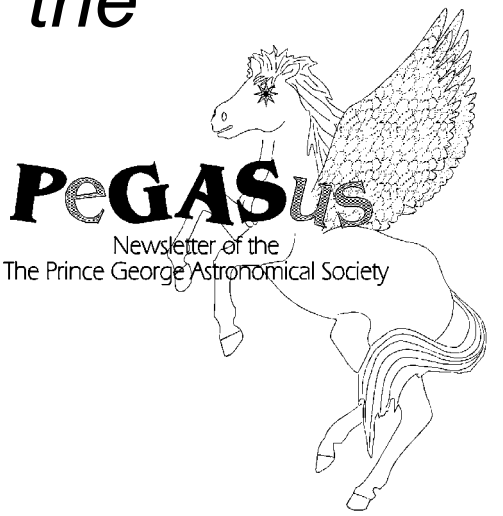
PeGASus
Newsletter of the
Royal Astronomical Society of Canada
Prince George Centre

The RASC-PG meets next at 7:30 pm Wednesday September 29 at The Observatory

Map on Page 2

September 2004

the



In Issue # 138

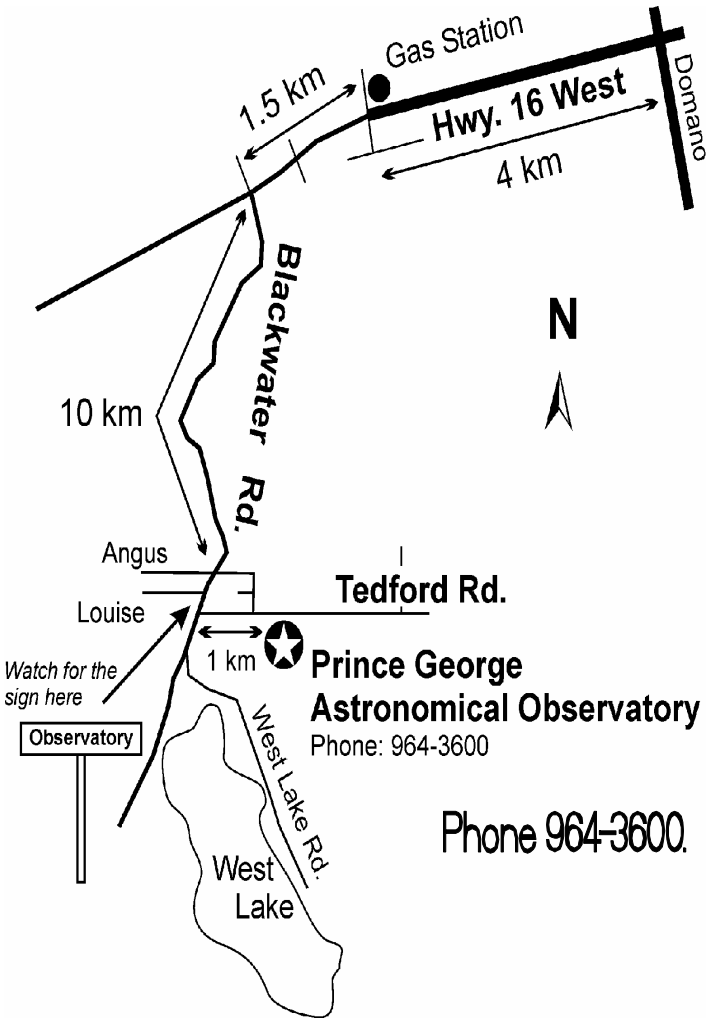
Also This Month;

Important notice
the Annual General Meeting ,PGAS (RASC-PG)
October 20, 2004 7:30 pm at the observatory.

2

the PeGASus
is published monthly by the
Royal Astronomical Society Canada
Prince George Centre

Our pursuits are out of this world.
Our activities are astronomical.
Our aim is the sky.



Contributions to the newsletter are welcome.

Deadline for the next issue is

October 15

PeGASus Editor
Gil Self

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you can renew your membership at
www.rasc.ca/princegeorge

Editorial

By Gil Self

Welcome back to a new season! Seems kind of odd to say that, since by the time you read this we will be about half way through the fall season. Perhaps we should try and do an August issue next year just so everyone is aware of all that's happening during August and September. This fall observing season is really more like the beginning of the year than New Years. It seems you never really lose that habit: dating back to the beginning of school as the start of a new year. As such, it also gives you pause to reflect on last year and years past. We are an evolving organization, we plan carefully. If you don't believe that, I'll copy you in the next time there is a round of e-mail as we sift through all the options and opinions on our way to a decision. Democracy in action, it works and I think we make good decisions.

What we really don't do enough of is celebrate our successes. What are the things that say that to me? Well, one very obvious example is groups that come back a second and third time, people that travel from out of town , people that bring friends and relatives back. I don't think it's because we are a cheap night out. It's because we are a warm, welcoming place more than anything. It's because of our people. I don't think it matters to any of our members, whoever pulls through that gate is welcome. Another indicator of the quality of experience our guests receive is our guest book, take a look through it sometime.

I have been involved with the PGAS for many years, and I have enjoyed all of those years. One reason for that is the supportive nature of all or members. If a notice goes out for an up-coming event , it doesn't take long until there are folks stepping up and volunteering their time. Even beyond that, come out to an event and just hang around, you'll see what I mean. Everyone is friendly, helpful and supportive. It's just a nice place to be! There are not too many things you do that you can see you are doing some good and making a difference, this is one of them. A worthwhile endeavor and it shows in the results.

Great people, great skies, great facility.

Gil

Important notice (s)

the Annual General Meeting

will <u>NOT</u> be held on the usual last Wednesday of the month but rather

<u>October 20, 2004 7:30 pm at the observatory</u>.

This is due to a total lunar eclipse occurring on the usual meeting day (Oct 27) so we will be busy with a public open house that night.

Also - The 2005 Observers Calendars have arrived! They are $13.95 for members and $16.95 for non-members. They are for sale at the counter of SpeeDee Printers in the photocopy department (corner of 5th and Brunswick). They will also be available at the meetings. If you can sell some of them to your friends & coworkers go see Brian and he will give you some. This is our big fundraiser so we really need to sell them all!

Coming Events

Sept 29	General Meeting	7:30 pm	Observatory
Oct 6	Executive Meeting	7:30 pm	Gil's Office, #31-8131 1st ave
Oct 20	Annual General Meeting - elections	7:30 pm	Observatory
Oct 27	Total Lunar Eclipse	6:00 pm	Observatory

Open House – every Friday night (August to end of November)
Members Night – every Saturday night (August to end of November)

The Night Sky for October 2004

by Bob Nelson, PhD

Hi Folks,

It's the start of a new season for the RASC-PG! Already, we can boast of a few new members (thanks to the hard work of workers -- especially Brian) who staffed the booth at the Pine Centre. The observatory has never looked or worked better. I am especially impressed with the new louvers in the hallway as you go to enter the observing deck, which add a professional look to things. Also, the flip secondary and focuser at the Newtonian position have now been installed, making it possible -- we hope -- to take excellent CCD images of the sky. (At time of writing, the flip mirror mechanism needs some "tweeking" to get it right and the focus assembly still needs some modification to get the alignment done correctly. However, these are -- hopefully -- just minor problems that will be rectified soon.) Other improvements to the drive and out on the observing plaza could perhaps be best described by others.

Anyway, "onward and upward" as they (whoever "they" are) say as we look forward to another great season!

Here is what is going on in the sky this month:

MERCURY is at superior conjunction on October 5 and is not visible for us "northies" this month.

VENUS, in Leo until Oct 22 after which it passes into Virgo, starts the month as a 16" gibbous disk at magnitude -4.0, 70% illuminated and rising at 03:06, PDT, some 4 hours before sunrise! At the end of the month, it's a 13.4" gibbous disk still at magnitude -4.0, 80% illuminated and rising at 04:33, PDT, now only 3 1/2 hours before sunrise. Telescopically, the planet is definitely in the "blob" stage, as one astronomer put it, as it races towards superior conjunction (occurring late March of 2005). 22, is a morning object this month. At mid-month, it rises about one hour before sunrise. It's a 3.6" disk of magnitude 1.7. Not much to see (except to say you saw it).

JUPITER, in Virgo until November 2005, is a morning object this month, rising at mid-month at about 2 hours before sunrise. It's a 31" disk of magnitude -1.6.

SATURN, in Gemini until 2005, is a morning object in October, rising at mid-month at about 23:00 in the ENE and making a transit at sunrise. It's an 18.3" disk of magnitude 0.1.

URANUS, in Aquarius until 2009, is an evening object this month. At mid-month, it makes a transit at about 22:00 PDT and sets at about 03:00 (AM). As usual, it's a 3.6" disk at about magnitude 5.7. It should be easily visible in binoculars (if you know where to look -- for a finder chart, consult the Observer's Handbook for 2004, page 185), and also with the unaided eye, we are told. Telescopically, it is a small blueish disk with a number of easily visible satellites that are fun to try to identify. This is close to the ideal time to observe this planet, so why not have a go at it?

NEPTUNE, in Capricornus until 2010, is an evening object this

month, setting at mid-month at about 01:00 (AM). It too has a finder chart on page 186, of OH 2004, that should prove handy. As usual, it's a 2.3" disk at about magnitude 8.0.

PLUTO, in Serpens until Sept 2006, is an evening object in October, setting as it does at mid-month about 3 hours after sunset. As usual, it's a 0.1" disk at magnitude 13.8

Standard time returns on the last Sunday of the month (Oct. 31). Yeah!!!

CONSTELLATIONS to look for in October (at 9:00 PM, PDT) are Pisces Austrinus, Aquarius, Capricornus, Equuleus, Delphinus, Pegasus and Vulpecula.

Pisces Austrinus (PsA, "The Southern Fish"), visible only on the extreme southern horizon here in Prince George and lying as it does off the Milky Way, contains only a few galaxies and no star clusters or nebulae. It does contain the well-known star Formalhaut the 18th brightest star in the night sky.

Aquarius (Aqr, "The Water Bearer"), to the north of Cap, lies on the Zodiac and contains a number of variable stars. Messier objects include M2 (a nice globular cluster), M72 (an open cluster), and M73 (a mistake by Messier -- it's just 4 stars!). Other deep sky objects include NGC 7009 (a small bright planetary nebula) and NGC 7293 (the "Helical Nebula").

Capricornus (Cap, "The Sea Goat"), lies on the Zodiac but it too lies out of the Milky Way (to the northwest of PsA) and contains only M30, a fine globular cluster. Of the brighter stars, Delta and Epsilon are both variable stars.

MARS, in Virgo until Nov

Equuleus (Equ, "The Little Horse"), a tiny constellation (the second smallest in the sky, after Crux) and contains NO deep sky objects at all. Delta Equulei, however, is a close visual binary. It was discovered by Otto Struve in 1852; it was for many years at period 5.7 years, the shortest known for any visual binary. Epsilon Equulei is also a close visual binary, discovered by F. Struve in 1835, and having a period of 101 years. The orbit is very tight - the maximum separation is 1.1" and the eccentricity is 0.70 (fairly highly elongated orbit). The estimated distance is about 200 light years.

Delphinus (Del, "The Porpoise"), to the northwest of Aqr, is a little constellation, containing only, for deep sky objects, two globular clusters: NGGs 6394 and 7006.

Pegasus (Peg, "The Winged Horse", "The Great Square" and our mascot), also lies off the Milky Way. It contains a few faint galaxies, an open cluster, and M15, a fine globular cluster. The latter was discovered by Maraldi in September of 1746 and rediscovered by Messier in 1764. According to Burnham, M15 is one of the richer and more compact globulars, remarkable for its bright core. The cluster contains a large number of RR Lyrae variable stars, all close to about magnitude 16. RR Lyrae stars are pulsating variable stars whose light curve resemble the famous Cepheid variables but are all of shorter periods, less than one day. The stars have been found to be spectral type A to F (brighter and more massive than the Sun) and of Population II (older and having way smaller percentage of atoms heavier than helium than the Sun). Calibration of the absolute brightness of the light curves coupled with identification and measurement of similar light curves in nearby clusters of stars (like the Megellanic Clouds) yields independent distance estimates.

Vulpecula (Vul, "The Fox"), in the Milky Way just to the south of Cygnus (and the last constellation in the book), contains M27, the famous "Dumbbell" Nebula (disc'd by Messier in 1764 and lying close to 900 light years from us) --– it's a wonderful object worthy of close observation or photography.

Clear skies to all,
Bob Nelson

So you want to buy a telescope, eh!

by Brian Battersby

If you have just caught the astronomy bug, your natural reaction is to think your first step should be to buy a telescope, right? Wrong. Your first step should be to head outside and look up.

Amateur astronomy is more than just looking through a telescope; it is knowing the night sky like an old friend. It is looking up and noticing what constellations are visible, knowing which "star" is really a planet and which is actually a star, seeing how faint an object you can see, taking note of how bright naked eye variable stars are, watching meteor showers and generally being comfortable in knowing what is happening in the sky. Learning the night sky should be done before you buy a telescope, as being familiar with the sky will make the job of learning how to use your telescope much easier. It will also allow for the "telescope fever" to wear off a bit as you take some time learning the sky and allow more time for researching your purchase before you spend $5,000 and risk your marriage on a telescope you might end up only using once.

It is also nice to realize when you are naked eye observing, that you are doing what the ancient peoples did for thousands of years before you; observing the sky, timing the rise and set of the moon, sun, constellations and planets, watching for signs from the gods - comets and supernovae.

Here is a list of what you can observe without a telescope, doing what is called naked eye observing. Some of these things can only be observed without a telescope.

Constellations
http://www.astro.wisc.edu/~dolan/constellations/

Moon (the basis of our month)
http://www.umich.edu/~lowbrows/guide/eye.html

Planets. (Mercury, Venus, Mars, Jupiter, Saturn.)
http://www.nineplanets.org/

Eclipses: Lunar and Solar
http://www.mreclipse.com/Special/LEprimer.html
http://www.mreclipse.com/Special/SEprimer.html

Meteor Showers
http://www.planetary.org/learn/activities/meteorshowers.html

Stars
http://www.seasky.org/cosmic/sky7a01.html

Variable Stars (these are stars which brighten and dim on a regular basis for a variety of reasons.) http://www.aavso.org/

Deep Sky objects
http://www.seds.org/messier/xtra/history/deepskyd.html

Comets
http://encke.jpl.nasa.gov/

Satellites
http://www.heavens-above.com/

Aurora
http://www.geo.mtu.edu/weather/aurora/

Green Flashes
http://mintaka.sdsu.edu/GF/

Zodiacal Light
http://www.as.wvu.edu/~jel/skywatch/skw9810h.html

Gegenschien.
http://www.as.wvu.edu/~jel/skywatch/skw9810h.html

The Shadow of the Earth
http://www.sundog.clara.co.uk/atoptics/earshad.htm

Here is a website that deals especially with Naked Eye Observing.
http://www.umich.edu/

Cont on page 11

All photos by Doug Wayland

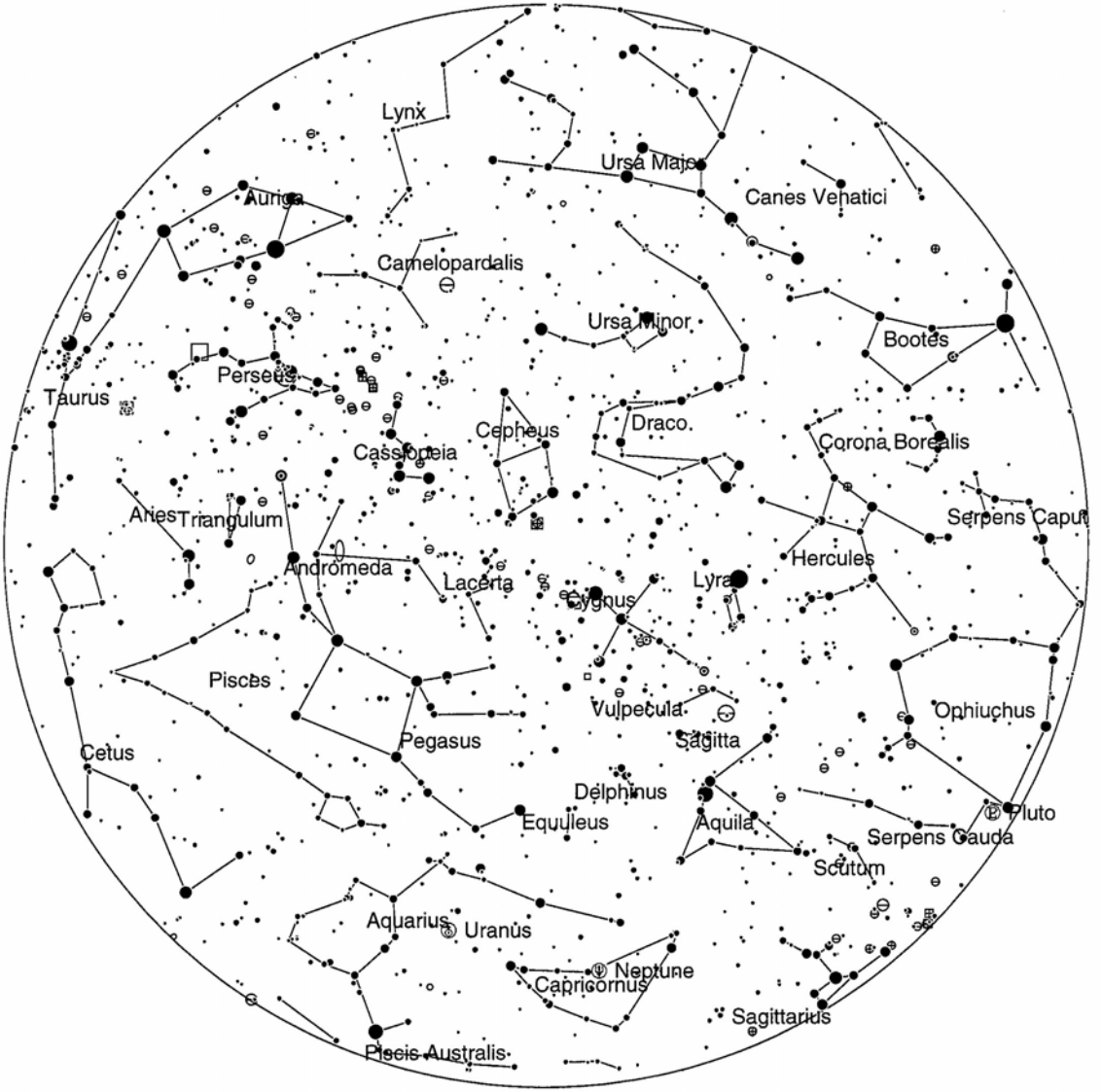
Attached are a couple Comet photos. One is when it was in the same field as the beehive cluster. The sky was still bright dusk on the other one. These were both about 15 minute exposures.

The one with the bright object near the Pleades, is when Venus passed by it. 200 mm lens with 2x teleconverter and a 5 minute exposure. A little too long I think, Venus was way over exposed.

The "crescent moon" one is actually Venus on May 11. I took this with my LX 10 and 12.4 mm eyepiece in projection mode.

These were all slides I scanned. The slides actually look better, It's very hard to scan dark slides and manipulate them to look good, the brighter ones scanned and reproduced well.

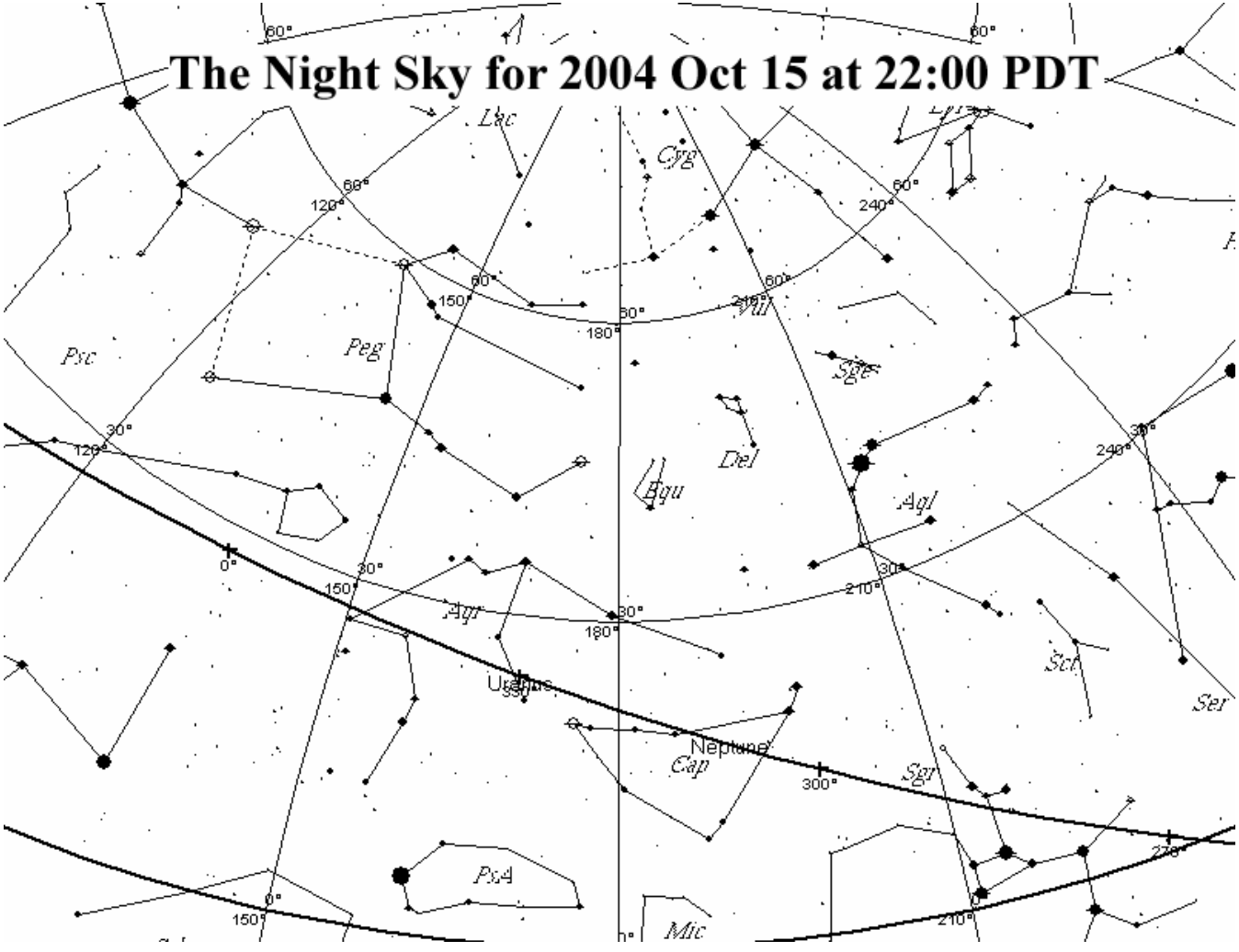
Night sky Map for October 15, 2004



SOUTH

21:00 hrs
P.G. Observatory

The Night Sky for 2004 Oct 15 at 22:00 PDT



Sky Map courtesy Dr Bob Nelson

We have a new "signature " picture, showing our extensively renovated observatory. (home page at our web site) photo by Doug Wayland

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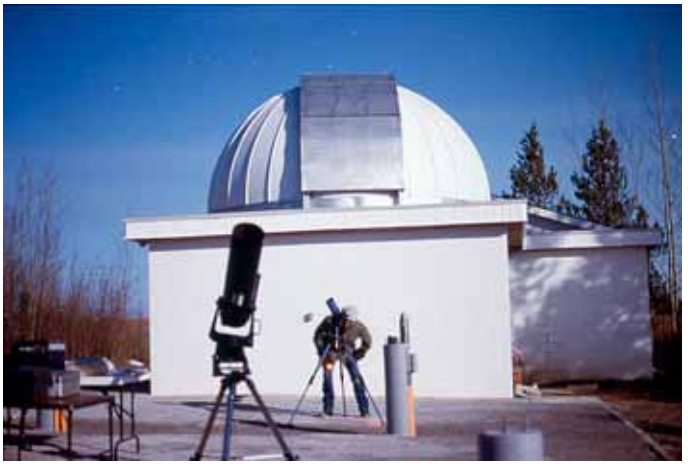
The dim moonlit scene was a 2 minute exposure with 28 mm lens.

The bright scene was 22:00 April 4 with a full moon, Jim Vandoran is there, stood still for one minute for this exposure. You would swear it was broad daylight wouldn't you?
Photos by Doug Wayland



~lowbrows/guide/eye.html

Here is a Naked Eye Observing program. http://www.citylightsusa.org/NakedEyeObservingProgram.html

Once you are ready to buy a telescope you will want to know where to start. I recommend joining your local astronomy club. There you will meet people with experience going through the same thing you are - telescope fever. They will be able to guide you and give you advice but most importantly, they will let you look through their telescopes! This is very important because while the general idea behind all telescopes is the same; collect light, focus it and magnify it to enable you to see celestial objects you would not otherwise be able to see. There are as many ways to accomplish these goals as there are stars in the sky. Without some experience first it will really be a miracle if you manage to choose the best telescope to fit your needs the first time you purchase a telescope.

A word of caution here: department stores generally sell poor quality telescopes. To buy a good one you should talk to a reputable telescope dealer. That being said do a survey of astronomy club members and you will probably find that the majority of them started with a "junk" department store telescope and they were not scarred for life. I have heard some people say that under no circumstances should you buy a department store telescope. I happen to disagree and think that if that is all you can afford and it will get you or your young one going along a path of lifetime interest in the stars then, as long as you are careful about what you buy - go for it. You should however, at least consider buying binoculars instead of a cheap telescope. They will show thousands of stars and hundreds of objects and are by far easier to use than a poor quality, wobbly telescope. They can also be used for more than just astronomy.

A question I am often asked by people looking at my telescope is "how much power does that have?" People say this assuming that "more power" is better. In astronomy, this is not the case. The term "power" equates to magnification, and the best magnification to use is the one that shows that particular object the best. This is the reason why people have sets of eyepieces and focusers designed to allow for the quick changing of an eyepiece in the dark. Astronomers are much more interested in gathering large amounts of light so that they can see fainter objects. This is why a large aperture, the size of the primary mirror or lens, is more sought after than high "power".

There are three main categories of telescopes to choose from: refractors, reflectors and Schmidt-Cassegrain. Refractors are the oldest of the telescope designs. They work by bending light to a focus point using lenses. A form of refractor that most people are familiar with is binoculars.
Reflectors use mirrors to focus the light. They have a primary mirror to collect the light and a secondary mirror to project the light to an eyepiece. The most common type of reflector used in amateur astronomy is the Newtonian, developed by Sir Isaac Newton. Schmidt-Cassegrain telescopes are a combination of the reflector and refractor designs.

Before you buy a telescope, you will need to consider what you want to do with your telescope. Do you simply want to look at the sky? If so then, you can do away with mounts that have motors to track the sky and put your money solely into the aperture of the scope. Do you want to take astrophotographs? If you do, then you need a telescope that will follow the movement of the sky. Do you only want to look at planets? Then maybe a high quality refractor is what you

(Cont on page 12

need. Deep sky objects require a larger aperture to view.

Other factors you will need to take into consideration are: will it fit in your car, will you be able to lift and carry it in the dark, are you willing to spend an hour setting it up or are your observing sessions going to be short mandating a quick set-up time? Remember the best telescope for you is the one you are going to use!

Pros and Cons:
Refractor:
Pros: excellent image quality
collimation required
good for astrophot
ography
(apochromatic)
good for daytime use
too
Cons:
can be quite long
expensive
poor for astrophot-
ography (achromatic)

Reflector:
Pro:
by using mirrors you
avoid colour abberation.
you can get a large ap-
erture for the same price of a
small telescope of the other
designs.
Con:
can be quite long
need to collimate (align
the mirrors)
need to clean the mir-
ror about once every two
years
poor for daytime use

Schmidt-Cassegrain:
Pro:
the most versatile design
pack a large aperture in a
small package
will allow for astrophotography
easily
good for daytime use too
relatively inexpensive
(compared to Refractor)
Con:
lower contrast than the
other designs
can suffer from mirror
shift when focusing
need to collimate
(align the mirrors)
relatively expensive
(compared to Newtonian)

If all of the different types of telescopes are making your eyes roll back in your head just remember this; Newtonian reflectors are probably the best all round telescope you can buy for the buck followed by, or surpassed by, depending on what you want do, Schmidt-Cassegrain.

To go along with the different telescope styles are different ways of mounting them. The most common are German Equatorial (most often used for refractors and reflectors), Fork mount or Altitude-Azimuth (most used often for Schmidt-Cassegrain), and Dobsonian (kind of a lazy susan with a rocker box sitting on top of it - really just another style of Fork mount), most often used with Newtonian reflectors. One thing to keep in mind about mounts is when the telescope is attached; the mount needs to be able to keep the telescope steady. I have noticed that telescope companies will generally sell three different sizes, 6", 8" and 10" on the same size mount. It is usually a safe bet that the 6" will be held rock solid by the mount, the 8" adequately and the 10" will be at or even beyond the mounts ability to hold properly and will be unsteady. If you are buying the 10" model in a series, I recommend that you buy the next biggest mount for it instead of using the one that the company packages with it. Dobsonian mounted Newtonians as well as fork mounted Schmidt-Cassegrain telescopes do not have this problem, as the mount must be made bigger to hold the larger diameter of the telescope.

To sum up, learn the sky first and buy a telescope second. Ask yourself what will best fit your particular needs and interests. Take the time to do lots of research into what types of telescopes and mounts are available. Oh yes, don't forget to enjoy the night sky!

Here is a good article continuing the discussion of buying a telescope. http://www.space.com/scienceastronomy/astronomy/

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October Star Hop in Capricornus and Aquarius Environs

by Doug Wayland

Map on page 15

You will notice I have updated the map I am using for this column, I think this one will be much easier to use. I have put arrows on the map to suggest a route from some brighter stars to the target object. Note the numbers on the map corresponding with each star hop in the text.
It is important to know your directions in the finder scope and telescope eyepiece. You can do this by nudging your scope in a known direction while looking in the eyepiece, note in which part of the field the stars are appearing. That is the direction in which you were pushing your scope. You may have to do this with both finder and telescope eyepiece.

I think you will find this months star hop interesting, we will be looking at some multiple stars, globular star clusters, planetary nebulae, planets and an asterism.

1) We'll start by taking a look at **Alpha Capricorni** at the west tip of the boat shaped constellation of Capricornus. This star named Secunda Giedi on the map is a wide naked eye optical double, meaning it is just a chance alignment. They are separated by 378 arc seconds at a position angle of 291degrees or WNW. Each of these naked eye stars has a fainter companion, so they are a wide double double. Alpha 1 is the west star, it is magnitude 4.2, a faint magnitude 9.2 secondary is 45 arc seconds away to the SSW or 221 degrees. Alpha 2 is mag 3.6 and also has a faint mag 9.3 secondary 155 arc seconds away to the SE or 156 degrees. All these four stars make a great view in a low power field of view.

2) Next look South, about 1/3 of the way from the west tip of Capricornus to the bottom of the boat shape. You will see a small triangle of mag 5 stars, which you may need to confirm with your finder. We will use this triangle as a jumping off point to our next target, **M75** in the Eastern edge of Sagittarius, but before you leave take a look at the southern point of this triangle. This star, 12 Capricorni, is a nice tight double of equally bright yellowish stars. From the triangle follow the arrows to the fairly bright stars as indicated on the map. Center your finder at the second star down. While looking in a low power eyepiece slide your scope 2 1/2 to 3 degrees due West and you should be able to scoop up the round halo of mist that is globular star cluster M75. It is fairly faint and you probably won't resolve any of its stars in a small scope, you probably could in the clubs 24". M75, according to Sky Atlas Companion, is 150 light years wide and 80,000 ly away from us. Night Sky Observers Guide puts its distance at 59,000 ly.

3) Now jump accross to the bright star about 1/2 way up the Eastern side of the boat shape. From this star, which is Zeta Capricorni, shift your finder about 3 1/2 degrees ESE to the star indicated on the map just to the East of **M30**. Center your cross hairs just to the West of that star and look in a low power eyepiece. A fairly bright globular star cluster, M30 will be there. Increase the power up to 150x or so. There is a convenient mag 8 star on the west side of the cluster on which you can adjust your focus. In my 8" SCT I could start to resolve some of the outer stars of the cluster. M30 is about 140 ly wide and 41,000 ly away from us.
Just as a matter of interest, M30 is the most elusive object in the Spring Messier Marathon because of its close proximity to the sun at that time of the year. It doesn't rise until the sky is getting quite bright.

4) and **5)** This next hop will bag us four objects. Start with the star in the middle of the boat and

follow up to the bright one just above. At this point look about 1 1/2 degrees West to see if you can pick out **Neptune** as a mag 8 small bluish dot. It is so small it may be hard to distinguish from star points, but the bluish tint may give it away. You will likely need a good finder chart to confirm, which can be found in the July/August issue of Sky News, page 25 or the April issue of Sky and Telescope, page 107.
Now go back to the bright star and carry on up north to the next naked eye star as indicated on the map. Center your crosshairs about 1 degree due West of this star and look in a low power eyepiece. A small round ball of bluish light should stand out from the star points in the field. This is the **Saturn Nebula** or **NGC 7009**, a planetary nebula. Increasing the power will dim the object, but you may detect an oval shape to the nebula. A medium sized scope and a dark night will be required to see the extensions on either side that give it the name Saturn Nebula. The Saturn nebula is 2900 ly away from us.
Now shift your scope 2 degrees SW from the Saturn nebula and in a low power eyepiece, you should see a remarkable arrow shaped or E-W Y shaped asterism of stars known as **M73**. This may look better as you increase the power. In his book The Messier Objects, Stephen James O'Meara likens this shape of M73 as a "Flash Gordon-style rocket ship sailing through space".
These stars may or may not be related to each other and the distance is unknown.
Go back to low power and shift the scope 2 degrees due West and a nice bright globular cluster, **M72**, should slide into view. It will be a glow with no resolvable stars unless you have a large scope. M72 is 110 ly wide and 62,000 ly away from us.
I really enjoyed this segment of our star hop because of so many interesting objects in a small area.

6) Moving North in Aquarius use the bright star Sadalsuud as a starting point to get to our next target. In your finder follow the pattern of stars 5 degrees North and using a low power eyepiece you should be able to fish around until you pick up another bright globular cluster, **M2**. This cluster may reveal some of it's indvidual stars to you if you have a six inch or larger scope. This seems to be an area of globular star clusters and that is because we are looking in the direction of just outside the hub of our galaxy where a lot of globulars do exist.
M2 is large at 240 ly wide. It is about 55,000 ly away according to Sky Atlas Companion. NSOG says it is 36,800 ly away

7) Now pick up the naked eye star Sadalmelik which is on the West end of what is known as the water jar in Aquarius. Shift your gaze SSE to the star Ancha which you can see with your naked eye. Carry that same direction about 1/2 as far again and if it is a very dark night you may be able to see **Uranus** with the naked eye, it is around mag 6. To confirm your location look for the naked eye star about 2 1/2 degrees East as indicated on the map. If you can't see the planet, binoculars will reveal it for sure, but they should be stabalized on a tri-pod. With a scope at low power you will see a greenish blue small dot, quite different looking than the more pinpoint stars. Increase the power to about 150x or more anthe position will be slightly different if you are looking at a much different time. Check the finder charts from the magazines I mentioned earlier.

8)Our last object is the largest and most challenging. From the water jar follow the aquarius main stars South until you get to Skat. Then follow the arrows SW to the star at the end of the second arrow. Put your cross hairs about 1 degree West of that star. With my 8" scope at 57x, I could barely make out a large very dim glow, that is easy to overlook. This is the famous planetary nebula, the **Helix** or **NGC 7293** that is so often featured in beautiful color images in astronomy magazines. Not much visually, but adding a UHC or OIII filter does increase the contrast a lot so the large planetary does become much more obvious. The Helix is a ring, like a large version of M57, but I couldn't really make out the ring shape, can you? Look for three mag 10 stars running E-W through the center of the nebula, you may have to remove your filter to see the mag 10stars.
The Helix is only 300 ly away and is probably the nearest planetary nebula to our solar system.

Star chart is from Sky Tools, North is up, West is to the right.
Technical information is from Night Sky Observers Guide by George Robert Kepple and Glen W. Sannerand from Sky Atlas 2000 Companion by Robert A. Strong and Roger W. Sinnott

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