...we'll enjoy our first observing session of the year. We will also be meeting at Class Connections on March 17th for Peter McMahon's talk – Wilderness Stargazing. With a name like McMahon, we suspect Peter is Irish, so wear a little green as it is St. Patty's Day.

Dave Duffus took me aside prior to the meeting to announce that he was dropping out of the club for personal reasons and we respect that. Dave was one of our founding fathers back in 1970 and he will be missed. We will keep in touch with Dave via the club newsletter and e-mails. Our thanks go out to Dave for all his efforts over the 30+ years. And we hope to see him back in our midst in the future.

Professor Patton then took centre stage and led us through a series of amazing images of our universe expanding shortly after the Big Bang, and galaxy structures clumping and galaxies forming. He then showed us some computer models of galaxies interacting. These events can take up to a billion years, so being able to see how the galaxies will twist and turn each other in a matter of minutes was quite exciting. The models even showed how the galactic gasses would heat up and new star-forming regions would be born.

As part of his talk, Professor Patton introduced us to the Sloan Digital Star Survey* and told us how he uses it in his research into colliding galaxies. Using the survey he is able to select candidates for future galactic collisions. He also gave us a quick lesson on how Cepheid Variable Stars are used to determine galactic distances. Professor Patton then wound down his presentation by fielding numerous questions from club members and those who had joined us for the night.

In addition to thanking Professor Patton for his marvelous presentation, we also thank Jessica Montieth and Dean Shewring for helping to get Professor Patton to be one of our guest speakers. Good stuff gang!!

*If you haven't been to the Sloan Digital Star Survey, Google it up. You'll find complete instructions on how to navigate the site and use the survey. Even if you just ogle the pictures, it's a fascinating site. I've bookmarked it in my computer.

John Crossen
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J O K E I J O K E I J O K E I J O K E I

On the bridge of a flying saucer, flying over the Earth: An alien soldier and his commander.

Soldier to commander: "Well, now that we've captured their king, they'll have to surrender!"

Behind them, bound and gagged: Elvis.

I J O K E I J O K E I J O K E I J O K E

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:

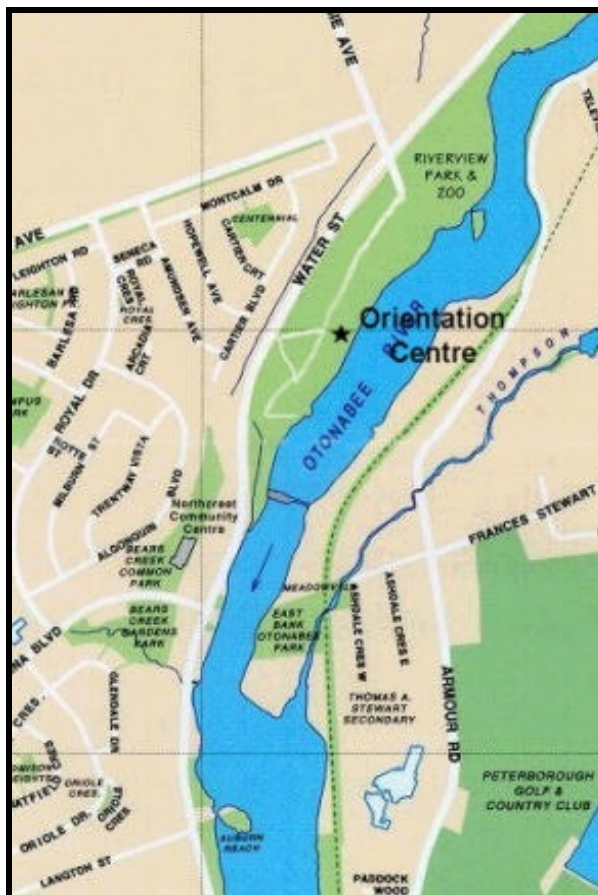
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**NEXT ISSUE'S
DEADLINE IS
Mar. 13, 2006**
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MEETINGS

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



1 CALENDAR OF EVENTS 1

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|----------------|--|
| March 3, 2006 | General Meeting— Observing night - Jaan Teng’s |
| March 17, 2006 | General Meeting— Guest Speaker Peter McMahon - Class Connections |
| March 31, 2006 | General Meeting— Movie night “The Dream Is Alive”- To Be Announced |

1 Moon Phases 1

First Quarter		February 5, 2006	March 6, 2006
Full Moon		February 13, 2006	March 14, 2006
Last Quarter		February 21, 2006	March 22, 2006
New Moon		February 28, 2006	March 29, 2006