From The Editor

The dozens of people I spoke to at our annual Telescope Clinic reminded me that many of us came into this hobby with less than ideal equipment. Over the years, I've lost count of how many passionate amateur astronomers started out with a "trash scope" from a department store. Although we turn our noses up at these frustrating and poorly constructed telescopes, we can't deny that they are often the spark that ignites a lifelong interest in astronomy.

On Christmas morning, there will be hundreds, if not thousands, of new telescope owners across Ontario. A few of those folks will persevere with their new scopes and join a local astronomy club. I hope that they will remember the joy that first scope brought them and help newcomers make the most of their "trash scopes"!

Have a happy Winter Solstice!

Ann Tekatch Editor@amateurastronomy.org

Chair's Report by Bob Christmas

A week and a half ago, the HAA's new Council appointed the Councillors At Large for the 2011-2012 year, in accordance with the HAA bylaws. Three are returning for new terms, Brenda Frederick, Joe McArdle and Harvey Garden. I am pleased to announce that three new Councillors At Large are now on board; please join me in giving a warm welcome to Keith Mann, Doug Black and David Tym. I must thank outgoing Councillors At Large Andrew Bruce and Wayne Stansfield for their exemplary service to the club. I also thank Jackie Fulton for her previous role as Second Chair of the HAA and for all those years of hard work on the Council.

The HAA Council is open to any member of the HAA to run for every October, and our monthly Council Meetings are open to any member of the HAA to sit in on as an observer. The HAA prides itself as being an open and transparent club. So please feel free to participate! Volunteer for a club activity, or come to a Council Meeting and see what it's all about. (Continued on page 2)

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Chair's Report (continued)

On November 25, the HAA had its Telescope Clinic at the Spectator Auditorium, and it was a huge hit. The scope clinic is put on this time of year largely to provide prospective buyers of telescopes some "food for thought" as to what to buy, and what not to buy, as Christmas fast approaches. Other people just want to simply find out how to use their scopes. At its peak, there were literally dozens of people at the clinic asking the HAA club members on hand many questions about telescopes, imaging equipment, cameras, binoculars, eyepieces, equipment mounts, etc. Club members who participated included myself, Jim Wamsley, Don Pullen, Ann Tekatch, Mathew and Janice Mannering, Ed and Kevin Salwach, David Tym, Keith Mann, Joe McArdle, Harvey Garden, Mary Arnold, among others. Members of the public came from as far away as Guelph, so I've heard, to partake in this year's clinic, and I would like to thank everybody in the club who came to help out, set up their rigs, and answer the many questions visitors had. It was a very successful night.

Two weeks before that, our November meeting at the same venue drew dozens of people, club members and members of the general public alike, to hear Charles Baetsen talk about his ultra-light, portable, home-made telescope. Also, HAA Observing Director John Gauvreau talked about the sky for the month of November, and Kevin Salwach gave a talk about what happened on that particular day in history. The next meeting of the HAA, free and open to the public as usual, is on December 9, when John Crowdis will talk about how astronomy has affected many of the world's religions. I am fascinated by how astronomical events and discoveries in the ancient past have influenced history and religion here on Earth, and I, among others, look forward to hearing John's talk.

December is here, and lots of astronomical events are happening up there. The sun is getting more active, with more sunspots showing up, as it approaches maximum solar activity. Comet Garradd

is still out there, still shining at about 6th magnitude, but is lower in the western evening sky in Hercules. A total lunar eclipse occurs on December 10, although we in Hamilton won't see it very well; the moon will already be setting at our location just as the eclipse starts. People out west will get a much better view of it. Also, the Geminids meteor shower occurs this month, as does, of course, the Winter Solstice. The weather may be turning colder, but there's still no shortage of stuff going on!

Whether you are an active observer, or an armchair astronomer, or both, I hope you continue to enjoy all of the fascinating things that this wonderful hobby of astronomy has to offer.

Clear Skies! Bob Christmas



November Treasurer's Report by Steve Germann

(Unaudited)	
Cash opening Balance (31 Oct 2011)	\$5837.50
Expenses	\$ 82.13
Revenue	\$1094.00
Closing Balance (30 Nov 2011)	\$6849.37

Notes:

1. Report covers period since start of our financial year.

2.Major revenue sources included: 50/50 (\$49), Memberships (\$260), Sale of ATM kits (\$130), Calendar Sales (50) (\$655)

3. Major expenses included: Cash Box (\$22.59), Speaker Expenses (\$59.54)

Masthead Photo Credits: Image taken at our November 25th Telescope Clinic by Don Pullen. Skies were clear during this normally indoor event, but a few participants set up their telescopes at the entranceway to the Spectator Building for excellent views of Jupiter. Inside, many members of the club had their telescopes, binoculars and imaging equipment set up for display and spent a busy night answering questions and offering advice.



Through The Looking Glass by Greg Emery

I was unable to submit my November version of *Through The Looking Glass*. When the deadline came up, I was in the Santiago Airport waiting for the next in a long line of flights. On October 22, my wife, Joanna, and I started on our current adventure. I had always wanted to see the southern skies since becoming active in amateur astronomy. My wife has always had a desire to visit Easter Island (Rapa Nui). The fates seemed to align and we scheduled a trip south. Rapa Nui is a territory of Chile, so by going to Rapa Nui, we would invariably be going through Chile.

When we booked the flights, the total transit time to get directly to Rapa Nui of 23 hours didn't seem too bad. After all we had stopovers in Miami and Santiago. Well we were wrong--23 hours including stopovers is brutal. Furthermore, we never appreciated how remote Rapa Nui was. The general directions to get there are - fly to Santiago, Chile then get on another plane and fly 5 hours west over the Pacific Ocean.

Rapa Nui is the Polynesian name for the island. It was called Easter Island after it was "discovered" on Easter Sunday by Dutch explorers. It is a small, beautiful island that above all else has done one thing right—to own a business or land on Rapa Nui you must be a native. The end result, as I saw it, is that there are no McDonalds, Wendy's, TGIFridays, or the like - how wonderful! The island can be completely toured and covered by car or bus in one day. The statues or heads are referred to as Moai. The Moai have great religious and spiritual significance for the Rapanui.

Our bed and breakfast was on the west end of town (Hanga Roa). A brief 15-minute walk before sunset brought us to a park that had several shelters and altars as well as a set of Moai. This park was special as the Sun set directly behind the Moai, giving some spectacular pictures.



Above: Sunset at Ahu Tahai October 25, 2011. All photos courtesy of Greg Emery. (Continued on <u>page 4</u>)

Through The Looking Glass (continued)

The Moai are all, but in one instance, set up near the shore looking inward. This is so they can project their spiritual powers to protect the island.

There are so many places to see there that I will give the highlights. The main quarry for the volcanic rock used in the construction of the Moai is the National Park Rano Raraku. Here a walking tour of the slopes show many Moai, both finished and left in an incomplete state.

Right: Joanna with one of the Moai at Rano Raraku

From an astronomical standpoint there is one set of Moai that are different from all the others. At Ahu Akivi, a set of Moai are located inland and face the sea. I was told that the Moai face the sunset at the equinox - but I did not have a compass with me to confirm this.

Below you see a picture of me at Ahu Akivi, doing my best not to blend in too much with the Moai.





The one other special place (and there were many) was Tongariki. Here there are twelve Moai lined up.

My favourite spot, however was the volcano Rano Kau and the ceremonial village Orongo. Visitors are able to walk the rim of the volcano, or at the ceremonial village located on the west rim, look over the cliff to the ocean 280 meters below.

(Continued on <u>page 5</u>)

Through The Looking Glass (continued)



Joanna and I at Tongariki

From Rapa Nui we travelled to Santiago, then flew up to La Serena. From La Serena we took a bus to Ovalle, then on to Rio Hurtado were we had reservations at Hacienda Los Andes. This resort is located in the area were some of the large observatories are located. We had one night here prior to having to start the long trip home. We had done our homework. The moon was one day from being new, the area in late October typically has clear skies. The clouds packed in in the afternoon - a washout!

The good news is that I did plan, partially, for that contingency. I brought a pair of 9x63 binoculars with me, and had some good patches of sky in Rapa Nui. The most difficult part for me, other than getting clear skies, was recognizing what I already should

know. I had prepared myself, or I thought I had, for the fact that the constellations would be upside down and that I would be completely without my standard markers (Ursa Major, Cassiopeia, Polaris). I

knew that I would see Orion doing a cartwheel, and after a few minutes of scratching my head found him. What really threw me were the skies to my west and southwest. There was a wonderful bright orange star hanging low in the

west. Using my star chart and Orion as an anchor, I found that this was Antares - it is on the map, so it must be true! But looking at the stars around it, something didn't seem right. I checked with my binoculars, and being the bright, knowledgeable astronomer that I am I moved my field of view slightly to my right. There should be a globular there (M4), which proved it. After several frustrating tries at figuring this out I gave up and started scanning the sky. I wanted to find something. There was the one small wispy cloud that wouldn't move. This seemed so familiar to me - I had made a similar mistake



Me on rim of volcano at Rano Kau

my first time to Manitoulin Island with the Scutum star cloud. The cloud that wouldn't move was the Large Magellanic Cloud - wow I just found the LMC. Ok, I will admit finding the LMC is only truly an accomplishment if you are in Canada at the time, but I still found it! I had studied my star charts enough to know, that if I was looking at the LMC then one of my goal targets was right there for me to see - 47 Tuc a beautiful globular. To keep the story short, I knocked off the small list of items that I wanted to see/find using my binoculars. The highlights of the list are 47 Tuc, Omega Centauri, Eta Carina, Coal Sac, Southern Cross, Jewel Box, LMC and SMC. It was wonderful and I will return to the south in the future. This time I think I will go to the Atacama...stay tuned.

Club Asset Sale



TELESCOPE MIRROR SET FOR SALE

17.5" f/4.5 primary mirror and matching secondary mirror for sale by the club. Proceeds of this sale will be used to assist with the loaner scope program and other club activities.

Asking \$750. (Large mirror sets such as this routinely sell for \$900 and more check out Canada Wide Buy and Sell or Astromart.)

Contact Jim Wamsley at 905-627-4323.



TRIPOD FOR SALE

This sturdy, aluminum telescope tripod was donated to the club and is being made available for the bargain price of \$60. The tripod could be used to support a binocular mount similar to the parallelogram mount built by Jim Wamsley.

Contact Jim Wamsley at 905-627-4323.

Proceeds from the sale will be used to support the club's loaner scope program.



OVERVIEW

The sun, the centre of our solar system, is one of the most traditionally neglected objects by amateur astronomers (until recent years) and is also the most interesting object in the sky - day or night, bar none. Because it is a daytime object obviously, most of us do not regard it as part of the necessary itinerary of sky objects to be viewed through an astronomical instrument. This is silly because it is, without any comparison, the most dynamic and changing body in the entire universe, for us, in an ongoing way. Because it is so dynamic, its occurrences are not seen as 'discoveries' by the IAU (International Astronomical Union). So, are professional astronomers also complicit, with the amateur community, in relegating Sol to secondary classification?

The answer to that question is in the negative. In fact, the sun has been getting more astronomical 'airtime' in more recent years. With our presence in space becoming more prevalent, an understanding of the sun and its processes is more important to us now than ever before in human history. In fact, there are more websites, both amateur and professional, engaged in solar research than ever before. And, many amateurs are beginning to pick up on the observations of a body that holds immediate potential for the understanding of its brethren far off in the universe.

Without getting into the research that professional astronomers do on the sun, at multi wavelengths, there are more opportunities for the amateur community than ever before. Some of this, indeed most of it, is a direct 'lift' from what the professional community has been doing for years. Today, equipment and techniques that were previously unavailable to the amateur faction are now produced for sale at reasonable prices; or there have been amateur versions of the original methods and equipment developed in more recent years.

My own studies of the sun have carried me into 6 different realms. I will walk you through those various categories now. After reading this essay, you can decide which of them you would like to pursue, should you decide to take up this fascinating activity of following Sol's daily progress.

WHITE LIGHT

So, what are the ways amateurs can track, study and enjoy the mysteries of our most important star? The first that comes to mind, for most of us, is the white light study. This consists of using an astronomical telescope, of whatever nature, fitting it with the appropriate glass, mylar or astrosolar film filter and monitoring the march of the bright faculae, or plage, and the dark sunspots across the solar disk on its 27 day rotation. Such studies are of interest to the American Association of Variable Star Observers, which has carried on these studies for decades, in attempts to analyze the sun's variability. Most white light filters can be fitted to and used with a variety of telescopes. However, it is the user's responsibility to check with his telescope manufacturer or a knowledgeable amateur or professional about the advisability of using his telescope for white light solar work.

This is the area where we, as experienced astronomers, express the most concern. For this is the place where the inexperienced can get into the most trouble. White light filtration is the most easily had and the most inexpensive way to get into this activity. And, the possibility for accidents is the greatest in this aspect of solar study. All white light filters can develop pinhole 'leaks' and should be inspected visually before they are attached to a telescope and any solar observation is attempted. Faulty filters can lead to serious eye damage and even blindness. Damaged filters should be repaired or replaced immediately and before any further use! It is incredible, to this author, that our governments allow trash telescopes to come into Canada, from offshore, equipped with insufficient 'eyepiece solar filters' which can overheat, crack and cause serious medical problems for an observer. He personally feels that any telescope, so equipped, should be given an immediate trip to the trash-can, lock, stock and barrel - not just the filter, but the whole affair! Undoubtedly, the entire thing is wanting in one way or another. And why would any serious amateur frustrate herself/himself with such junky nonsense? Better to save his/her money and get what he/she really desires. (How many times have we amateurs reiterated this caveat??)

(Continued on <u>page 8</u>)

Observing the Sun, Part One

WEBSITES

Websites are another way to monitor Sol's activity. To begin with, they are SAFE - TOTALLY! You cannot blind yourself or do any serious eye damage by following some outer space aspect of the sun on a satellite website. These sites have professional data and can be used for educational, interest and research purposes. One of the principal sites for solar, geophysical and meteorological activity is the National Oceanic and Atmospheric's GOES (Geophysical Orbiting Environmental Satellites) website. It has everything from climatology to weather observations and predictions to solar x-ray, proton and electron bursts, planetary K-indices, flares and coronal mass ejections - a lot more besides. There are many other sites for solar work and lots for other areas of astronomical investigation, as well. Googling around the internet will usually net you big dividends in almost any area of sky research you choose. However, as with visual work and radio studies, it will be your persistence, dedication and continuous efforts that will net you results and possibly some discovery. Doing any area of astronomy on a 'once-in-a-while' or a 'when-I-feel-like-it' basis may be aesthetically rewarding but it will not lead to much understanding, discovery or learning about the area you are engaged in. And, there can be no excuses about cloud cover or cold temperatures with radio or internet studies because you will be in a warm and inviting environment. Your home office becomes your observatory. Comfort in 'observing' does not get any better than this! You will be free of cold weather, cloud cover, noxious insects and the worries and concerns about expensive, automated, internet-controlled observatories in remote locations like Atacama, Chile or Arizona.

SHORTWAVE

Closely connected with astronomical internet work is that of shortwave and long wave radio studies especially shortwave (SW). Like all long-distance radio wave propagation, shortwave depends on the conditions of the earth's ionosphere. And, the capability of that atmospheric component to propagate radio transmission depends very strongly on the events that Sol visits on us at any given time. The radio spectrum consists basically of long wave (LW), amplitude modulation (AM), shortwave (SW), frequency modulation (FM), very high frequency (VHF), and ultra high frequency or UHF going from the lowest to the highest frequencies. Lower frequencies are often best for long-distance transmission by reflection or bouncing around the world off the ionosphere. Any radiation that the sun can toss at us to enhance the electrical charge of the ionosphere will favour the transmission of longer wavelengths. Shorter waves tend to be inhibited by solar flares, proton outbursts and coronal mass ejections. The amateur astronomer can use all of this to his/her advantage. Shortwave has been the favoured medium of communications of radio-communication amateurs (HAMs) around the world for decades. While not that 'short' by comparison to aircraft frequencies, marine communications, satellite and other UHF frequencies, it is still adversely affected by solar outbursts of almost all natures. SW does suffer from radio blackouts. Therefore, if one is monitoring a shortwave frequency (especially WWV out of Fort Collins, Colorado @ 2.5, 5, 10, 15 or 20 MHz - the U.S. atomic clock signal) and it disappears or becomes challenged, one knows that there are meteorological and probably solar issues at hand, at that moment. (An interesting aside says that Jean {my partner}has a radio clock which is governed by the WWV atomic time signal. It is interesting, listening to WWV on shortwave and watching her clock change with the audible radio signal. When WWV gets slightly behind or ahead, this can be seen on the clock as a slightly delayed or advanced change in the minute.) Checking the GOES, Solar Cycle 24 or Space Weather websites can be used to confirm vour SW radio 'observation'.

LONGWAVE

For nearly 4 years, I ran a long wave (LW) radio apparatus that monitored the sun's x-ray output and how it influenced the ionosphere. This programme is run by Stanford University Solar Physics Department. My principal investigator was a woman by the name of Deborah Scherrer. Long wave studies of the sun have been run by the American Association of Variable Star Observers (AAVSO) for many years. However, the Stanford programme, now monitored by the Society for Amateur Radio Astronomy (SARA), will build, test and sell you the equipment. With AAVSO, you are on your own. If you are not an electronics 'techie' you are at somewhat of a disadvantage. After all, astronomy is not about building equipment. It is about getting observations and understanding! So the Stanford programme is far more popular than the AAVSO format. When I joined it, it had 18 stations around the

(Continued on page 9)

world. When I left it, there were well over 100, of which 50 were in mainland China!

So, why did I leave it? Several reasons. Emails were not answered and I think the site has been fully automated. Has Deborah retired? I do not know. Also my little red SID (sudden ionospheric disturbance) receiver guit. I was not about to try to find someone locally who could fix it and I was not about to pay SARA for a new one. The whole programme and data collection probably cost me about \$1,000.00 - although cheap by radio astronomy standards. Frustrations with the internet, file serverproblems, electrical disruptions and the U.S. Navy - yes, the navy! - are things of the past, for me. I collected ~20,000,000 discreet observations of a body that is dynamic, in visible process and astronomically close-at-hand. LW mimics, very closely, the GOES satellite results. However, I find that monitoring the GOES x-ray charts is not only collecting data about x-ray observations directly. It is also totally reliable, maintenance-free for me and I do not have to worry about navy maintenance shutdowns for 8 hours every Monday! GOES satellites only miss data for 1-2 hours occasionally, when they are eclipsed by the earth. LW SID charts take up about 15 times the computer space of GOES charts. When one figures in the fact that any GOES chart displays not 1 but 3 days' worth of data, the Stanford SID charts are taking up 45 times the space of the GOES charts. So, I can get the same observations in a lot less computer space.

How does LW (and SW for that matter) SID detection work? The concept is really quite simple and rather ingenious, at the same time. The LW apparatus consists of a circle or square (with rounded corners) of 14-24 gauge, insulated copper wire of ~400-600 ft. in length, fashioned into an antenna (passive coil, perhaps??) of ~1-2 metres in diameter. It is attached by a radio-co-axial cable to the small, ~24 kHz receiver (In my case, made by Stanford University or SARA. You can also make your own from plans devised by the AAVSO.) which is connected by an analogue-to-digital converter to a dedicated (slave) computer, with the appropriate, dedicated software to collect and store the readings.

The entire setup runs for 24 hours/day and 7 days/week. Mine ran for nearly 4 years. The LW radio

signal is generated by the U.S. Navy for purposes of submarine communication and navigation and there are many of these giant stations around the world for this purpose. I chose one suited to my geographical location. Like all long-range radio frequencies, LW is affected by the state of the ionosphere which is affected by the sun's x-ray output. The generation of the LW radio signal is totally out of my control, as it is the property of the U.S. Military. It will have its signals up and running or shut down for maintenance at its pleasure and scheduling, and there is NOTHING the amateur solar observer can do about it. He is at the navy's scheduling, which was the most frustrating aspect of the whole project! Personally, I'm glad to be out of it, for that reason alone. However, for anyone who can shrug that aspect off, this is a great way to make charts of solar output, flares, large prominences and coronal mass ejections. Your data collection will go on continuously and you don't even have to be at home. Your antenna can be in your attic, outside or in your basement. LW is not in the real estate business of 'location, location'. (To digress back to SW temporarily, it operates in a similar way, except that it is very much less specific. It is far more simple to do. All you need is a good SW receiver and appropriate antenna(e) to monitor the SW atomic time frequencies on WWV, National Institute of Standards and Technology. The upside is that THESE are scientific signals and they NEVER go down for maintenance. World time is dependent on them. The downside is that SW only responds to solar disruption by dropping out or fading. You can make charts with the appropriate computer software or recording device. However, it is far more satisfying to simply monitor it several times a day and check the GOES charts on the internet for confirmation. The GOES charts can be downloaded and saved in Microsoft Word for later perusal, interest, study or research, if you are so inclined.)

Next month: Observing the Sun, Part Two: Spectroscopy, Hydrogen-alpha and Calcium-K filters.



Across

- 7. This lunar event on December 10 is best seen in western Canada.
- 9. On December 26 there will be a double shadow transit across this planet.
- 12. Physicist born Christmas Day 1642
- 13. December meteor shower
- 14. On December 22 what planet is at its greatest western elongation?
- 15. A Canadian comet for Christmas

Down

- 1. On December 6, the moon is at . . .
- 2. Born December 14, 1546
- 3. Moon phase on December 2
- 4. The full moon in December is called this type of moon.
- 5. Seasonal event on December 22
- 6. In December Comet Garradd is in this constellation.
- 8. On December 20 the waning crescent moon is below this planet in the predawn sky.
- 10. On December 22, the moon is at . . .
- 11. Born December 27, 1571

November 2011 Meeting Summary by Keith Mann

With the moon full, the weather chilly, and the skies filled with clouds, most astronomers would agree that on the evening of November 11, it was better to be inside talking about our hobby than outside practicing it. Not surprisingly, then, the Spectator Auditorium was filled with poppy-wearing HAA members and guests happy to spend the last hours of Remembrance Day in the warm company of their fellows.

Promptly at 7:30, Bob Christmas took the podium for the first time as Chair of the club to kick off the first meeting of our new membership year. Bob led with the formal announcement of the availability of the HAA's 2012 Celestial Events Calendar (many of which had already been sold, judging from the pre-meeting activity at the sales table). He then reminded the club of the upcoming Telescope Clinic, to be held on Friday, November 25th at the Spectator Auditorium, and encouraged club members to come out both to share their knowledge and expertise, and to ask questions of their own. On a related note, Bob concluded by mentioning that the telescope making workshops had gotten underway the previous Monday, November 7.

Our Chair then introduced the evening's speaker, Charles Baetsen. Following on from his article in the October edition of the Event Horizon, Charles gave a detailed account of the history, design, and construction of his Ultra-Light Travel Telescope. Considering the number of in-depth questions Charles received, and the size and enthusiasm of the crowd who spent the intermission examining Charles' telescope, it wouldn't be surprising to see any number of 'scopes based on Charles' design emerging from our member's workshops in the coming months.

Following the intermission and the traditional drawing of the door prizes and the 50/50, Kevin Salwach delivered another great installment of "Today In Astronomy."

It was then John Gauvreau's turn to take the stage to present "The Sky for November 2011." Returning to the role of Observing Director after serving as Chair for the past year, John described several upcoming astronomical highlights, provided us with some great tips on observing the popular (but perhaps under-appreciated) Andromeda Galaxy (M31). John also took a cue from Kevin's presentation and related his story of attending the launch of STS-1 (more than thirty years ago!).

We adjourned into the cold night; many, finding it still unsuitable for stargazing but having not had their fill of astronomy, heading to Crabby Joe's for more warmth and conversation.



2012 HAA Calendars For Sale

We still have a few 2012 calendars remaining. These beautiful calendars make great Christmas gifts!!

Price is \$15 each with volume discounts available to members. See Steve Germann (treasurer@amateurastronomy.org)or Jim Wamsley (secretary@amateurastronomy.org) to get your copies soon.



December 2 - First Quarter Moon

December 6 - Moon only 5 degrees from Jupiter

December 9 - HAA General Meeting

December 10 - Full Moon (Full Cold Moon, Oak Moon, Long Night Moon) Lunar Eclipse

December 14 - Geminid Meteor Shower

December 22 - Winter Solstice

December 22 - Mercury at greatest western elongation (morning sky)

December 23 - Comet Garradd at perihelion (closest to sun)

December 24 - New Moon

December 26 - Moon 7 degrees from Venus (low in west after sunset)

December 27 - Busy night on Jupiter - Europa transit (8:20pm - 10:45pm))

- Europa shadow transit (10:45pm 1:15am)
- Ganymede shadow transit (8:55 10:55pm)
- lo disappears behind Jupiter (10:40pm)

<u>Cassiopeia</u>

Last month we talked about the constellation of

Pegasus, but at this time of year the well known constellation Cassiopeia is at its highest in the sky. There is no better time to see the wonders that this constellation holds.

As one of the constellations that predate our earliest records, we know her to be ancient and well known. Cassiopeia was Queen of Ethiopia, the mother of Andromeda and the wife of Cepheus, both prominent constellations at this time of year. Those three are tied together with last month's Pegasus, Perseus and Cetus, to create one of the grandest and most sweeping groups of constellations. They are bound together in mythology and in the sky. More recently (if one can refer to the 16th century as recent!), the constellation played host to Tycho's supernova, which shone as brightly



not immutable, but were in fact home to a dynamic and changing host of stars. Tycho's supernova didn't just change the way the sky looked, it changed the way we looked at it.

Cassiopeia is easily recognized by its **distinctive W shape**, although at this time of year the W appears upside down as we face north. In truth, Cassiopeia is almost directly overhead early in the evening, giving us the chance to look at it through very little atmosphere. Its abundance of deep sky objects shine most brightly in December. It also sits on the opposite side of the north celestial pole from the Big Dipper. Beginning observers often use this info to find Cassiopeia, starting at the Big Dipper, following the pointer stars to Polaris, the North Star, and then continuing (Continued on page 13)



(Image: Cassiopeia on ceiling fresco from the Villa Farnese in Caprarola, Italy, painted around 1573)

The Sky This Month (continued)

on to finally arrive at Cassiopeia. Since at this time of year it is easier to find Cass than the low-riding Dipper, we can use Cass to guide us to other constellations. From the center point in the W we can follow one line down and to the left to point us at Perseus and the other line down and to the right to point us at An-



Aries Pisces are looking along the pl

ble Cluster in Perseus and M31, the Andromeda Galaxy, respectively. (see map at left)

Cassiopeia is home to two Messier objects and both are open clusters. Even though Cassiopeia lies in the Milky Way, it is in the direction away from the galactic center. When we look at Cassiopeia we

dromeda. In fact, so conveniently placed are these guides, that they point quite accurately at the Dou-

are looking along the plane of the galaxy, but out towards the edge. As such, (*Continued on page 14*)



this constellation contains very little nebulosity for the modest telescope, but many open clusters. M103 is a loose cluster with about 50 stars. It was added to the Messier catalogue by his colleague, Pierre Mechain, but was observed and confirmed by Messier. In fact, M103 was the last object in the original Messier catalogue. M104 through M110 were added in modern times. M103 is located very close to the second star in the W, making it easy to locate. M103 is also located right next to NGC663, which is smaller but just as bright as M103 and generally considered the nicer of the two. You can easily observe both, but use a star chart to make sure you know which is which. NGC663 is considered to have predominantly yellow stars. How do they look to you? Can you see a colour difference between the stars of NGC663 and M52? M52 is larger and brighter than M103 and is also easy to locate. go from the fourth star of the W to the fifth (last) star of the W and keep going in a straight line for the same distance. You're there! M52 is about 4,000 lightyears away but M103 is more than twice the distance at over 9,000 ly away. Of the clusters we've mentioned and the many more in Cassiopeia (take your binoculars and just scan the area; it's so rich and dense with stars and clusters!) NGC457 is the favourite for many observers. Although at has traditionally been know as the Owl Cluster, today's sci-fi savvy astronomers usually refer to it as the E.T. Cluster. It is easy to find right below the W, bright and a delight to see, with its aesthetic shape and colour and recognizable by its two bright stars peering back at the observer. To complete the similarity to its namesake, the eyes sit atop a column of stars that resemble a body with wings for the owl, or long arms for E.T. (all the better to phone home with).

Right next to the E.T. cluster is phi Cassiopeiae. This star is so close to the cluster that some have wondered if is is actually a member. Best estimates give it a distance of only a couple of thousand lightyears though, which is less than half of the cluster's distance. This makes it a foreground object. Even at that distance though, it still shines at 4th magnitude, making it a supergiant star, possibly up to 200,000 times the luminosity of the sun. At some point in the future, it will certainly go supernova, recalling the great supernova of 1572 that was made famous by Tycho. One day in the future, as in the past, Cassiopeia will again shine forth with an extra star, outshining all others.

Under the Stars

Cassiopeia is home to many **double stars** and at a recent observing session at Binbrook, many HAA members took the time to focus on two of them. Eta Cassiopeiae is one of the finest pairs in the sky. At 13 arcseconds separation, it's not challenging to split, but the colours make it well worth a visit. When observing double stars their colour can be perceived by people standing right next to each other as guite different, or appear different in different telescopes. Always judge for yourself. Eta Cassiopeiae's primary star is usually described as yellow, but it's companion has been recorded as garnet. almond brown or yellow. I agree with the great double star observer William Henry Smyth, who called it purple. Yes, it's subtle, but I would have to say that it looks like a purple star. Just lovely.

lota Cassiopeiae is actually a triple star system, and maybe the best triple in the sky. It's a very tight group, with a separation of only 7 arcseconds and 2.5 arcseconds (remember there are two separation figures because there are three stars). The colours here are very subjection



Iota Cassiopeia by F. Ringwald, Fresno State's Campus Observatory, 16" Meade LX200, Toucan camera)

tive and worth commenting on. Smyth says yellow, lilac and blue, while *Sky and Telescope* writer Sue French calls the primary "lemon yellow". Everyone seems to agree that the primary is yellow, but some (*Continued on page 15*)

The Sky This Month (continued)

sources say the secondary is blue and some say also yellow. Finally, the third star, called blue by Smyth and others, was observed to be a warm colour by those of us at Binbrook. The best description I heard was 'pumpkin coloured", indicating a soft, warm orange (although Andrew Bruce jokingly said it was more of a 'butternut squash").

In May of this year the Israeli Defence Forces Air Control Unit scrambled planes and assault helicopters after reports of a suspicious formation of lights in the sky by air traffic controllers at Haifa. The pilots returned to report that the mysterious grouping of lights was, in fact, the constellation Cassiopeia. It seemed that Israeli air space was safe, at least from invaders from space.

December is the beginning of winter and we tend to shy away form cold weather observing. But who among us has not thrilled to the sight of observing@amateurastronomy.org

the winter constellations as they rise in the eastern December sky. The giant and luminous constellations of Orion, Gemini, Taurus, Auriga and Canis Major are finally here, making those crisp winter nights all the more spectacular with their own natural holiday lights. The brightest star of the sky is Sirius, or Alpha Canis Majoris. It is at its highest in the sky at midnight on New Year's Eve. I've been out under the stars to mark the passing of the year before, and after talking here in the EH about what we have been observing, I will say that I hope to be out there again, under the sky, enjoying the passing of the earth's end point in its orbit around the sun, and of course, its starting point too. I expect it to be a lovely holiday, and I wish you the same.

Let me know of any observations you would like to share with the club, and hopefully I'll see you out there!



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Siguist

How astronomers decorate their tree for Christmas

Answers to Astronomy Crossword on Page 9



UPCOMING EVENTS

Dec. 5, 12, 19, 2011 - Telescope Making group meets Mondays, 7:00-9:00 in the common room of Centurion Apartments in Dundas. All members are welcome. Please contact Ann Tekatch (editor@amateurastronomy.org or 905-575-5433 for info.)

Dec. 9, 2011 - General Meeting in the auditorium of the Hamilton Spectator Building, 7:30 p.m. John Crowdis and John Gauvreau will be our speakers.

Dec. 10, 2011 - The cosmology discussion group will meet at 7:30 p.m. All members are welcome. Contact John Gauvreau for details: observing@amateurastronomy.org.

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