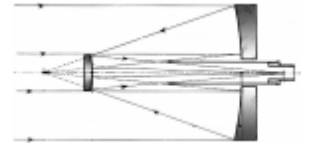




PETERBOROUGH ASTRONOMICAL ASSOCIATION

The Reflector

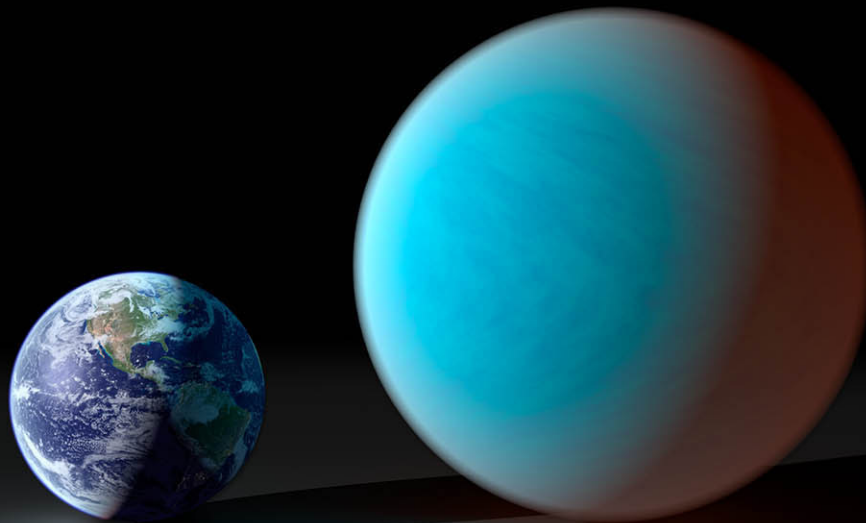


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December 2011

Re-thinking an Alien World



The Strange Case of 55 Cancri e

Artist's rendering compares the size Earth with the rocky "super-Earth" 55 Cancri e. Its year is only about 18 hours long!

by Dr. Tony Phillips

FORTY LIGHT YEARS from Earth, a rocky world named "55 Cancri e" circles perilously close to a stellar inferno. Completing one orbit in only 18 hours, the alien planet is 26 times closer to its parent star than Mercury is to the Sun. If Earth were in the same position, the soil beneath our feet would heat up to about 3200°F. Researchers have long thought that 55 Cancri e must be a wasteland of parched rock.

Now they're thinking again. New observations by NASA's

Spitzer Space Telescope suggest that 55 Cancri e may be wetter and weirder than anyone imagined.

Spitzer recently measured the extraordinarily small amount of light 55 Cancri e blocks when it crosses in front of its star. These transits occur every 18 hours, giving researchers repeated opportunities to gather the data they need to estimate the width, volume and density of the planet.

According to the new observations, 55 Cancri e has a mass 7.8 times and a radius just over twice

that of Earth. Those properties place 55 Cancri e in the "super-Earth" class of exoplanets, a few dozen of which have been found. Only a handful of known super-Earths, however, cross the face of their stars as viewed from our vantage point in the cosmos, so 55 Cancri e is better understood than most.

When 55 Cancri e was discovered in 2004, initial estimates of its size and mass were consistent with a dense planet of solid rock. Spitzer data suggest

see "Extrasolar Planets" on page 16

Taking Stock of the Year

Here we are at the end of another year, our Annual General meeting will be or has taken place and not only time, but executive have moved on. Hats off to those executive that have taken a turn at “doing their duty.” In particular, our Vice President, Dean Shewring, Librarian, Valerie Mathias and Secretary, John Cameron, need to be recognized for all that they have volunteered and done for the PAA. I would like to also thank all those who over the past five years have assisted and supported me and the PAA to help make this club what it is today. It was truly an honour and privilege to have served in this capacity. I am pleased with our club’s many achievements. Not that we can rest on our laurels, but that we be spurred on to new and greater heights. Can we do better? Sure we can, we all can! It is teamwork that gets things done and I thank any and all of you that have helped in any way. Your contributions are appreciated and do not go unnoticed.

I give my full support to our new executive and I will do anything I can to assist

in a smooth and seamless transition. I am not leaving town anytime soon, so all the state secrets can be passed along to “those that need to know.”

This time of year is always a cause for reflection and what happened over the past year. To name just a few, from the gain of new members, to amazing speakers (like Terence Dickinson) and presentations (skyping), punctuated with successful public viewing (Emily Provincial Park) and education sessions (Astronomy on the Hill) and much more. Lots of work and dedication go into these events and you should all be proud of these accomplishments.

If I do not see you at our last club observing session of the year (Cedar Knoll on Dec. 17th), I wish you and your loved ones a safe and happy holiday season, a Merry Christmas and a Happy New Year. Don't forget your New Years resolution... “I will do more with and for the PAA this coming year” ...right?

Rick Stankiewicz

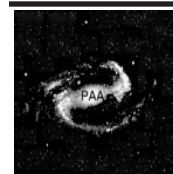
Letter from the Editor

As we come to a close of another year it might seem it has been quiet in the world of Astronomy. But there have been some intriguing events. The one that comes to mind for me is the appearance of a supernova in the Whirlpool Galaxy (M51), just off the handle of the Big Dipper. Brian McGaffney of Nutwood Observatory imaged it and we present it to you on page 12.

It may seem counter-intuitive, but imaging an asteroid might be more difficult than imaging a supernova. In essence you need to depend on accurate predictions and a bit of luck to photograph a miniscule rock that reflects very little light. But Mike McCarthy managed to do just that. See his image on page 9.

Hope you enjoy this issue and see you next year!

Phillip Chee
Editor, The Reflector



**Peterborough
Astronomical
Association**

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

JOHN CROSSEN

WHEN IT COMES to familiarity Orion the hunter is second only to the Big Dipper. Orion's Belt was made famous in the movie *Men in Black*. Just about anyone who grew up in a small town before light pollution washed out the night sky knows the mighty hunter.

In December the big fella is just breaking loose from the eastern horizon at night fall. By 9:00 p.m. his feet are free of their Earthly bonds and Orion is heading up and towards the southern sky.

Orion is a great naked-eye and binocular target. The three stars that make up his belt are instantly recognizable. And in size alone Orion occupies a sizeable chunk of celestial real estate. Hanging from Orion's belt is his sword and the spectacular handle of that sword is the binocular astronomer's reward for challenging the chilly night.

It's called the Orion Nebula and it glows like a slightly bloated star. In a pair of binoculars at about 7 power it becomes a very distinct misty patch. As you are viewing it, ponder this. The Orion Nebula (also known as M42) is a gigantic star birthing factory. At its centre hot new stars are already lighting up the surrounding gas that gave them birth. But there's more.

The Hubble Space Telescope (HST) has photographed planets forming around some of the newborn stars. Millions of years from now those young stars may be the host stars for new solar systems. What Hubble has witnessed is not just the birth of new stars, but new planets — planets which might someday be home to new life forms. You and I won't be around to



Orion is an easy target thanks to the three stars that mark his belt. Photo by Gord Rife of Schomberg, Ontario.

see it happen, but the mere thought of it is exciting to contemplate.

While you're looking up, don't give the giant planet Jupiter the cold shoulder, chilly though it may be. Jupiter is almost directly over head in December and makes a stunning sight on the night of December 6 when it is just 5 degrees from the Gibbous Moon. If you're looking for a great winter sky photo this could be a good one.

Joining Jupiter and Orion in the winter sky are Gemini the Twins, Cetus the Whale and snuggled safely at the feet of Orion is Lepus, the little rabbit. Also ambling across the sky is Eridanus, the River. It's a tough one to spot because it is close

See "December Nights" on page 15

Why Santa didn't bring you a telescope for Christmas



Gifts for the novice astronomer include *NightWatch*, a subscription to *NightSky Magazine*, a home planetarium, binoculars, a planisphere, astro-posters, warm socks, mittens and hats. Anything but a telescope—please!

JOHN CROSSEN

THE LAST THING A BEGINNING backyard astronomer needs is a telescope—even a good one. The reason is simple, after finding the Moon where will they point their shiny new scope? Chances are they won't know what else is up and stars are so distant they look nearly the same through a scope as they do to the naked eye.

So after looking at the Moon a couple of times, boredom sets in and the scope ends up in the corner waiting for a yard sale. Please, listen to me, I have at least a half dozen people drop off virtually untouched telescopes at the observatory every year because they either can't figure out how to use them or “the kids got bored”.

So before you press the plastic for a telescope, check out what's available at Happenstance Books in Lakefield, or Coles and Chapters in Peterpuddle. A good book on astronomy works two ways. If your giftee really is interested in Astronomy, they'll be reading the book and out under stars the first clear night after they receive it. If it was just a passing fancy you'll only be out about \$40 and some wrapping paper.

However, if your budget for a telescope was just \$40, it's time for a reality check. The only places that sell telescopes at that price are big box stores who stock up on junk scopes to foist on the patsies looking for a last minute surprise. Unfortunately

See “Astro Gifts” on page 15

Cloudy night gifts for stargazers — new or experienced

JOHN CROSSEN

ASTRONOMY DVDs ARE the silver lining to cloudy nights. Thanks to the BBC, PBS, the History Channel, the Discovery Channel and the Science Channel there are more than enough astronomy DVDs to cover all the cloudy nights south-central Ontario can muster in a year. Not only do they make good viewing, they also make great gifts at Christmas.

From the BBC comes *Wonders of the Solar System* with Professor Brian Cox. Professor Cox is a PhD in Physics and a former rock star in his homeland. He is also a brilliant presenter who can make complicated topics simple and best of all — exciting. In typical BBC fashion the series spares no expense in shooting or post-production. Watching all the episodes will take about two cloudy nights. On a scale of one to ten I'd give it an easy twelve. It's the best I've seen recently.

The History Channel has been running its series on *The Universe* for the last five years. They release a fresh set of DVDs at the end of each year. I have all five years worth of the series and they are excellent. Each chapter features a number of world-renowned experts in their respective fields. All are blessed with great presence in front of the camera and can simplify the complicated with ease. The pacing of the series is brisk and is laced with graphics that make the point while entertaining the audience. From the planets to their moons, black holes, the future of space travel and more than you can imagine, the series covers anything and everything an astronomy nut could ask for.

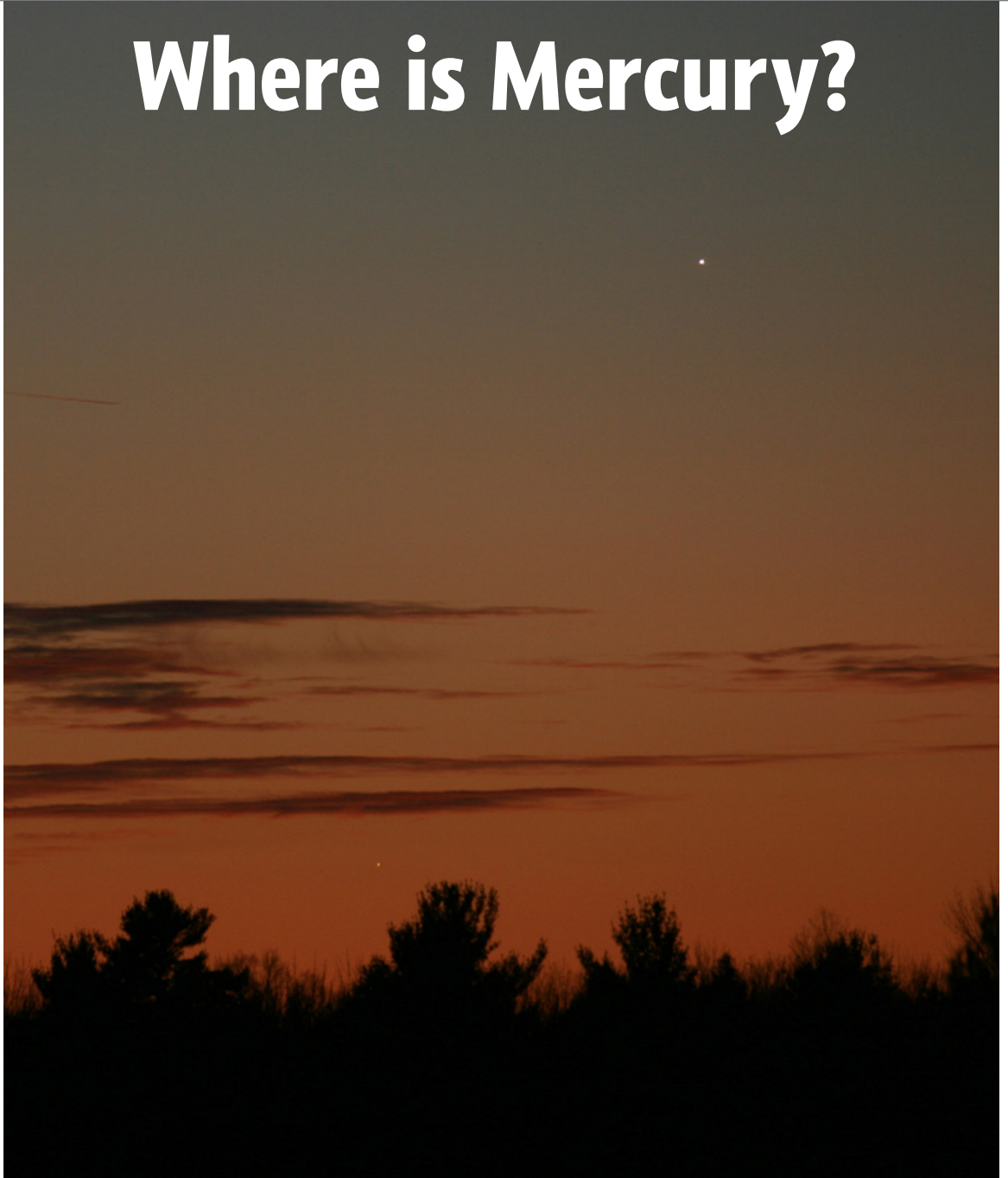
PBS has more astronomy DVDs than I can mention here. Just go to their website and call up the "Science" category. You'll find about five pages worth of titles that'll have you seeing stars and a whole lot more on cloudy nights. To say the range of topics is diverse qualifies as an understatement. Plus you'll find specialty topics like "spy satellites", "why Pluto was demoted" and the story behind "the Sputnik launch" that shook the world in 1957. If you can't find something you like, you don't like astronomy.

See "DVD Gifts" on page 14



Welcome to three of my four shelves crammed with astronomy DVDs. You can get 'em online via Amazon, PBS, Nova, BBC, the Discovery and Science Channels. Chapters and HMV in Peterborough are good drop-in and shop resources.

Where is Mercury?



If you were looking for our most inner planet (Mercury) this past month, you had to look really close to the western horizon right after dark and about 2 degrees below the brightest planet, Venus (magnitude -3.9). The attached image shows the view south of Peterborough on November 5th at 6:36 p.m. Mercury (magnitude -0.3) is orangey coloured (more like Mars) by the Earth's atmosphere, as it slipped between two white pine trees. It was not an easy capture, as many evenings in November were cloudy on the western horizon after sunset. You can appreciate how difficult it can be to view Mercury from our northern latitudes (keeping it so close to the western horizon). Mercury is sinking lower each night since November 14th and Venus has been rising higher each night into December, so keep looking for some nice pairings with the Moon (photogenic) on December 26th after sunset.

This cropped image was taken with a tripod mounted Canon 400D camera and Sigma 70-300mm at 238mm (ISO-200; f/5.6; $\frac{1}{4}$ sec.)

Rick Stankiewicz

Ganymede and Callisto

Jupiter's far out moons

JOHN CROSSEN

THE LARGEST PLANET IN our solar system is also home to the solar system's largest moon — Ganymede. With a diameter of 5,262 kilometres Ganymede is just the super-sized ticket. In fact Ganymede's pudgy girth makes it larger than our own Moon and bigger than the planet Mercury. Sorry, dwarf planet Pluto doesn't qualify for the contest, but if it did Ganymede would more than double its diameter — 5,262 km versus 2,304 km.

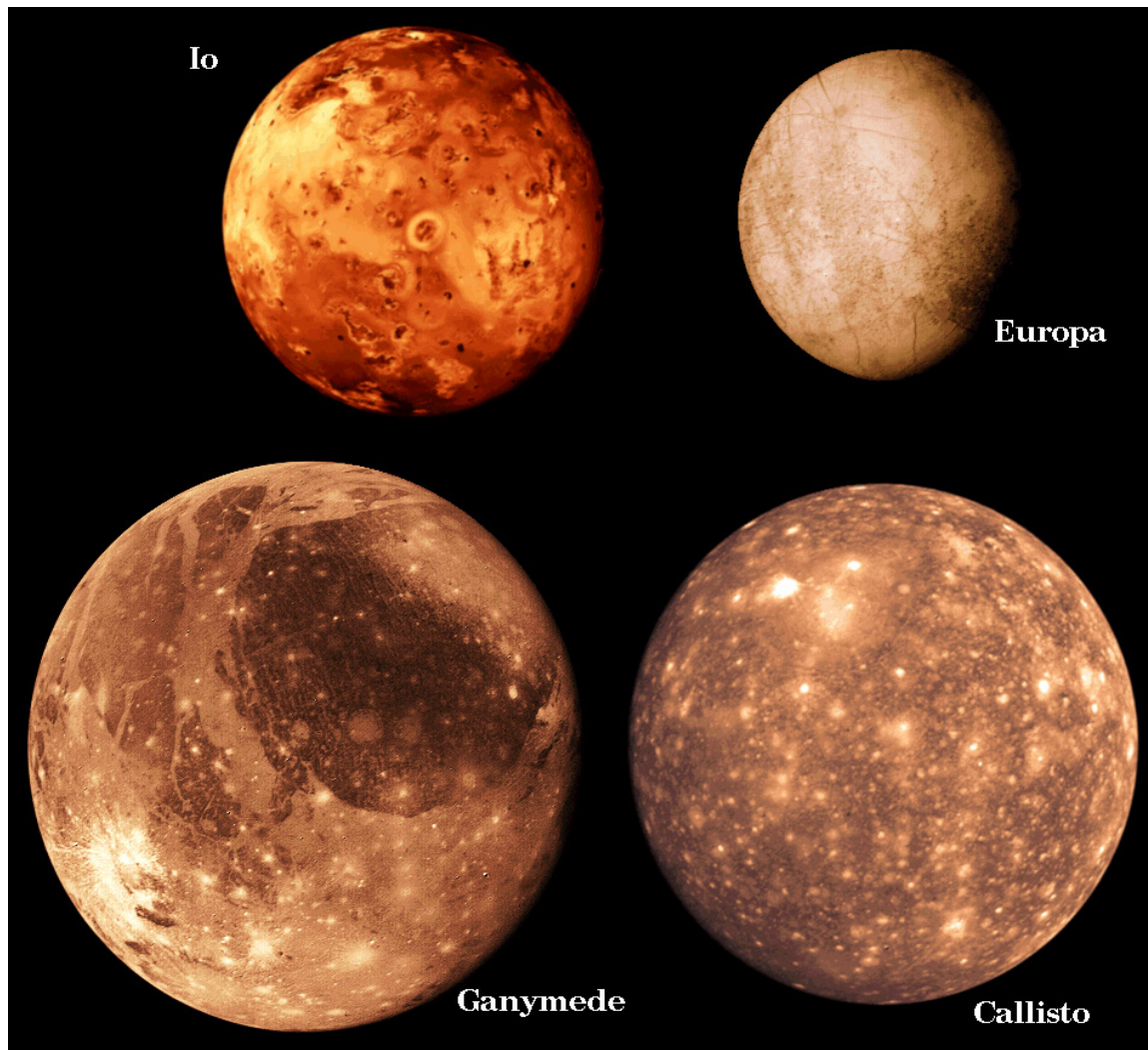
Comprised mainly of rock and ice, Ganymede has a brownish surface criss-

crossed by stripes and patches of white. Scientists think the darker areas are older and the white areas show evidence of more recent geological activity.

Upon closer inspection, the long white strips appear to be areas on the moon's surface where it has been pulled apart. This causes them to slip and overlap each other. Material from beneath the Jovian moon's surface then wells up and freezes to form a fresh crust.

Jupiter's super moon orbits the gas giant at an average distance of 1.07 million

See "Callisto" on page 13



Family portrait of the Galilean Moons. Photo's by NASA.

Sunspots



This was taken this afternoon (November 5) with a cheap Kodak at the eyepiece. I used my Stargazer Steve 4-1/4 inch planetary Dob, a Burgess Optics SWA (70 degree) 20mm eyepiece, and the Baader solar filter I picked up as a door prize at Fall 'n' Stars. I think Norm Wellbanks is smiling seeing that it is being well used, as well as the 3-6mm Televue Nagler zoom eyepiece. With that eyepiece I could zoom right in on the monster sunspots.

Mark Coady

Asteroid 2005 YU55



This is a screen shot of my broadcast that was a 10 second integration/exposure of the asteroid 2005 Yu55. It was cloudy with some brief clear patches that allowed me to find the asteroid and then actually track the asteroid using offset tracking rates from my planetarium program. The orbital data was obtained from <http://ssd.jpl.nasa.gov/?horizons> and entered into the planetarium. The asteroid is in the lower middle with the background stars having trails.

Mike McCarthy

Jupiter's moon Io, Where the Action is Hot and Heavy

JOHN CROSSEN

DEPENDING ON THE criteria used when counting its moon system, giant Jupiter has 63 or more natural satellites. Four of them are readily visible in backyard telescopes, and keen-eyed observers with tripod-mounted binoculars can see the moons change positions from night to night as they orbit the planet. They are often referred to as the Galilean Moons because they were first observed by Galileo Galilei when he turned his telescope to the night sky.

For the next couple of articles I invite you to join me as we do a little moon-hopping to take in the sights on these very different satellites. So if you're ready for some red-hot action, let's start with Io. Actually, it's more than just hot, it's volcanic.

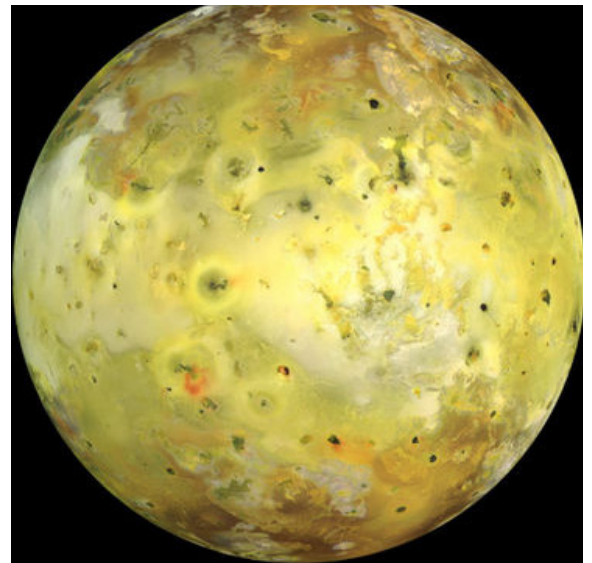
Io has the honour of orbiting closest to massive Jupiter. This closeness combined with Io's very elliptical orbit is the reason the little moon has the "hots". Let me explain.

When Io's elliptical orbit positions it closest to the jovial giant, the pull on the planet is very strong. But when it is farther away, the pull lessens. This creates what is called tidal friction. What is happening is that little Io is being stretched and released continuously in its lopsided swing around Jupiter. If you've ever bent a strip of metal back and forth then touched the spot at which it bends, you'll find that it has become very hot. The same happens inside Io.

The result has given Io a molten core which releases its material and heat in the form of volcanic lava and sulphur compounds. These continual eruptions make Io the most volcanic body in our solar system. In fact, volcanoes are its principal form of geological activity that shaped the hot little hottie. Close up images of Io taken by the 1977 Voyager missions showed no craters from the moon's past because the outflow of lava would have obliterated them. More recent images taken by the Galileo mission have shown over 200 volcanoes on Io's surface

Images have also shown volcanic plumes rising 280 kilometres above the limb of Io. In fact, the Galileo Mission of

See "Io" on page 15



Jupiter's volcanic moon Io might be a nice place to fly-by, but its lava and sulphur covered surface would quickly have you waving bye-bye. Photo by NASA from the Galileo Mission of 1999.

Jupiter's Moon Europa Says Bring Your Scuba Gear



Will the depths of Europa's oceans show us life forms huddling around sulphur-spewing volcanic vents? Shown here is NASA's DepthX thinking robot explorer which is currently undergoing tests in caves off the coast of Mexico. Expected launch date is 2019. Artist drawing from NASA.

JOHN CROSSEN

FROM THE VOLCANIC hell-world of Jupiter's innermost moon, Io, we step out to diminutive Europa and an ocean covered by ice up to 10 kilometres thick. Europa is the only Galilean moon that is smaller than our own. All three of the others are larger than our Moon with Ganymede being larger than planet Mercury. From the inside out they are Io, Europa, Ganymede and Callisto. But it isn't Europa's thick icy shell that interests scientists it's what lies beneath — water and the possibility of life forms.

When the Galileo mission first examined Europa in 1999 and detected its cue-ball smooth water-ice surface the cry went out "Dive Europa". Shortly thereafter

NASA began experimenting with projects that could land on Europa, melt down through its thick ice crust and explore the ocean beneath as a mini submarine.

From a distance the pinkish coloured moon appears to be crisscrossed with gigantic cracks which you would expect to produce huge ridges. But up close the moon is almost smooth. In fact, if you could inflate Europa to the size of the Earth, it would have no surface feature higher than 600 feet. No soaring mountains, no deep valleys and no impact craters. They all have been flattened out by the ever-shifting ice. So where do the dark cracks come from and what are they?

See "Europa" on page 13

M51 Supernova Event SN2011dh
June 2011

Local astronomer images a supernova



Brian McGaffney took these before-and-after images of M51 and the supernova from Nutwood Observatory near Apsley, Ontario. The supernova was first discovered by A. Riou in France.

THE EVENT TOOK PLACE IN the Whirlpool Galaxy which lies at a distance of 31 million light years. So in truth the supernova took place 31 million years ago and the light from that mammoth blast didn't reach us until June 3, 2011. In other words, the supernova occurred about 27 million years before our ancestors took their first steps.

Weidong Li and Alex Filippenko of UC Berkeley have identified the likely precursor star as a yellow supergiant with a mass of 18-24 Suns. Giant stars such as this end their lives as a Type II supernova. Here's how it works.

During its life span a massive star goes through many stages. Being initially comprised of hydrogen, the immense heat and pressure at the star's core compress the hydrogen atoms so tightly that they fuse into helium. As part of that fusion process, a small bit of energy is released. It is that energy which makes the star shine.

Just as your car's gas tank runs out of fuel, the star's core runs out of hydrogen to fuse into helium. But instead of getting a refill, the star switches fuels. In this case it fuses helium into oxygen and once again the fusion process releases more energy. This process repeats again and again at the star's core until the star reaches the element iron.

But instead of fusing into another element, iron absorbs energy. At that split-second the star's core

collapses and the rebound sends billions of tons of "star stuff" as Carl Sagan called it, out into the universe.

As carbon-based life forms, we owe our existence to the many supernovae that took place during the universe's 13.7 billion year existence. The iron in your blood, the oxygen you breathe and the gold in your wedding band were all forged in the incredible heat and pressure of a massive star's core. The elements heavier than iron were then formed in the supernova blast where temperatures reach billions of degrees Kelvin.

If the term "fusion" sounds familiar, that's because the same process takes place in the atomic bomb. Nature invented it. Science just discovered how it works.

Something else nature invented that mankind is finally clueing into is recycling. After a star goes supernova or (as will be the case with our Sun) simply expands and puffs off its outer gas shells, the elements come back together again in another cloud of gas and dust. Eventually gravity will cause portions of that nebular cloud to clump, compress and heat up into proto-stars. The fusion process will have begun again and another generation of stars are born.

I thank Professor David Patton of Trent University for his input while preparing this article.

—John Crossen

continued from page 7

Callisto

kilometres and shows some evidence of meteor and asteroid impact craters on its surface. But when it comes to craters, Callisto is King of the Cosmic Ker-smacks.

One look at Callisto's pock-marked surface and you wonder where this moon hasn't been hit. Instead of large dark areas with a few small impacts like our Moon, Callisto is just one crater after another though there are some large impact basins called palimpsests. These appear to be ancient major impact sites in which the Callisto's surface has been punctured allowing slushy ice material to ooze up and flow over the surrounding area. They are like the dark lava basins on our own Moon only slush has replaced the lava that poured forth from our Moon's core. Callisto is the most remote of Jupiter's large moons, orbiting the planet at 1.8 million kilometres.

While we're still rocketing through Jupiter's Lunar System, try to imagine what a mind-blowing experience it must have been for Galileo to be the first human to see them shift position with each successive night through his telescope. Having long been a proponent of a Sun-centred solar system, watching Jupiter's four largest moons orbit about the giant planet certainly would have confirmed the theory — at least in Galileo's mind.

While each of our solar system's planets has its own distinct personality, the moons orbiting around them are often more unusual. For instance Saturn's moon Titan has liquid methane flowing in rivers and lakes. It even rains methane on Titan. Water on the other hand is frozen so hard on Titan that it is like granite here on planet Earth.

Exploring the planets will be an exciting adventure for the next generation and those to follow. But could the moons harbour even more unusual stories? They might just be weirder and more wonderful than we ever expected.

continued from page 11

Europa

Scientists now think that the dark colouring comes from the ocean below. What happens occasionally is that the same monstrous gravitational pull from Jupiter that created Io's volcanic environment pulls apart the ice covering Europa. This allows the brown water from below to well up to the surface where it once again freezes. The colouring comes from brownish-coloured sulphurous chemicals that have erupted from the underwater volcanoes on the little moon.

The underwater volcanoes mean heat, and where heat combines with water the possibility of life becomes interesting to say the least. Anyone who has seen a National Geographic documentary with the life forms teeming around the spewing vents at the bottom of Earth's oceans can imagine what might lie beneath Europa's icy mask. Could the same extremeophiles that thrive in the incredible heat and pressures on the lightless floor of our oceans do the same on Europa? Why not? They may not be building transistor radios and television sets, but they are life forms and they are surviving!

continued from page 5

DVD Gifts

The Science Channel makes a worthy contribution to our cloudy night starfest with Morgan Freeman and his series *Through the Wormhole*. This series deals more with cosmology than any other series I have had the pleasure of watching. It enlists a host of experts and spectacular graphics as it explores the weird worlds of matter, anti-matter, dark energy and the search for the Higgs Boson that could unify the world of physics. It even goes so far as to address issues such as “Is there life after death” from a scientific point of view. The words “thought provoking” just aren’t adequate to describe the series. And of course, Mr. Freeman does a thoroughly delightful job of moderating each episode.

Whether you’re Christmas gifting or just looking for a little intelligent entertainment, the world of astronomy DVDs is filled with choices for everyone from beginners to the avid enthusiast with years of experience. If I’ve tweaked your curiosity, start Googling now while there’s still time for delivery before the fat man flies.

The Sky this Month

Mercury at inferior conjunction on the 4th. Appears in the eastern dawn sky during last half of the month. Greatest elongation west (22° on the 23rd.)

Venus in the southwestern evening sky. Moon passes 6° N on the 26th.

Mars in eastern morning sky in Leo.

Jupiter visible most of the night along the Aries-Pisces border. Resumes direct eastward motion on the 26th.

Saturn well placed in the dawn sky.

Total Lunar Eclipse at peak totality at 9:36 AM on the 10th. Eastern North America only sees the the U1 stage around moonset.

Geminid Meteors peak at 1:00 PM on the 14th.

Ursid Meteors peak at 9 PM on the 22nd.

Winter Solstice 12:30 AM on the 22nd.

Moon Phases

First Quarter	4:52 AM	December 2
Full Moon	11:36 AM	December 10
Last Quarter	7:48 PM	December 17
New Moon	1:06 PM	December 24

continued from page 3

December Nights

to the horizon. Waiting until January will help finding Eridanus because it will be a bit higher in the sky.

By December the constellations Taurus the Bull and Auriga the Charioteer should be familiar sights, as should the Seven Sisters of the Pleiades. Taurus is home to the bright star Aldebaran and the large open star cluster known as the Hyades. The Hyades (*hi-a-deez*) and the Pleiades (*pli-a-deez*) are both superb binocular targets for December.

Way up, is the Double Cluster between Cassiopeia and Perseus which are now overhead. Notice how the familiar “W” shape of Cassiopeia is now an “M.”

Until we meet again, keep your outside lights dimmed down and aimed down to help preserve the Kawartha Night sky. You’ll also save some money and energy.

continued from page 10

Io

a few years back flew through one of Io’s smoke stacks.

Yet another effect Io’s close orbital path around giant Jupiter has is to tidally lock the moon so that one side of Io is continuously facing Jupiter. It’s the same reason our own Moon only shows one face to us.

Next up on our Galilean moon hop will be from the fires of Io to the ice-coated world of Europa. This tiny little ice ball is the only Galilean moon that is smaller than our own. It may also have a gigantic ocean beneath its 100-km thick ice crust.

So until we meet again on Europa, keep the porch lights dimmed down and aimed down. You’ll save energy, money and our dark Kawartha night sky.

continued from page 4

Astro Gifts

the plastic lenses don’t work, the spindly tripod wiggles in the slightest breeze and the person who gave it as a gift will be the one surprised — at how fast it lands in the trash.

On a cheerier note, there are not only a number of good astronomy books available, but you also have a wide variety of other useful items to browse. Planispheres are a great choice for finding the constellations at any time of year. Just hold it overhead while facing north and the constellations will fall into place... with a little practice.

If your budget is flush, you might want to try one of the hand-held electronic planispheres from Celestron or Meade. You just point either one at a celestial object, press a button and it tells you what you’re looking at and a little about it. Neat! There are also a number of inexpensive astronomy apps for smart phones and touch pads not to mention home planetariums.

Binoculars are another great choice. They turn those misty patches you see with the naked eye into dazzling star clusters. They’re also useful for bird watching and sporting events. Plus they give you a correct view whereas an astronomical telescope is usually left-right-reversed depending on its optical design.

A strap-on flashlight that shines a red beam of light can help protect the fledgling astronomer’s dark-adapted eyes. It’s cheap and very useful.

Welcome gifts for the winter astro buff include warm socks, sweaters, or any of the old-fashioned down-filled coats. Also, mittens are warmer than gloves and there’s nothing quite as warm as one of those dopey-looking Russian-style hats with the flaps. I have two and I don’t care if I look stupid, it’s dark anyhow.

continued from page 1

Extrasolar Planets

otherwise: About a fifth of the planet's mass must be made of light elements and compounds — including water. Given the intense heat and high pressure these materials likely experience, researchers think the compounds likely exist in a “supercritical” fluid state.

A supercritical fluid is a high-pressure, high-temperature state of matter best described as a liquid-like gas, and a marvelous solvent. Water becomes supercritical in some steam turbines — and it tends to dissolve the tips of the turbine blades. Supercritical carbon dioxide is used to remove caffeine from coffee beans, and sometimes to dry-clean clothes. Liquid-fueled rocket propellant is also supercritical when it emerges from the tail of a spaceship.

On 55 Cancri e, this stuff may be literally oozing — or is it steaming? — out of the rocks.

With supercritical solvents rising from the planet's surface, a star of terrifying proportions filling much of the daytime sky, and whole years rushing past in a matter of hours, 55 Cancri e teaches a valuable lesson: Just because a planet is similar in size to Earth does not mean the planet is like Earth.

It's something to re-think about.

Get a kid thinking about extrasolar planets by pointing him or her to “Lucy's Planet Hunt,” a story in rhyme about a girl who wanted nothing more than to look for Earth-like planets when she grew up. Go to <http://spaceplace.nasa.gov/story-lucy>.

The original research reported in this story has been accepted for publication in *Astronomy and Astrophysics*. The lead author is Brice-Olivier Demory, a post-doctoral associate in Professor Sara Seager's group at MIT.

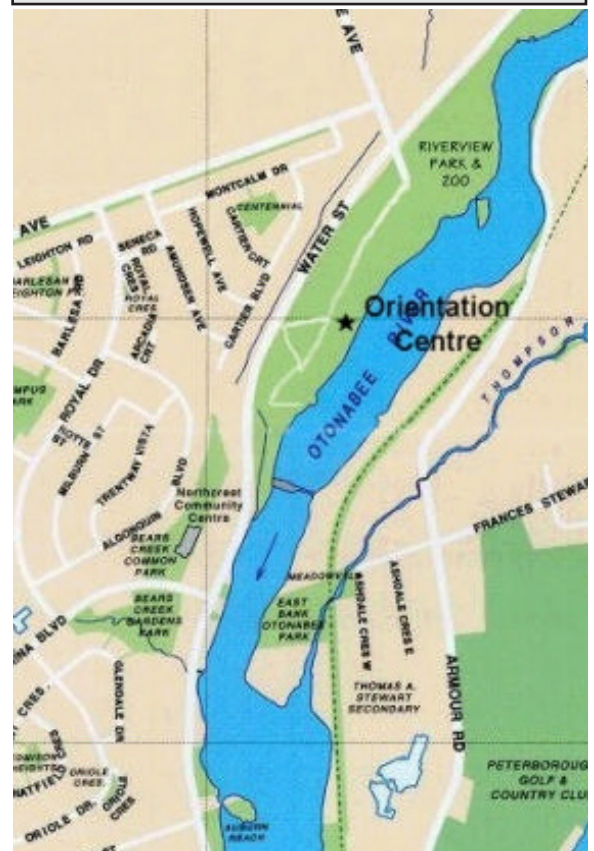
This article was provided courtesy of the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

Articles

Submissions for *The Reflector* must be received by the date listed below. E-mail submissions are preferred (Microsoft Word, OpenDoc, ASCII and most common graphic formats are acceptable). If your article contains photos or graphics, please provide a separate file for each. 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:

phillip.chee@gmail.com

NEXT SUBMISSION DEADLINE:
DECEMBER 23, 2011



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 p.m. P.A.A. executive business will be conducted starting at 7:30 p.m. Members and the public are welcome to attend the earlier time.