



Event Horizon

Volume 18, Number 4
February 2011



From The Editor

It seemed that Murphy's Law was invoked the moment I sat down to put together this month's Event Horizon! I upgraded the publishing software (bad idea - will I *never* learn...??) to take advantage of what looked like some cool new features only to lose a couple of old ones in the process.

I must apologize to Mario Carr for not implementing the "form fields" in his Crossword this month. Next month, I hope to have wrestled the software into submission and you will be able to complete the Crossword on your computer screen instead of printing it off and using a pencil.

In spite of the glitches this month, I really enjoyed reading all of the articles and submissions. I'm sure you'll enjoy them, too!

Cheers,

Ann Tekatch
Editor@amateurastronomy.org



Chair's Report by John Gauvreau

This past month was an extraordinary one for the HAA. Our monthly meeting saw speaker, celebrated author Dan Falk, bring in more than 90 audience members. They were not disappointed, as his presentation was both accessible and entertaining. So many people wanted to ask questions and speak with him personally that we needed an extended intermission to give everyone the time they wanted with Dan. Even better was that many of those in attendance were guests, getting their first taste of the HAA and perhaps their first experience with the world of astronomy. Mario Carr, HAA publicity director, was singled out as being the driving force behind getting the word out about our meetings. Well done, and thanks, Mario!

Two weeks after the general meeting, the HAA's Cosmology Discussion Group met and had a wide ranging and vigorous discussion that started with the ideas around inflation, a short period of time (a *very* short period of time) that occurred shortly after the Big Bang and a (Continued on [page 2](#))

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Chair's Report (continued)

concept that cosmologists use to explain many of the observed phenomenon of today's universe. We began by viewing a half-hour video of a lecture on the subject, which gave everyone in the room, both beginner and experienced amateur, a level footing. Of course, like in any good discussion, we were soon off topic and exploring many surrounding ideas.

Of course, for many members the universe needs to be explored not just intellectually, but visually. And in that regard, January was less than ideal. Clear skies were rare this past month, and not only our members, but also the public missed out on observing. Our Burlington Public Night, in conjunction with the Burlington Winter Carnival, was completely clouded out. Sadly, this is one of the hazards of winter events. Many more public events are planned for the year, and of course all HAA members, family and friends are welcome.

I had a busy month too, moving my residence from an apartment to a small house. Our club Secretary, Jim Wamsley, helped move my astronomy gear (telescope, mount, binoculars and other fragile optics) from one location to the other. My gear was in safe hands and I had peace of mind. When we arrived at the new house and Jim saw the place for the first time, he walked right through the house and out to the back yard, asking, "So, what kind of sky have you got here?" I laughed at the time, but Jim had really got right to the heart of the matter. Amateur astronomy as a hobby is a thing of joy for all of us. A night under the stars can take your mind off your daily troubles, the stress of the day disappearing into

the darkness of night. Having a backyard where I can enjoy the sky is one of the things that will make this house a home, giving me a place as important as a spacious living room, or a finished basement (neither of which I have, by the way). A place where I can feel comfortable and relaxed, and for many of us one of those places is under the stars. Now I just need the clouds to go away so I can check out what kind of sky I actually have.

See you out there.

John Gauvreau
chair@amateurastronomy.org



This is not my new house. - John G.

Masthead Photo Credits: This month's feature photo is the first object on Messier's list: M1, the Crab Nebula. I hope that it inspires you to participate in this year's Messier Marathon fundraiser. The photo is a stack of images taken by my husband, Bill Tekatch, with a Starlight Express MX916 CCD camera and a 180mm f/9 refractor. The images were taken from our backyard observatory.



Astronomy (and other stuff) in Belize by Jean Craig and Mike Jefferson

From the 4th until the 18th of this month, Jean and I had the opportunity to travel to Belize, in Central America. It is located just south and east of the lower part of Mexico and used to be the colony or protectorate known as British Honduras.

The purpose of the trip was to investigate some of the business ventures of her nephew in this very sparsely populated country and to experience some of the many natural wonders of its environment.

Hardly had we been home from our travels to New Zealand and Australia, last March, and we

were already looking at shorter term exploits in the more southerly climes of this hemisphere.

The purpose of my writing is not to create a travelogue of what transpired but to give a look at some of the astronomical and a few of the cultural aspects of going to a 'challenged'-and-tourist area of the Western hemisphere. Like the previous trip, this was also a general-purpose expedition but less-planned and more self-guided and impromptu. Consequently, equipment had to be managed with that in mind and the following is a list of what we took: Leica 8X20; Canon SX 120; small Maglite with red filter; 8" mini-tripod; 20 mw Beta laser pointer and Jay Pasachoff's "Peterson Field Guide to the Stars and Planets". This may not seem like much, but when you are back-packing it around, in and out of vehicles, hotels and residences, it gets very heavy, very cumbersome and very awkward very quickly! FYI - always plan every astronomical adventure with this in mind, whether you are going abroad or remaining in our local area!

One of the prime things to keep in mind is that there is no place on this planet where you will get

perfect viewing conditions all of the time. Perfect viewing conditions from anywhere will occur only a few times in anyone's life. Even the high plains and plateaus of Atacama, Chile, will guarantee good conditions for 320 days out of 365 - not too

bad at all, but not perfect!! Nature does not always cooperate. Like the skies on my Costa Rican trip, those of Belize, while very dark by Ontario standards, are subject to the challenges of humidity. This would make them superlative for planetary studies, but haphazard for deep sky investigations.



This is a photo of San Pedro Beach in Ambergris Caye, Belize, close to where Mike and Jean stayed. This photograph is by Adam Reeder and is courtesy of Wikipedia. - Editor

I saw Orion, with the binocular, while we were staying in a hotel in San Pedro. This 'Never-never-Land' community on one of the major islands off Belize provided us with a lovely hotel accommodation for 4 beautiful days and a pier from which to investigate 'The Hunter' on one very dark night. It was better than I had seen it in Australia and New Zealand back in March. The night was dark and windy. The seas had kicked up and no fishing or diving boats had gone beyond the protective reef that day. But that night Orion put on the best show it has ever done for me! Why do I say that? Orion is seen in our Ontario skies as The Hunter with the belt, sword and the Orion Nebula (under the best circumstances). From the dock at San Pedro it took on the added majesty of the surrounding nebulosity, its countless variable, double and multiple stars, the Orion Nebula, the superior resolution and contrast of the belt and sword regions, Barnard's Loop, the added nebulosity and darkness of the Horsehead region, M-43 En and the Rosette Nebula. The whole constellation put on a stunning show that night in an 8X20 roof-prism binocular.

(Continued on [page 4](#))

Astronomy (and other stuff) in Belize (continued)

I had an opportunity on the island and on the mainland to take some images of the moon in its various phases, all leading up to the full phase with the Canon SX 120.

The sun shone almost all of the time, with the exception of a few periods of cloudy weather and the odd bit of rain. This was despite the fact that LO-FAR II's data over the last few weeks has been as low as I have seen it over the last 2.5 years. So, we had a sun with lots of steady solar wind and, with the exception of a few recent C-events, nothing in the way of cataclysmic bursts!

With regard to time and seasons, this part of the world is only 1 hour behind us in the Eastern Standard Time Zone. It is thus running on Central Standard Time. Therefore, I didn't even have to change my digital watch. It simply kept running on EST and I made allowances for the 1 hour difference. Because we were closer to the equator, and therefore closer to the Southern Hemisphere, it did not get dark as early in the evening or stay dark as late in the morning, as it does here right now.

Geophysically, anthropologically and ecologically: we had a chance to explore very large caves with a river running through them - this is called 'cave tubing' and is done by floating on the river using inner tubes, tying them together in a 'train' and under the direction of an experienced guide; a huge Mayan city was explored far in the interior beyond a waterfall called the Seven Sisters, where we stayed at a rustic hotel in the mountains; and one afternoon we visited the Belize City Zoo, where we saw cougars, jaguars, crocodiles, poisonous reptiles, exotic birds, howler monkeys and all sorts of other fauna and flora.

All in all, a very experiential trip, since we did not stay in 5-star hotels with a lot of other North American tourists. We lived with the local and indigenous peoples on a day-to-day basis. Would we do it again? You bet!



February Treasurer's Report by Don Pullen

(Unaudited)

Cash opening Balance (1 Jan 2011)	\$ 5472.72
Expenses	\$ 20.00
Revenue	\$ 304.00
Closing Balance(31 Jan 2011)	\$ 5756.72

Notes:

1. Major revenue sources included: 50/50 (\$59), Memberships (\$125), Calendars (\$120)
2. Major expenses included: Gas Card for Guest Speaker (\$20)



App-stronomy App Of The Month by Jim Wamsley

This month, I have chosen two apps to talk about. These are maybe the two most useful apps I have found. Other astro- apps are fun, informative and extremely useful, but I have found these two simple app tools to be indispensable. Their names are simply Scope Tools, and Polar Align. I use both of these every time I go out observing.

In the past, I would have to use a separate bubble level and compass to set up my tripod and mount. I would use the compass to align to north, and then use the bubble level to find level. Of course, the compass points to magnetic north, and I have to guess on the difference to true north. When I levelled the tripod it threw off the alignment to north, and out comes the compass again. After all this, I would find that when I put on the mount, and take my first look in the polar align scope, I was way off, and must move the scope all over again to find Polaris, and re-level, then make the final fine adjustment to Polaris. Of course, after I had completed the polar alignment I would remember to turn on my G.P.S. and wait for it to boot up and load the satellite info, before I could enter it into the handset, and start the star align setup.

Now that I have an iPhone, this whole procedure is much quicker, and far more accurate. I just set the tripod up and plunk the iPhone down on top of it, and with a few taps of the screen, the job is done. The first screen is the level, simply a red dot in a circle (see image below); this is large and easy to read. With two taps of the screen the compass takes its place, and a third tap to choose true north. I can then set the tripod very accurately to north. Again, with just two taps, I can re-check level. I have found that the iPhone has cut the tripod

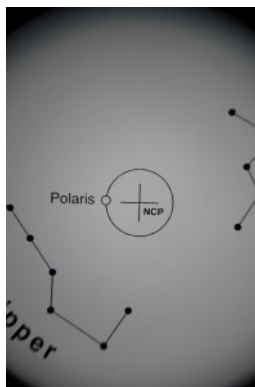


setup time in half, and made it far more accurate. A must, now I am doing astrophotography. As a bonus, a tap on the screen brings up the time and location function, with all the info you need for the computer controlled scope, no waiting for the G.P.S. you forgot to turn on. An additional bonus is a magnification calculator. By simply inputting the scope objective diameter,



focal length, and focal ratio, and the eyepiece focal length, it will give you the magnification.

The second app is the Polar Align App. There are several ways to do polar alignment, and the view through the polar alignment scope can be different from brand to brand, but all have one thing in common, some kind of cross within a circle with a dot or smaller circle offset. My scope has a picture of the Big Dipper and Cassiopeia (see photo below), and by rotating the mount on the



right ascension axis, you match the view in the scope to the position of the Big Dipper and Cassiopeia in the sky. This sounds simple and is one of the easier methods, but it can be difficult to match perfectly, due to the difference in scale of the two views. Using the Polar Align App, you simply match the crosses, (see image below) and Polaris will be in the correct position. Both apps use night vision-friendly red light, and the Polar Align App has brightness adjustment.

I hope this article has been helpful, or at least entertaining. Next month, I hope to review one of the planetarium software apps. In the meantime, I hope we get some clear skies, and warmer temps, so we all can get out and enjoy a night under the stars.





Through the Looking Glass by Greg Emery

Hopefully this frigid weather hasn't been too unbearable for all of you. On the bright side, the cold and cloudy conditions give ample time for contemplating, what else—astronomy; observable structure of the universe; global warming and will the Leafs ever win another cup?

The structure of the universe, as observable to the amateur in visible light, consists of what I like to think of as six levels or stages: dust; stars; small groups of stars; large groups of stars; galaxies; groups of galaxies. Dust and gases are visible in nebula and in the gaps in the Milky Way. Dust and gases clump together under the influence of gravity to form rocks, meteors, comets, planets and stars although not necessarily in that order. As we look at stars we sometimes encounter groups of stars. This time of year the Pleiades and Hyades are two excellent examples of groups or clusters of stars. These two examples are Open Clusters (OC), which can be described as stars randomly spaced in a close vicinity of space, along our line of sight. All the stars we see in a cluster are not necessarily the same distance from us, we just lack the depth perception and thus the stars appear to be the same distance away. Stars can also form into more tightly packed groups which are more or less spherical. These groupings are called globular clusters (GC).

Here's an astronomical recipe: fold together untold billions of stars, sprinkle in millions of open and globular clusters and an extremely large, but as of yet undetermined, amount planets, meteors and comets then liberally season the mixture with all the leftover dust and gases that are on hand, and we have a galaxy.

Now the galaxies will start to form small groups, which are part of larger groups. This is going beyond that which is observable to most amateurs.



(Pleiades from <http://www.kqed.org/quest/blog/2008/02/25/star-clusters-in-the-milky-way/>)



(M15 in Pegasus from <http://skyimager.webs.com/theopenclusters.htm>)

This describes the observable universe as I perceive it. Starting with the biggest element—the galaxies—what can an amateur expect to see? A better way to phrase the question is “What should I be looking for in that greenish/white fuzzy patch I see in the eyepiece?”

The definition of a galaxy involves the notion, to some scale, of the recipe I gave above but goes on to include other, more exotic objects, as well as the concept of gravitational interaction of all the components. Just like everything else, however, galaxies grow and evolve.

The types of galaxies present in the universe can be grouped or classified by many different methods. For amateurs, the Hub- *(Continued on [page 7](#))*

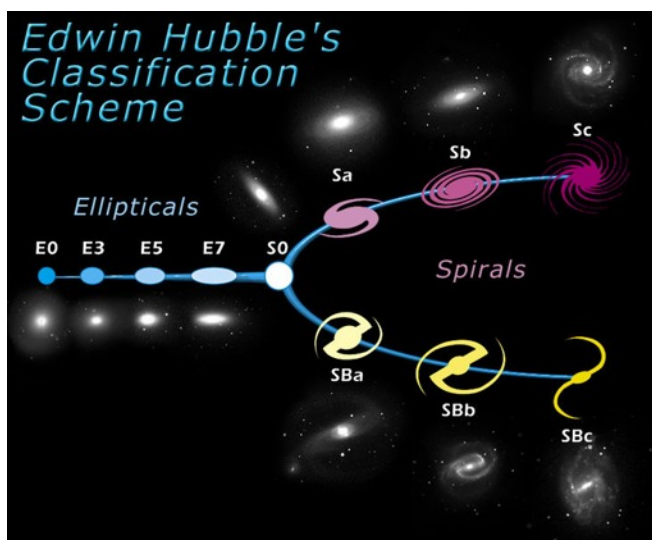
Through the Looking Glass (continued)

ble Classification or Hubble Tuning Fork is probably the most relevant (other classifications for those interested are De Vaucouleurs (1959) or the Yerkes Scheme).

There are three main types of galaxies according to the Hubble Scheme: Elliptical; Spiral and Barred Spiral. This method unfortunately overlooks the Irregular Galaxies - but then again they chose to be non-conformists so let them be left out!

An elliptical galaxy is designated as an E with a number of 0 through 7. The higher the number, the more oblate or less spherical the galaxy. As the diagram below indicates an E0 is quite round, whereas an E7 is very elongated or drawn out. The elliptical galaxies show a distinct lack of concentration of stars and matter. The matter is distributed throughout. Although it cannot be viewed, the motion of the stars within elliptical galaxies is not in a uniform circular motion around a perceived center.

The pivot point of the Hubble Tuning Fork is the Lenticular galaxy, S0. These are round galaxies that exhibit a central concentration of stars along with a round disk that is distinctly thinner than the central bulge. There is no apparent ring structure or star formation region within the disk of these galaxies.



(From http://en.wikipedia.org/wiki/Galaxy_morphological_classification)

The Tuning Fork branches off at this point. One arm is the Spiral Galaxies, the other the Barred Spirals. The Spiral Galaxies are designated with a S. The lower case letter refers to the spiral arm structure. One or few tightly wound arms that are not distinct will be an "a" with many open arms with a well defined structure being designated as a "c".

The barred spirals (SB) have a solid bar-like structure running through the central bulge. The arms will then originate from the end of the bar structure. The lower case letters again refer to arm structure and definition.

When viewing galaxies we may see the galaxy from the top (or bottom!). Examples of this are M33 in Triangulum and M51 in Canes Venatici. The extreme from viewing the galaxy face on is to view it edge on. The Sombrero Galaxy (M104) in Virgo is the best example I can think of an edge on galaxy.



The Sombrero Galaxy (M104)



January 14, 2011 Meeting Summary by Bob Christmas

The first HAA Meeting of 2011 got under way at 7:30pm sharp, with HAA Chair John Gauvreau wishing everyone in attendance, all 90 of us, a Happy New Year.

John mentioned that this is the first meeting in which attendees were encouraged, but not obliged, to bring non-perishable food items to help out the food banks in the area, and the response this first time around was tremendous.

He reminded everyone of some upcoming events, including the Burlington Public Night, the Cosmology Discussion and the annual Messier Marathon.

Without further adieu, John introduced us to our main speaker of the night, Dan Falk, an astronomy journalist who gave us the Universe on a T-Shirt, and who has written many articles for a wide range of publications. Dan was here to give his talk entitled "In Search of Time".

He began by describing how the passage of time was observed and documented by the earliest humans, citing the example of a 30,000-year-old lunar calendar.

The marking of time evolved through the Stone Age to the Neolithic Age with the construction of stone monuments such as Stonehenge in England and Newgrange in Ireland, which were, and still are, calendars that mark the Summer Solstice and Winter Solstice in spectacular fashion.

Timepieces have been around a very long time too. The first sundials were invented about 5,000 years ago. The mechanical clock was invented a few hundred years ago.

Dan went on to talk about how science tried to describe time more seriously, with the likes of Isaac Newton and Gottfried Leibniz disagreeing on the definition of time, as well as the advent of the Entropy, the Second Law of Thermodynamics, and, eventually, Albert Einstein's Special Theory and General Theory of Relativity, which imply that everyone has their own "master clocks", and they can disagree.

This led Dan's talk into the present-day era of modern physics, including time's relationship with the Big Bang, the possibility of a "previous epoch" before the Big Bang, String Theory, "M" Theory, as well as the possibility of time travel and parallel universes.

He pointed out that during Russian cosmonaut Sergei Krikalev's 804 days in space, he time-travelled 1/50th of a second into the future!

Thanks and kudos go to Dan for such an interesting talk!

After the usual intermission, Alex Tekatch picked the tickets for the door prize winners and the 50-50 winner.

Then, HAA Observing Director Steve Germann presented The-Sky-This-Month for January 2011 by announcing a couple of anniversaries for this day. Two hundred and ten years ago, the dwarf planet Ceres, the largest object in the asteroid belt between Mars and Jupiter, was discovered. Twelve years ago, the Army was called in to Toronto to help clear all the snow left by a series of monster storms. Also, 6 years ago, the Huygens probe landed on the surface of Saturn's moon Titan and sent back some cool images of Titan's surface.

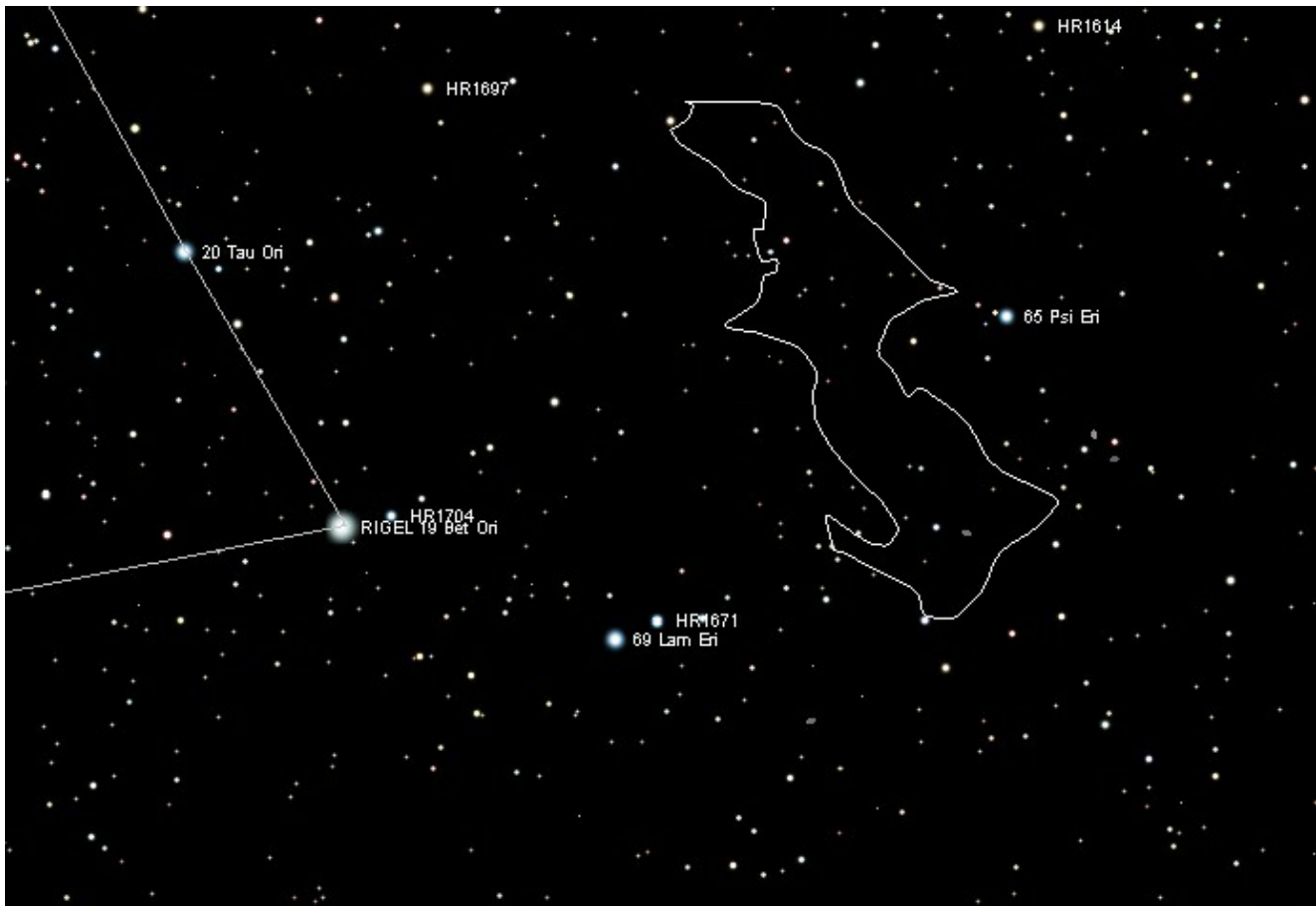
Steve also informed the audience of 10-year-old New Brunswicker Kathryn Gray's discovery of Supernova 2010lt about a month ago. I bet she had a thing or two to say at school show-and-tell!

(Continued on [page 9](#))

January 14, 2011 Meeting Summary (continued)

Next, it was time for Steve to show some astro-images. He showed my collage and animation of the Total Lunar Eclipse of last December 21. Then he showed an anonymous image of the Coathanger Cluster in Vulpecula, Kerry-Ann Lecky Hepburn's spring Binbrook image of Orion setting in the west, and John Gauvreau's picture of Orion, which was featured as NASA's APOD picture a couple of years ago.

Speaking of Orion, this was Steve's choice of emphasis for January, being a prominent winter sky fixture. Steve outlined various double-stars within Orion, as well as the faint nebulosity of Barnard's Loop and the Witch's Head Nebula that arc around Orion's perimeter, and John Gauvreau's "football" asterism just to the right of the bright star Rigel (Orion's right knee). Alas, of the entire audience, only Steve, yours truly, and John himself were able to spot it! Can you spot John's "football"? Have a look at the accompanying map showing Rigel and area. Look in the lower right of the map, just below and to the right of the Witch's Head Nebula.



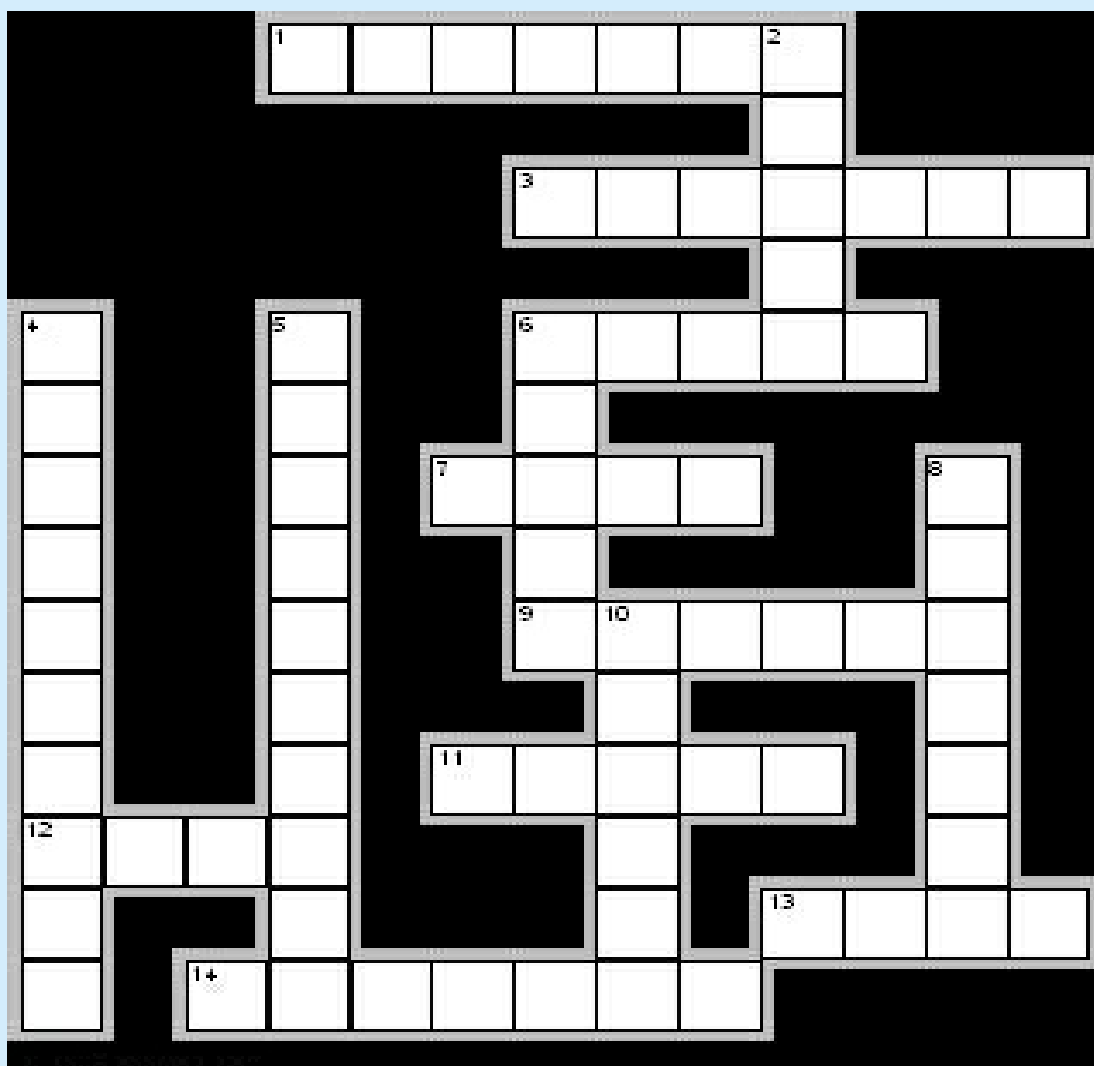
Steve wasn't done yet. There are the planets and comets of course. Jupiter and Uranus are getting lower in the western sky, Venus is in the morning sky, and Comet Hartley 2, while still well-placed in the winter sky in northern Canis Major, is nevertheless fading as it moves away from the Sun and the Earth.

What a fabulous turnout for this meeting. As I alluded to earlier, 90 people showed up on this night!

Afterwards, some of the HAA regulars went to Crabby Joe's in west-end Hamilton for food, drinks and story-telling.



Astronomy Crossword by Mario Carr



Across

1. This astronomer was born Feb. 15, 1564
3. During Feb. 2011, this planet sets in the south west around 8 p.m.
6. This Sci-Fi writer was born Feb. 8, 1828
7. During Feb. 18, the full moon is known as this type of moon?
9. During Feb. 2011, this planet will rise around midnight.
11. On Feb. 23, 2011, this spacecraft is expected to blast off to study the Earth's climate.
12. Feb. 2011 Hamilton Amateur Astronomers speaker
13. In Jan. 2011 this 10 year-old girl from New Brunswick was the youngest person to discover a supernova.
14. On Feb. 19, 2011, the moon is at?

Down

2. A winter constellation
4. This astronomer was born Feb. 19, 1473.
5. A variable star in Orion
6. During Feb. 2011, this planet can be seen in the south east during morning twilight.
8. A double star in Orion
10. On Feb. 6, 2011, the moon is at?

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The scope does not need to be disassembled between uses. It transports as two compact pieces that can be assembled and ready to use in seconds. It is easy to collimate and holds its collimation throughout the evening. It has tension adjustment control on the altitude bearings.

Contact Keith McColl at 905-648-6830 or dkmccoll@cogeco.ca





The Sky This Month: February 2011 by Steve Germann

February is one of the best times to observe, especially if you are looking for difficult objects, because *after* a winter storm, the crispest, clearest skies often result. I remember one year the air was so clear that the green laser beam could not be seen.

This month, Mercury, Mars and Neptune are all lost in the Sun.

Mars, being behind the Sun, is also incommunicado with Earth, and the Mars Reconnaissance Orbiter is saving up its data, to send to us once the Sun gets out of the way. During this time, no commands will be sent to the spacecraft at Mars, lest they be garbled by the strong radio noise put out by the Sun. The no-zone is about 16 days long, and will end on February 11th. Here's more: <http://www.physorg.com/news/2011-01-rover-anniversary-mars-sun.html>

Venus is in Sagittarius, still about 45 degrees from the Sun. You can pick it up 3 hours before Sunrise, or you can take the "Daytime Venus Challenge". (It lingers, since the earth and Venus are playing tag in the sky, orbiting at a similar rate) To do this, you need to simply stand near the edge of a building so you can shade out the sun, and look 45 degrees west of the Sun. (Two hand-spans from the Sun) If you know where to look, and can arrange to have a (deciduous) tree in the field of view, you should be able to find it easily. Once found, you can admire it with binoculars, if you are careful to keep them well out of the sun's light. Don't look through binoculars if the sunlight can get to them... it's too dangerous to be worth it. Remember, as time passes, the shadow of the building will move and the sun's light will approach your position. Be cautious, and try to position yourself to keep Venus close to the edge of the shadow. That way you know you have 3 hours before the Sun gets there.

Jupiter (and Uranus) are evening objects, setting earlier and earlier. This month will see them at 30 degrees above the horizon at 7:30 PM. Next month, it will be daytime when they are 30 degrees above the horizon... You'd better have another peek at Jupiter before it (and Uranus) become invisible in the Sun's glare and 2 months later become a (much more difficult) daytime object.

Rather than report the time Saturn reaches the horizon and 'rises', I think it's more informative to know when it's likely to be up high enough to see: Saturn reaches 15 degrees altitude at 1:25 AM on Feb 1 and at 11:27 PM on March 1, so it's time to prepare for the greatest sight in the telescopic sky. It will rise about 2 hours earlier each month from now on, reaching opposition on April 3, 2011, when it will be visible all night. I will be sure to keep you posted. I will also eagerly await any reports you have about seeing it. It's easy to find Saturn without

setting up your telescope, because it's in Virgo, very close to Spica. You can "Arc to Arcturus" and then "Spike down to Spica" and you will be within 9 degrees of Saturn, which is a bit West of Spica. It will be bright, a bit yellow, and not twinkling. If you can find it like this, you will know better where to set up your telescope for a good view of it. You can read a succinct article about Saturn in the sky, here <http://earthsky.org/astronomy-essentials/give-me-five-minutes-ill-give-you-saturn>, but HAA members should probably already know all that stuff (you do now).

The New Moon this month will be on February 3rd. So the best time to observe deep sky will be right now until about the 7th, and then again starting after the 17th when the moon starts rising after you finish observing.

This month's Full Moon is the "Snow Moon", as the heaviest snows of the season tend to fall in this month. Don't let that keep you inside... just wait until the storm passes (see above). The waxing crescent moon of early February will be librated unfavourably. Likewise the waning crescent. You will be seeing the 'near side' of the Moon all month!

No new comets on the Comet Watch, and in fact, any old ones are so faint I would not recommend even photographs, unless you have astro-gear all set up already. Likewise, there have been no supernovae of note this year yet.

On the Meteor Watch, the only meteor shower this month is the Alpha Centaurids. They pin down not just the constellation but the star as well. (Centaurus is a big constellation.) Alas, the radiant is (always) far below the horizon for our location. What does that mean? Absolutely no meteors (from this shower) will be seen at our latitude, since the earth would have blocked their path from getting to our atmosphere on this side.

We will have our best meteor shower of the year on May 6, when the eta-Aquarids come. They have a (Zenithal Hourly Rate) ZHR of 60 and the moon will be only 7%. That's close to Astronomy Day. I will be reminding you nearer the time. The ZHR is what you would see in dark skies with a wide-open horizon. Like a sale with 'up to' 60 % off, or the fuel efficiency rating of a new car, the ZHR is subject to some embellishment. There's a formula here...

http://en.wikipedia.org/wiki/Zenithal_Hourly_Rate which basically shows you how to claim a higher hourly rate than you saw. Conversely, it allows you to compute the actual effective hourly rate for your conditions. The long and the short of it is that there's an element of luck involved. For sure, you will hear someone exclaim just when you are looking through a telescope or looking away. Some of those you nev- (Continued on [page 13](#))

The Sky This Month: February 2011 (continued)

er had a chance, being behind you. They don't count as part of the ZHR calculation. Others are just bad luck. Then there's the good luck (and the story) when you see a great fireball going right across the sky, leaving a glowing green trail. I have seen a few of them in the Perseids showers... it helps to be up all night.

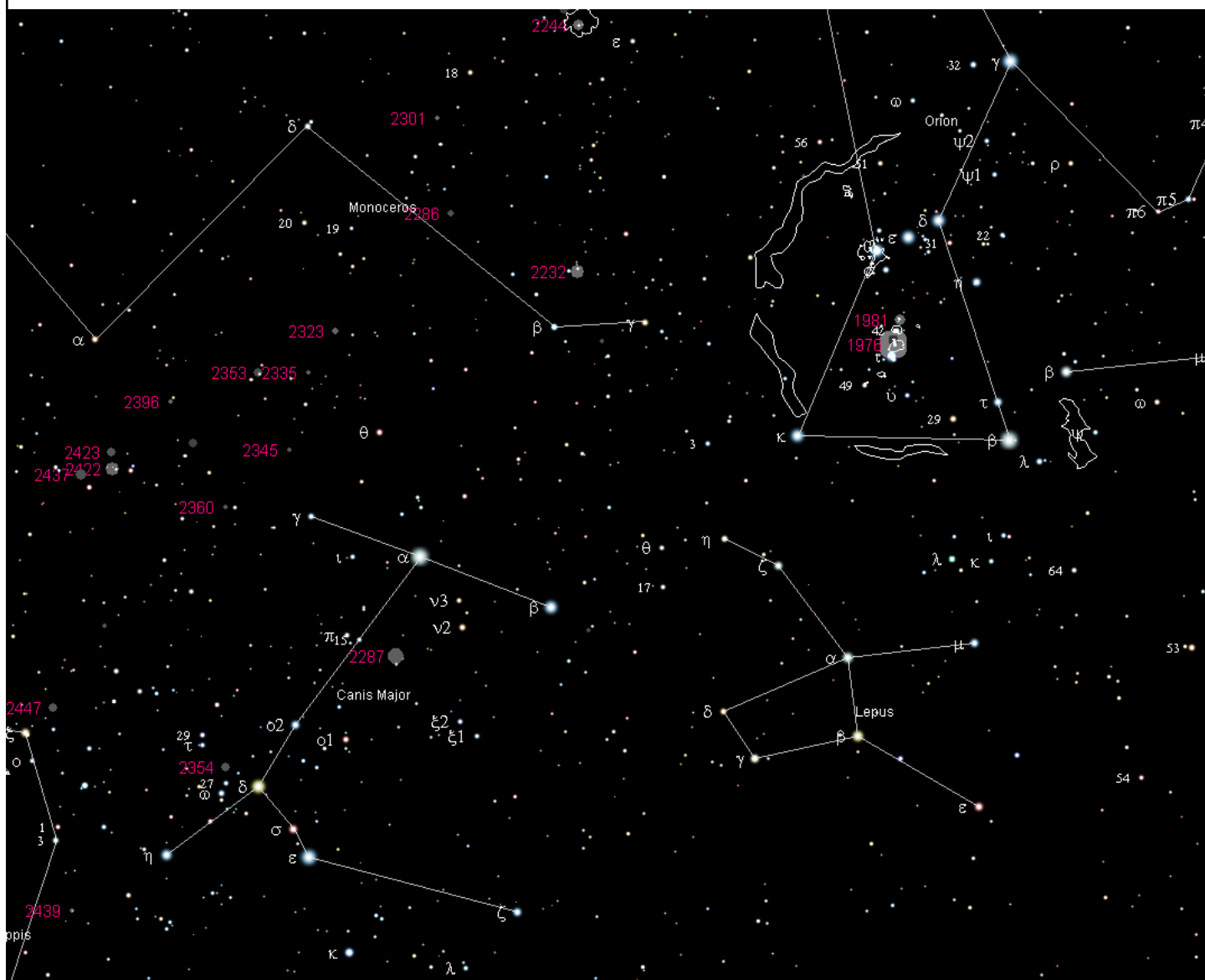
You should always take a peek on every clear night, around midnight, for Aurora and the odd sporadic meteor. Predictions don't really work for those.

We have seen glimpses of Canis Major (CMa) in previous articles, but this month CMa comes to the fore. In addition to looking at the constellation and the stars, let's talk about using the constellation for other purposes!

Let's refer to the map for a moment.

Having the brightest star in the sky, Sirius, (The Alpha Star) (Magnitude -1.46, 3/4 of a magnitude brighter than Canopus, the second brightest star) helps a lot. Notice how the belt stars of our old friend and most-easily-found constellation Orion point in the direction of Sirius. You will know where to expect its rising, and can have your telescope ready for it.

Pay attention to Sirius rising in the east, and notice how its light gets scattered by atmospheric turbulence (seeing), causing it to change colour at about 90 times a second. You can perceive the effect more readily by getting a less-sturdy mount, and tapping the telescope while looking at Sirius. It will cause it to trace a path, and its light will be spread over an oval; the colours will be smeared out accordingly. You can also de-focus the



(Continued on [page 14](#))

The Sky This Month: February 2011 (continued)

telescope and see that the colour changes are actually moving rapidly past us, as opposed to changing all at once. Fascinating.

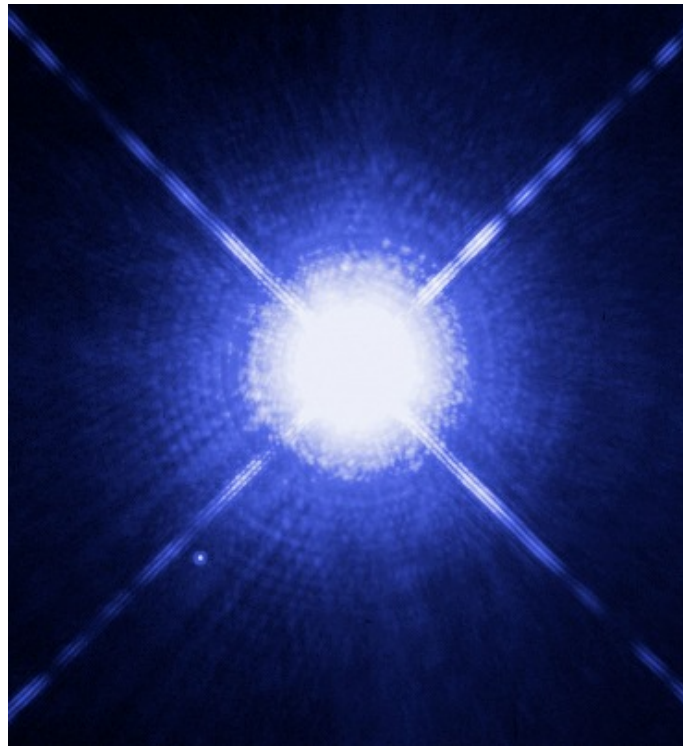
That's enough of Sirius, for now, we will get back to it though. Let's explore the rest of Canis Major. There are a number of fine Open Clusters in Canis Major. For starters, M41, (NGC2287) my favourite. I still recall my finding it in the sky at former Club Chair Glenn&Gail Muller's Observatory, 3 years ago. There are many pinpoint stars in a cloud. A fine sight indeed, made sweeter because it was my next target in my Sequential Messier Marathon.

Another treasure is NGC2362, which has a total magnitude of 4.1, making it brighter than some of the stars in Ursa Minor. It's labeled as a star on the map, Tau, just above NGC2354. Its surface brightness of 8.36 means you should be able to pick it up with binoculars quite nicely, but its comparatively small size of 8 arcminutes means a 60-150x telescope will do the best job bringing it to you. Don't forget to swing over to NGC 2447, also known as M93, at magnitude 6.2. It's another fine open cluster; they are so common in this part of the sky.

The much fainter and larger cluster NGC2354 is magnitude 6.1 with a surface brightness of 12.6. That will require dark skies to appreciate, but since it's made of stars, you can magnify it a lot. As you can see from the map, Cartes Du Ciel has not accepted the new Reindeer line-connections for Canis Major yet. I really must see how to do that.

Sirius is a double star. The heavier component became a red giant 120 million years ago, and boiled off its outer layers. Orbiting Sirius A closer than the orbit of Pluto, with a 50 year period, we are treated to an example of stellar evolution, only 8.6 light-years from here. It's been measured to be 5 milli-arcseconds in apparent diameter. To put that in perspective, that's 1/200 of an arcsecond, or, considering the moon is about 30 arcminutes in apparent diameter, about 8 meters at the distance of the moon. That's pretty big, as apparent star diameters go. Alternatively, about the size of a dime at 400 km distance, which is about the altitude of the International Space Station.

Sirius has a white dwarf companion, Sirius B, with a magnitude of 11.18, beyond the reach of binoculars. It is, however, almost 7 arc-seconds away from its brighter partner, so with a clean telescope and no moon, you should have a good chance of picking it out. In the Hubble photograph, you can see it quite plainly. In your telescope, it will be a bit more of a challenge. Use a cross-hair or thread to block the light from Sirius and then magnify it a lot.



Sirius's declination means it goes directly over Fiji every night. The Polynesians used the stars, traditionally, for navigating on the open ocean.

The most interesting thing I read about was the ability to use a star to tell the seasons. The Egyptians used to predict the Nile River flooding based on Sirius. How to do that? Well... As the seasons pass, stars rise earlier every evening. So it's not easy to detect a 'new' star in the evening, without a clock... it was there the night before too. However, think about the morning. In the morning, Sirius will become visible in the morning twilight between being lost in the daylight. There's a narrow window (especially at equatorial latitudes) of twilight. So, before the 'season', Sirius is out in the daytime, and not visible during the day. It sets before the Sun in the evening. It rises in the late twilight when the sky is too bright. As the 'season' arrives, Sirius has gotten progressively earlier so that it's visible in the darker morning twilight. That magic time when Sirius can be seen in the morning twilight for the first time, is a seasonal event. Wait a few weeks longer and it's rising earlier still, in the night. That's uninteresting.

So now you know how to use a star's latitude to find Fiji and how to use its longitude to predict seasonal events.

Of course, with the precession of the equinoxes, Sirius has changed by a full month compared to the Seasons. It no longer signals the start of the Nile floods. Fortunately, several dams on the Nile River have also made the predicted timing less pressing. *(Continued on [page 15](#))*

The Sky This Month: February 2011 (continued)

There's one more treasure for you to hunt in Canis Major. Check out Nu2 and Nu3 Canis Majoris. They are near Sirius in the chart. Both are orange supergiant stars. Nu2 (magnitude 4) is only 65 ly away, but Nu3 is 465 ly, and only a little dimmer in apparent magnitude, at 4.4. Can you see any other differences between them? They should fit nicely in the same binocular field, being 1 degree apart. Watch for Nu1, between them. At 276 ly, it's about at the midpoint of distance of the other 2 stars. It's fainter and has a different colour. What do you see?

HAA Helps Hamilton

To support our community, we will be collecting non-perishable food items and cash for local food banks beginning with our January 14th general meeting.

Please bring a non-perishable food item to the meeting and help us help others in these tough economic times.

If you would like to help or have any questions about this new initiative, please contact Jim Wamsley at 905-627-4323.



Cosmology Review by Bill Tekatch

Here are some cosmology items that I found somewhat unusual in the last year. I hope you find them interesting.

Fourth Flavor of Neutrino? Physics Experiment Suggests Existence of New Elementary Particle

<http://www.sciencedaily.com/releases/2010/11/101102185722.htm>

A fourth flavour of neutrino that occurs only in anti-matter may account for much of dark matter.

Mysterious Cosmic 'Dark Flow' Tracked Deeper Into Universe

<http://www.sciencedaily.com/releases/2010/03/100310162829.htm>

Why are clusters of galaxies flowing at a high speed in Centaurus and Hydra?

Evidence for spatial variation of the fine structure constant

<http://arxiv.org/abs/1008.3907>

"Qualitatively, our results suggest a violation of the Einstein Equivalence Principle, and could infer a very large or infinite universe, within which our 'local' Hubble volume represents a tiny fraction, with correspondingly small variations in the physical constants."

No Direct Link Between Black Holes and Dark Matter, Scientists Find

<http://www.sciencedaily.com/releases/2011/01/110120073654.htm>

The size of the central bulge of galaxies seems to be related to the mass of the central supermassive black hole.

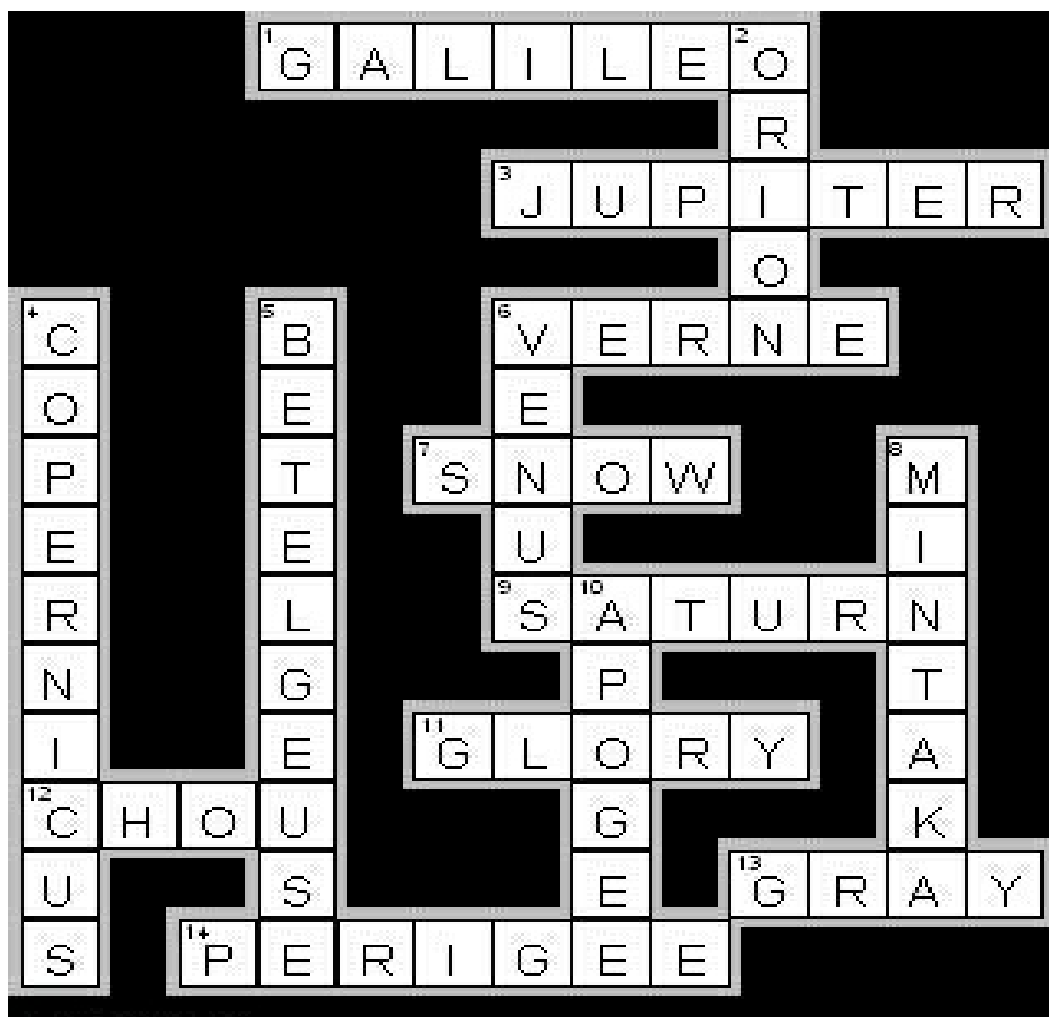


**The newest reality TV
show:**

Telescope Hoarders



Answers to Astronomy Crossword on Page 10



UPCOMING EVENTS

February 11, 2011 - 7:30 p.m. General Meeting at the Hamilton Spectator Building. Dr. Ralph Chou will be our main speaker.

February 26, 2011 - 7:30 p.m. HAA Book Club meeting. Dan Falk's recent book, "In Search of Time" will be discussed at the next HAA book club meeting on Sat., Feb. 26 at 7:30 p.m. If anyone would like to join the group, please contact Mario Carr at mariocarr@cogeco.ca.

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<http://www.npca.ca/conservation-areas/binbrook/>

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