February 2009

Regulus

RASC Kingston Centre

Venus and Uranus over Starlight Cascade Observatory
Kevin Kell took this 15-second image with a Canon PowerShot A540 on January 24th. It shows stars to magnitude 6½. A Meade DS90 is visible at bottom.

The Galileo Project: Music of the Spheres

Special Concert, 8p.m. on Thursday, March 5th at Grant Hall, Queen's University

From the Tafelmusik website:
"*The Galileo Project: Music of the Spheres* is **Tafelmusik**'s contribution to the International Year of Astronomy, marking 2009 as the 400th anniversary of Galileo's development and use of the astronomical telescope. We have created an event which uses music, words and images to explore the artistic, cultural and scientific world in which 17th- and 18th-century astronomers lived and did their work. We have chosen these [pieces of music] because they speak profoundly and eloquently of what lies at the heart of the **International Year of Astronomy**—a celebration of the wonders of the cosmos and the achievements of the human spirit."★

Web Link: http://www.tafelmusik.org/concerts/galileo.htm

In this issue:

Upcoming Meetings

Friday, February 13

7:30-9:30 p.m.

Dr Gregg Wade will speak on recent "Large Programs" that have been established at the Canada-France-Hawaii Telescope. These are really exciting, and range from a census of the Virgo cluster to detailed mapping of individual stars. One of the four Large Programs is his own project called MiMeS, which is about stellar magnetism.

Thursday, March 5

Concert at Grant Hall (info below left).

Friday, March 13

7:30-9:30 p.m.

The One Metre Initiative: A New Major Observatory in Canada
Speaker: Frank Roy, Elektra Observatories.

Meetings are held at Stirling Hall Theatre "A" on Bader Lane at Queen's University in Kingston, Ontario. Our meetings are co-sponsored by the Queen's Physics Department and include astronomy lectures open to the public.★

KAON Public Observing

Saturday, February 14 7:30-9:30 p.m.

How Has Galileo's Telescope Evolved? Speaker: Susan Gagnon

Saturday, March 14 7:30-9:30 p.m.

- **IYA 100 Hours of Astronomy**
- **Saturn**

Speaker: Terry Bridges

Saturday, April 11 9:00-11:00p.m.

Observing the Moon
Speaker: Fred Barrett

KAON (Kingston Astronomy Outreach Network) sessions are held at Queen's Observatory on the 4th floor of Ellis Hall.★

100 Hours of Astronomy

Kim Hay, Terry Bridges

Queen's Physics, RMC and RASC Kingston Centre will be collaborating together to bring the *100 Hours of Astronomy* to Kingston.

We plan to do solar observing in **Confederation Park** on Saturday, April 4, from 1 to 4 p.m. If Saturday is cloudy, we will observe on Sunday afternoon instead. We will have Coronado solar filters, a Sunspotter, a Shoebox solar telescope, and other types of filters and telescopes on hand as well as various handouts about the sun.

If you wish to participate and man a telescope or talk to the public, please contact **Terry Bridges** at tjb (at) astro (dot) queensu (dot) ca.

On Saturday night (April 4) we will be holding an extra observing session at the Observatory from 9:00 to 10:30 p.m. If it is clear then we will be on the deck with telescopes and handouts. If it is cloudy then we will be in the warm-room with the *100 Hours of Astronomy* observatory webcast, and holding chats with the public.

Again, if you are interested in coming out to help (no experience is necessary!), contact Terry Bridges at the email address above.★

100 Hours of Astronomy 100hoursofastronomy.org

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Regulus Needs You!

Items of interest from members—full articles, or even just a couple of paragraphs are always welcome. Deadlines for each issue are the last day of the month. Send items to:

walter2 (at) starlightccd (dot) com

or:

Walter MacDonald
PO Box 142
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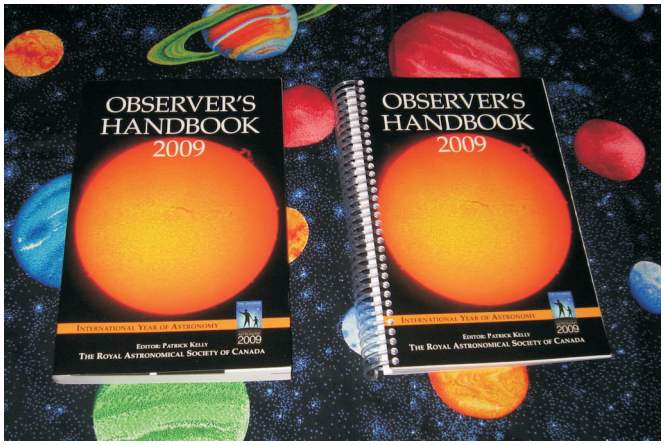
Observer's Handbook Mod

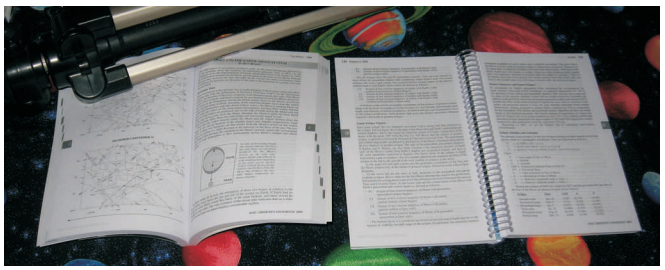
Kevin Kell

Every year for some years now, you have heard us talk about a very useful modification of your RASC *Observer's Handbook*. This modification involves changing the binding to allow the book to lay flat when it is open.

The image at top right shows a regular 2009 *Handbook* before and after modification.

The image at bottom right shows the modified *Handbook* on the right, open to a page and not needing any help in doing it. Contrast that with the regular *Handbook* on the left, being held open with a tripod and still not doing a very good job at it.





These images each show the original (left) and modified (right) Observer's Handbooks.

You can get this done down at your local office supplies store. We go to Staples Business Depot here in Kingston and they can slice the old binding off and insert the new Cerlox or coil binding (your choice) for under $5 and in just a few minutes if it is not busy.★

What About Binoculars?

Kevin Kell

One of the first questions we get at public observing sessions is: "what kind of telescope should I buy to start out?"

We tell them: "none." That always elicits a shocked silence and a look of "huh?"

What follows is a good interaction going between the astronomer and the interested visitor about why binoculars are a good starting point and the initial question gets re-phrased as: "what kind of binoculars should I buy to start out?"

In the image below are two sets of binoculars. On the right a set of Minolta 10x50 binoculars purchased back in 1988 for about $150. They show an extra-wide-angle field of view, come covered in a rubber coating and are fantastic for both the beginner and the advanced observer alike. They can be handheld for periods of time, but I still prefer to attach a $20 tripod bracket to them and mount them on the tripod shown. This makes the image much more stable and the view more enjoyable. These are 10 power and have a 50mm objective lens size.

Sometime farther down the road, the astronomer may wish to see just a little bit more magnification and maybe some more light gathering ability.

That's where the 15x70 Celestron binoculars come in. Currently available in Kingston at Canadian Tire for $150, Kim and Susan picked up a set each of these while on a road trip to Toronto a year or two ago and they are great.

They are much lighter than I expected while at the same time well designed to hold or to tripod mount; they are large enough and long enough that some kind of stable mounting is almost a necessity. Binoculars are great for large objects, such as the moon, open clusters and comets...especially comets: like Comet McNaught in January 2007, Comet Holmes in October-December 2007, and the much-anticipated Comet Lulin in February 2009.

These are pieces of equipment that we will never part with. Usable for birdwatching, scenery, Presidential Inaugurations and more! I'm beginning to sound like an Infomercial!

We'll leave it there for now. Clear Skies!★

Cosmic Blunders: Missed Planetary Discoveries

Walter MacDonald

"Planet hunting is a slippery business. One small mistake can result in total failure..."
—Clyde Tombaugh

As **Clyde Tombaugh** noted, finding new planets is rather a dangerous enterprise. A quick look at the discoveries of Uranus, Neptune, and Pluto easily confirms this.

Uranus

When **William Herschel** discovered Uranus on 1781 March 13, he became the first person in recorded history to discover a planet. As it turns out, however, he was not actually the first person to see it. Uranus was recorded over 20 times by several astronomers between 1690 and 1771, including two Astronomers Royal! In 1690 (91 years before discovery), **Flamsteed** took it for a star and designated it 34 Tauri. He observed it again in 1712 and 1715 but still didn't make the discovery. Ditto for **John Bradley**, who observed it in 1748 and 1750. **Pierre Lemonnier** actually observed Uranus eight times in one month in early 1769. How could he not have discovered its true nature at that time? Herschel did have one advantage over others: he had the best telescopes around (which he built himself), and with these he was able to distinguish the non-stellar nature of Uranus. Nevertheless full credit must go to Herschel since he was able to make the discovery where so many before him had failed.

"While I was examining the small stars in the neighbourhood of H Geminorum, I perceived one that appeared visibly larger than the rest..."
—William Herschel

Unlike the discovery of Neptune, the discovery of Uranus created little controversy. Herschel was clearly the discoverer, so there were no fights over priority. At first it was thought that Uranus might be a comet, but its planetary status was confirmed in short order by its apparent motion relative to the stars. The naming of the new planet did create some debate, since there were different ideas on the subject: Georgium Sidus, Herschel, Hypercronius, Neptune, Uranus. Ultimately, of course, the name Uranus was agreed upon by astronomers.

"We see it as Columbus saw America from the shores of Spain. Its movements have been felt, trembling along the far-reaching line of analysis with a certainty hardly inferior to ocular demonstration."
—John Herschel, 1846 Sept. 10

Neptune

The earliest observations of Neptune were made by **Galileo** in December 1612 and January 1613, 234 years prior to its discovery! He was observing Jupiter and its satellites very intensively at this time, measuring and sketching their positions, and often including bright background stars (which helped show the motion of Jupiter). His notebook contains an entry for January 28, 1613 in which he notes that Neptune (which he thought was a fixed star) seemed to have moved from the previous night! (See figure 1.) If only he had followed up on this! (It would, incidentally, have put a big dent in Bode's Law before it even got started.)

Neptune should have been discovered on May 10, 1795. On that night, **Joseph Lalande** was working on his star maps. As he was re-observing various fields to check his previous work, he noticed that one star had moved between sessions. Once again, history repeated itself: he assumed it was an error, so he corrected it and carried on. (If there ever was a time to say "D'oh" this was it, but that word had not yet been invented!)

Volumes have been written on the story of the events in 1845 and 1846 leading up to Neptune's discovery. It is a very interesting story, one that is chock full of blunders! Two mathematicians, **John Adams** in England and **Urbain Leverrier** in France independently worked out the location of an 8th planet from its gravitational effects on the orbit of Uranus. Although Adams' efforts were slightly in advance of Leverrier's, there was much difficulty getting a search going in England. This finally happened in the summer of 1846 when **James Challis** started in on a methodical, ambitious search program covering 10° x 30° of sky to 11th magnitude. Although the search was pursued with only a modest effort, the program was a success, observing Neptune twice in the first four nights! Unfortunately he did not analyse his observations until it was too late. He could have worked harder (or even just started earlier), and the discovery would have been his. Or, he could have worked smarter, and made the discovery more easily: a less ambitious survey, restricted to a small area around the predicted

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Cosmic Blunders: Missed Planetary Discoveries

...continued from page 4.

positions (which both turned out to be pretty accurate) and just to 9th magnitude would have done the trick. Easier still, would have been to survey that small patch of sky and simply look for any "star" that appeared to be non-stellar. Challis did this, and observed a candidate, but couldn't be bothered to switch to a higher magnification at the time. As it turns out, it was already too late by the time he got around to doing this. So he became yet another "casualty" on the road to discovery.

There was even to be a search for Neptune made in the USA. When Leverrier's work became known in the US in August of 1846, an astronomer at the US Naval Observatory proposed searching for the new planet. Although he received permission to do so, telescope time was not available until October. So it was that the Americans missed a chance at discovery. (This is not to pick on the Americans—since Leverrier's work was published and well-known in Europe, astronomers in many countries must have had the chance to mount a search in time to make a discovery.)

With the continuing circus unfolding in England, you would think that the French would have been stampeding to their telescopes to confirm Leverrier's prediction and take all the glory. But no! Ultimately, Neptune was only discovered because Leverrier took the initiative and wrote a letter to Johan Galle at Berlin Observatory. The Germans did everything right. The letter was received on 1846 September 23rd and action was taken without delay. Director **Encke** (of comet fame) gave permission to **Galle** and **Heinrich d'Arrest** (who asked to join the search) to use the 9" Fraunhofer refractor to search, and they did so that very night. In contrast to Challis' efforts, Galle searched the immediate area where Neptune was predicted to be and looked for an object with a visible disk, and he found...nothing. Then d'Arrest suggested using a detailed new star map the observatory had just produced. Galle searched again, with d'Arrest immediately checking his observations against the map. After a short time d'Arrest said "That star is not on the map!" Neptune's reign of terror (or should that be "error?") was over! It was less than one degree from Leverrier's predicted position.

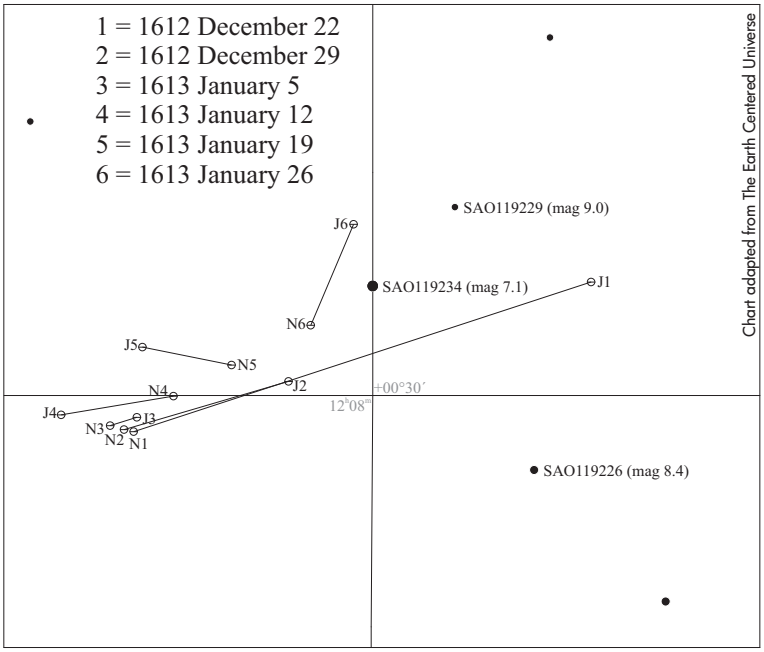

Figure 1: Jupiter and Neptune do their dance in Virgo during the time Galileo observed them. Positions are numbered 1 through 6 and correspond to the dates indicated. Jupiter occulted Neptune on January 3rd, 1613.

Jupiter and Neptune do a similar dance in 2009, being within 1° of each other from mid-May to mid-July in Capricornus

As with Uranus, there were a number of names put forward for the new planet: Janus, Leverrier, Neptune, Oceanus. Emotions were still running high in the aftermath of the discovery, but the name Neptune ultimately carried the day.

Pluto

The history of the search for Pluto isn't nearly as colourful as for Neptune, but it is still quite interesting.

In the wake of the prediction and discovery of Neptune, much work—both mathematical and telescopic—was done. In the 19th century, visual searches were conducted without success. In the 20th century, searches went photographic. On the mathematical front, **Percival Lowell** (Lowell Observatory) and **William Pickering** (Harvard Observatory) produced many hypothetical planets, but unlike the accord between the predictions of Adams and Leverrier,

Continues on page 10...

Further Reading:

- The Discovery of Neptune, Morton Grosser.
- Galileo's Sighting of Neptune, Drake & Kowal, Scientific American, December 1980.
- Out of the Darkness: The Planet Pluto, Clyde Tombaugh and Patrick Moore.
- Clyde Tombaugh: Discoverer of Planet Pluto, David H. Levy.

Happy Birthday Uranus and Neptune!

Walter MacDonald

While reading up on the discoveries of Uranus and Neptune, I thought it would be really neat to be able to observe them in the same area of the sky where they had been found originally. Since Uranus goes around the Sun every 84.02 Earth years and Neptune every 164.79 Earth years, their "birthdays" only come that often (and you thought people born on a leap day had it tough!). As it turns out, we are in luck: both have birthdays coming up!

Based on the numbers in the table below, Neptune has its first birthday on 2011 July 10 and Uranus has its third birthday on 2033 April 2. One can only hope to still be around for the latter! (Certainly there is a higher probability of that than seeing Halley's Comet again in 2061, or observing dwarf planet Pluto on its first birthday in the year 2178!)

Neptune

On 2011 July 10 Neptune is 31° up in the SSE at the beginning of astronomical twilight (dawn). However, it is not quite in the same place in our sky as it was at discovery. This is because the Earth is at a different point in its orbit than it was one Neptunian year previously. As a result of this difference, you will doubtless want to re-observe Neptune sometime from mid-October to the end of November when it is in the exactly the same place in the sky that it was at discovery. (See figure one.)

Uranus

Uranus is even better placed on its birthday, and also very near its discovery position. At the end of astronomical twilight (dusk) on 2033 April 2nd, Uranus will be 47° above the western horizon. The sky will be a little bit different than what William Herschel saw though, since Saturn will be a part of the scene, just 4 degrees from Uranus. (See figure 2.)

If you happen to go out two weeks or so earlier for the 252nd anniversary of Uranus' discovery (2033 March 13), the scene will be much the same except that Saturn will only be 3 degrees from Uranus and both planets will be about 1 degree further west. ★

Planet	Discovery	Period† (Earth days)	Previous Birthdays	Next Birthday
Neptune	1846 Sep 23	60190	none yet!	2011 Jul 10
Uranus	1781 Mar 13	30687.2	1865, 1949	2033 Apr 2

†Periods from NASA's Solar System Exploration pages at http://solarsystem.nasa.gov/planets/index.cfm

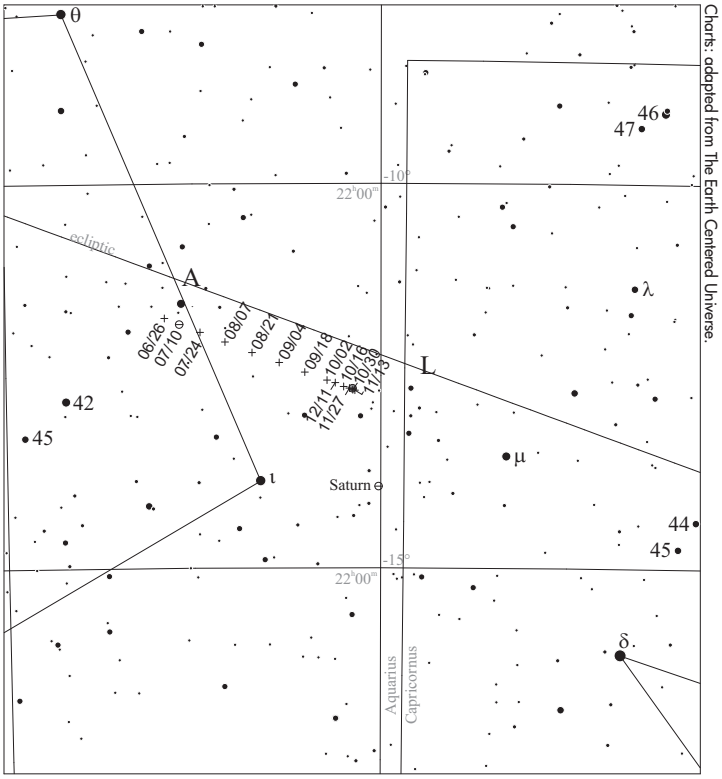

Figure 1: Neptune (dark circle) and Saturn are shown at the time of Neptune's discovery in 1846. "A" and "L" denote Adams' and Leverrier's predicted positions for Neptune at that time. Tick marks indicate Neptune's position at 14-day intervals in 2011.

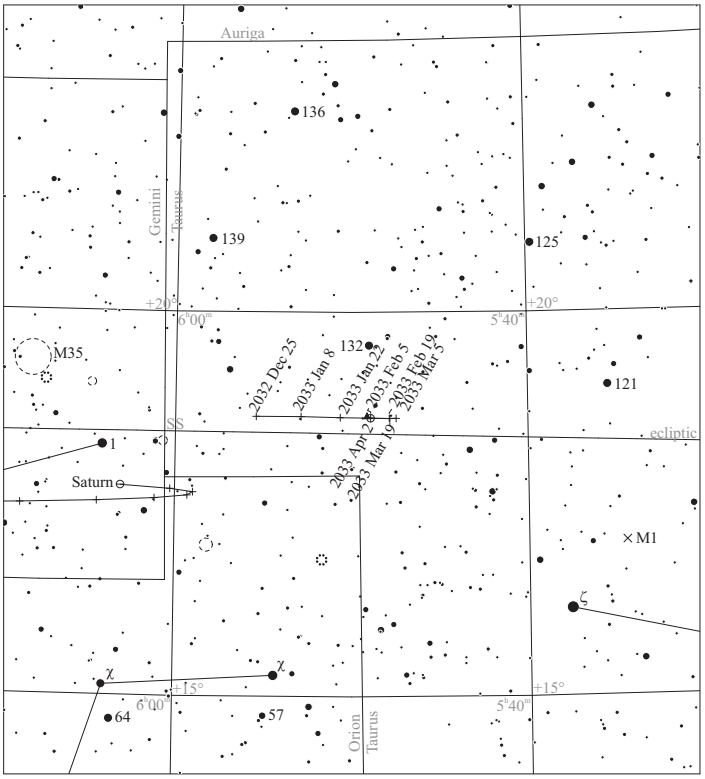

Figure 2: The shaded triangle indicates the discovery position of Uranus on 1781 March 13. Ticks at 14-day intervals show the motion of Uranus and Saturn in early 2033.

KAON Report: 2009 January 10

Kim Hay

Well, as luck would have it in our area of Canada, the day started sunny, but the clouds moved in and covered up the moon, our observing target for the evening.

But this did not dampen spirits. We converged on Ellis Hall, and started setting up tables in the lobby. **Kevin Kell** manned the table with Star Finders and Astro cards fielding questions from interested people. Prof. **Kristine Spekkens**, and Prof. **Gregg Wade** were on hand at the front helping at the construction desk of the Star Finders.

Steve Hart was traffic director and number taker. **Susan Gagnon** was helping out in the Observatory warm room where **Galileo** and **Cardinal Barberini** were mincing words and doing a demonstration of the famous argument of astronomy.

Terry Bridges was manning the quiz table with NASA Stickers, star and moon stickers, hand outs from Gemini Telescopes; copies of *Sky News* magazine and *Mary Lou's New Telescope* were doorprizes.

Stephane Courteau and **Melanie Hall** were in the dome, and introduced the **Mayor** and Prof. **Judith Irwin**.

Joel Rodgier, **Pascal Elihai**, **Kim Hay**, **David Maguire**, **Jonathan** (a grad student) were busy with video cameras, digital cameras. Yes, we have the talk on Video, we are hoping to show it at a meeting in the future, take still images for our website, and a copy for the library.

People did tours of the observatory before the talk, **Stephane** made announcements thanking all the volunteers, and the introduced the Mayor, who then read a Proclamation which introduced the IYA to Kingston and declared this the kick off date. Next, Prof. **Judith Irwin** entertained the 117 people present with her talk "Galileo: What did he know then? What would he think now?" The talk lasted for 45 minutes; there were some questions after, ending with an invitation to the January 13th talk being given by Dr. **Sara Seager** at RMC. Everything was pretty well over at this point, though a few people went up to the observatory; we had everything cleaned up and done by 9:30 pm.

Shortly after we got home, a check of the radar showed that it was snowing in Kingston. We had hot chocolate (with additives) and watched a show of *Battlestar Galactica*; by this time it was snowing in Yarker.

I personally want to thank everyone who came out and who helped pull this event off without any problems. It was a great start to a wonderful year where we do what we do best, Astronomy, and share it with others.★

Astronomical Anecdote

Walter MacDonald

One of my old observing buddies, the late **Steve Chomniak**, once told me a story about one time that he went to our dark-sky site in the concessions northeast of Oshawa by himself...

It was a cold winter night, crystal clear as only cold winter nights can be, and the deep sky gems of the winter sky were beckoning. So Steve loaded up the car with his equipment and a toboggan. This latter item was a necessity since our dark-sky site lay near the mid-point of an unimproved road, and was not passable from late fall to early spring (this had been learned the hard way, but that is another story...)

Driving out into the country, he soon reached the start of the unimproved road. Here he loaded up the toboggan and hauled his equipment out to the designated spot. It was a great observing session as he worked his way through the usual winter showpieces. There was almost no wind and the conditions were indeed very good.


Photo: Steve Chomniak

All was well as he contemplated the universe, until he suddenly felt two hands land solidly on the back of his shoulders! It is very rare in life that one experiences absolute, sheer terror, but this was one of those times. Steve told me that his heart just about stopped! With great courage, he turned his head and saw that it was a big dog that had come across the field (probably from the nearest farmhouse) and jumped up behind him. What a way to meet a new friend! Needless to say, there was no trouble staying awake the rest of the night, with all that adrenaline flowing!

So the next time someone tells you that Astronomy is boring, you can tell them about some of the unexpected events that can occur while observing in the dark...in the middle of nowhere ... in the dead of winter... alone. But for the time of year, it would be a great Halloween story!★

Winter Observing at Latitude 26 Degrees

Leo Enright

At the invitation of the new editor of *Regulus*, I am pleased to contribute an observing report from southern Florida, along with a few comments that were also invited about astronomical events currently happening in this part of the world. I arrived at about latitude 26° on 2008 December 11th, just over one month ago. Since that time my observing log has grown by 12½ pages, an average amount for a standard observing month, but certainly more than the average usually seen in the months of December or January in Ontario. As compared with previous years in **Florida**, my first two weeks here this winter were considerably "cloudier and rainier" than ususal. Since Christmas, however, the skies have been generally quite clear, with the ususal "December expectation" of 85 to 90% of the nights clear and usable for observing, and with daytime temperatures around +22 to +26C. and nighttime cooling to +14 to +16C.

After my arrival I did not have an observing session that merited an entry in my log until December 16th and between then and this morning (2009 January 13th) I had 20 evening/night observations and 12 very early morning observing sessions. In addition, there was one **solar** observation, with diagram, done on Saturday January 10th. For the stated period of time, my log also shows 14 diagrams, drawn mainly to illustrate the view of the planetary array in the southwestern evening twilight sky.

Even after seven years of winter sojourns at this latitude, there is a noticeable adjustment to make each time. Moving from my backyard near Sharbot Lake (at about latitude 45°) to a backyard that is just 2½° above the **Tropic of Cancer** means many things. Obviously, every star and every constellation in the southern sky is 19° higher, but unless they observe the contrast firsthand, most observers do not appreciate how differently—how dramatically differently—the planets move along the ecliptic, AND it is MOST dramatic in the winter and early spring of the year when the **ecliptic** here is inclined so very steeply both in the western evening sky (where 3 planets and the Crescent Moon were concentrated in early January) and in the eastern morning sky (where various planets have been concentrated in previous years). In addition, from Ontario, I was never used to seeing the **Pleiades** precisely in the zenith, and from there I never saw a First Quarter Moon north of the zenith. Never!

"...the December/January evening observing attire is a t-shirt, short pants, and sandals..."

In Ontario it was always **Sirius**, brightest star in the heavens, that appeared 10 to 12 degrees above the southeastern horizon on crisp December evenings and later marched across the sky as the night progressed. Down here that is not the case, and I am not referring to the fact that down here the evenings are never crisp(!); in fact, the December/January evening observing attire is a t-shirt, short pants, and sandals. That star blazing in the southeast 10 to 12 degrees above the horizon, and about to make its way across the southern sky as the night progresses, is NOT Sirius, but rather **Canopus**, second brightest star in the sky, the lucida of the constellation Carina, and a jewel that is never seen from Canada. [In the sky, Canopus is 36 degrees south of Sirius.] Its blazing appearance, in spite of the neighbourhood's ambient light, is a reminder that other dramatic views await in the spring of the year, for in that season the **Southern Cross** (the lucidae of the constellation **Crux**) will peak above the southern horizon, and **Alpha and Beta Centauri** will show themselves too at this latitude.

Even the **moon** appears at a different place in the sky!! Of course, generally on a casual viewing, the **lunar parallax** is not noticeable, but careful drawings made simultaneously by two observers separated by 19 degrees of latitude, at a time when the moon appears close to a bright star or planet, can demonstrate it very clearly. [I hope to continue my efforts from last year in this regard. Remarkable how uncooperative the weather was last winter when it had to be good in two places at once!!]

An adjustment is also required to the conditions under which observations are done in southwestern Florida. Although I find myself about thirty kilometres from the core of the city of Naples, **light pollution** is an ever-present, and growing problem, very noticeable to someone accustomed to the dark skies of the Sharbot Lake region. Over this entire region, in the past fifteen years, the rampant growth, in the form of both commercial and residential development, has been truly and unbelievably remarkable. The hour-and-a-half drive from Naples to Fort Myers, that 15 years ago passed through 4 or 5 distinct little towns is now a drive through one enormous development. One of the latest additions, less than 5 kilometres from our residence, and one that opened only a year ago, is a **super-complex** that combines commercial and residential develop-

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Winter Observing at Latitude 26 Degrees

...continued from page 8.

ment; imagine, if you will, six or seven of the largest shopping malls in Ontario mixed together with six or seven large residential complexes —all in one super-development! Maybe paradise for that part of humanity that wants to spend every waking hour shopping!

All this means burgeoning **light pollution** and a growing concern for the local astronomy club, which has tried bravely to find a solution for its members. It has acquired the right to use what is called the **Fakahatchee Strand**, well to the southeast of the city of Naples and at the edge of the everglades, but the terrain at the site is a challenge for ordinary vehicles and sanitary facilities are lacking. Yet some of the serious observers in the club do make the effort to use the site.

At the practical level, one just learns a few things: like the location of a little-known switch to turn off the outside lights on our building, and when to turn them back on before other residents complain, and where to position the observing chair so that certain bushes or trees can block the glare of a certain streetlight! [In truth, complaints about a few lights going out for an hour or two are very rare. Last year one neighbour, who does understand what I am doing, said another neighbour had told him of seeing a "drunk" lying on a lawn chair in his driveway looking up at the nighttime sky. I am sure that the first neighbour was able to explain the sobriety of the person in question!]

For most of my observations the instrument of choice is my **18x50 IS** binoculars. Their superb Canon optics conveniently provide the optical assistance needed for the kind of observing that is feasible at my location. With the very steady skies of southern Florida, double stars, and brighter variable stars, and star clusters are logical and favored targets. Many galaxies and nebulae that would be routine from Ontario are out of the question here because of the ambient light.

In the winter sky, the constellations Orion, Monoceros, Canis Major, Gemini, Taurus, and Auriga have provided numerous stars and clusters for recent exploration. Though the Rosette Nebula cannot be viewed because of the light pollution, its distinctive central cluster, for example, **NGC 2244** is a beautiful steady binocular sight, and in its immediate area, are numerous objects of interest always worthy of exploration: **Plaskett's Star** (named after a famous Canadian astronomer commemorated in a medal awarded by our Society) found in the cluster called **Collinder 106**, the beautiful bright cluster **Levy 159** (in the shape of an inverted Christmas tree) and its associated variable star S Mon, the variable star AR Mon within the cluster **Collinder 97**. This area of northern Monoceros is a favorite, not just for the changes to be seen in the variables mentioned.

Another region that has attracted me for years has presented a new fascination this year following a fine article by Ken Hewitt-White, formerly of the Ottawa Centre. The article (from *Sky and Telescope*, February 2009, p.51) describes interesting stars near **Orion's Belt**, which he explains, is also known as the cluster **Collinder 70**! My binoculars could easily split the Belt Star, **Delta Orionis** into the two components—the 6.8 magnitude secondary 53" north of the 2.4 magnitude primary. (Florida's steady skies allowed the splitting to be as easy as if done with a much larger telescope in Ontario!) **Sigma Orionis**, located not far from the Horsehead Nebula, actually a 4-part multiple star, is also clearly split in the binoculars with the AB primary seen at magnitude 3.7 and the E companion seen at magnitude 6.3. Very close and just to the left was the 3-component **Struve 761**, which is easily split also, with the components A and B which are 1' apart. I strongly urge others to read and use Ken's excellent article about stars in this part of Orion.) Of course, in the binocular winter sky I also routinely revisit the region's Messiers: 35, 36, 37, 38, 41, 42, 43, 46, and 47, and on some nights I pursue the challenge of M1 which is successful on some nights. I also frequently observe the pair of clusters within the horns of Taurus: **NGCs 1647** and **1746**.

"By the end of the day, I was very happy to have participated in 45 'Galileo Moments' —great opportunities to share the fascinating world of Astronomy with the public."

As might be expected, my attempt at observing the **Quadrantid Meteor Shower** was somewhat disappointing—because of both the ambient light and a bit of extra haze present on the night of the observation. I observed between 4:00 and 5:00 a.m. (astronomical twilight began at 5:56 a.m.), and saw only 10 meteors. Admittedly, they were bright, with a pair at mag. 2, and one possibly mag. 1. [I had heard the western part of the continent would be more favoured for this shower (with the instant of the peak occurring after twilight in the east),

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Winter Observing at Latitude 26 Degrees

Leo Enright

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but was totally unprepared for what our Honorary President would tell me about his observations that morning. By comparison, at Vail, Arizona, **David Levy** told me that his hour of Quadrantid observations yielded 88 meteors—the most successful of his life for any shower except for the Leonids of 2001.] In spite of the conditions that I had, I was still glad I had tried to observe them.

In the 15 evenings since December 29th (and up to January 12th), I have had 13 observations of the evening planets, with two evenings being completely clouded out. There were three other evenings on which I was partly clouded out and prevented from seeing some of the planets, or was interrupted, but on those three occasions I did manage to see Venus.

At sunset **Venus** has been consistently 40 to 45 degrees above the southsouthwestern horizon at sunset, and visible to the unaided eye at sunset or very close to the time of sunset, sometimes before it. For the last 3 days of 2008, the **Crescent Moon** climbed through the planetary array—with the 2½-day-old crescent being just 8° above Jupiter and 10° above Mercury on the 29th, 18° above Jupiter and 18½° above Mercury on the 30th, and just 3° from Venus on the 31st. On both December 30th and 31st, **Jupiter** and **Mercury** appeared only about 1 degree apart, but soon Jupiter began to drop down toward the horizon, though I could still see it until January 6th, by using binoculars on the 5th and the 6th.

I have been able to have 10 observations of **Mercury** between December 29th and last night (January 12th), with those on January 9th, 10th, and 12th being with binoculars. [To those in Ontario who think that 10 Mercury observations at one elongation of that planet is significant, I must remind them of **Warren Morrison**'s truly remarkable record of 31—established quite a few years ago—from Ontario!!!!] With good weather in the next few days, it may be possible to extend the number of Mercury sightings by one or two, but Mercury is fast descending toward its inferior conjunction on January 20th. Though Jupiter and Mercury will have departed from the evening sky, I expect to see **Venus** there for a good while; it has still not reached its Greatest Eastern Elongation from the Sun! [That happens tomorrow—January 14th!]

I shall say little of my early morning observations, other than they include the planet **Saturn** which, by 5:00 a.m. has climbed to within a few degrees of the zenith.

I have mentioned the local astronomy club—the **Everglades Astronomical Society**. Twice in the past month Denise and I joined with some of their members for a public outreach event in a large park in Naples. It was part of **Art in the Park**, an event for "arts-related organizations" to meet the public. Our astronomy tent had handouts and information available, and three or four telescopes for solar viewing.

On Saturday, December 13th, we talked to 60 or more people, and I assisted with the telescope operations. On Saturday, January 10th, we talked to perhaps 100 people on a sunny and very hot day! I assisted with the operation of a **PST** telescope for hydrogen-alpha viewing of the **Sun** and the large prominence that was visible at the lower edge of the disk. Another telescope gave the white light view of the solar disk. There my observation was of one very compact group of sunspots, containing 6 spots. [My Relative Sunspot Number (RSN) = 1 x 10 + 6 = 16.] By the end of the day, I was very happy to have participated in 45 "**Galileo Moments**"—great opportunities to share the fascinating world of astronomy with the public.

Doing winter astronomy at latitude 26° is always challenging, but fascinating, and an interesting contrast in many ways to that of summer astronomy done at latitude 45°.★

Cosmic Blunders

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their predictions were all over the sky, changing as they repeatedly revised them.

Lowell Observatory was most active with photographic searches starting in 1905, 1911, 1915, and 1929. In the course of photographic surveys, Pluto was photographed at Lowell Observatory in 1915 and at Mount Wilson in 1919—but Pluto's images were missed and two more chances at discovery lost.

It wasn't until after **Clyde Tombaugh** took over the Lowell Observatory search program in 1929 that Pluto was finally found, on 1930 February 18. Tombaugh's work continued well after Pluto's discovery in an attempt to find any other outer solar system objects, but no more were found after a total of 14 years of searching.

Tombaugh's search was quite thorough: it would be another half century until the discoveries of Kuiper Belt objects.★