

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

**The RASC-PG meets next at 7:30 pm  
Wednesday October 20  
at The Observatory**

Map on Page 2

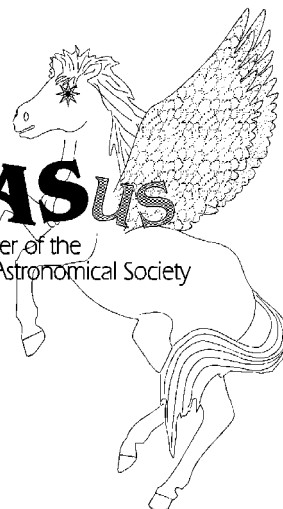
**October 2004**

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**PeGASus**  
Newsletter of the  
The Prince George Astronomical Society



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**Important notice  
the Annual General Meeting ,PGAS  
October 20, 2004 7:30 pm at the observatory.**



**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.

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Contributions to the newsletter are  
 welcome.

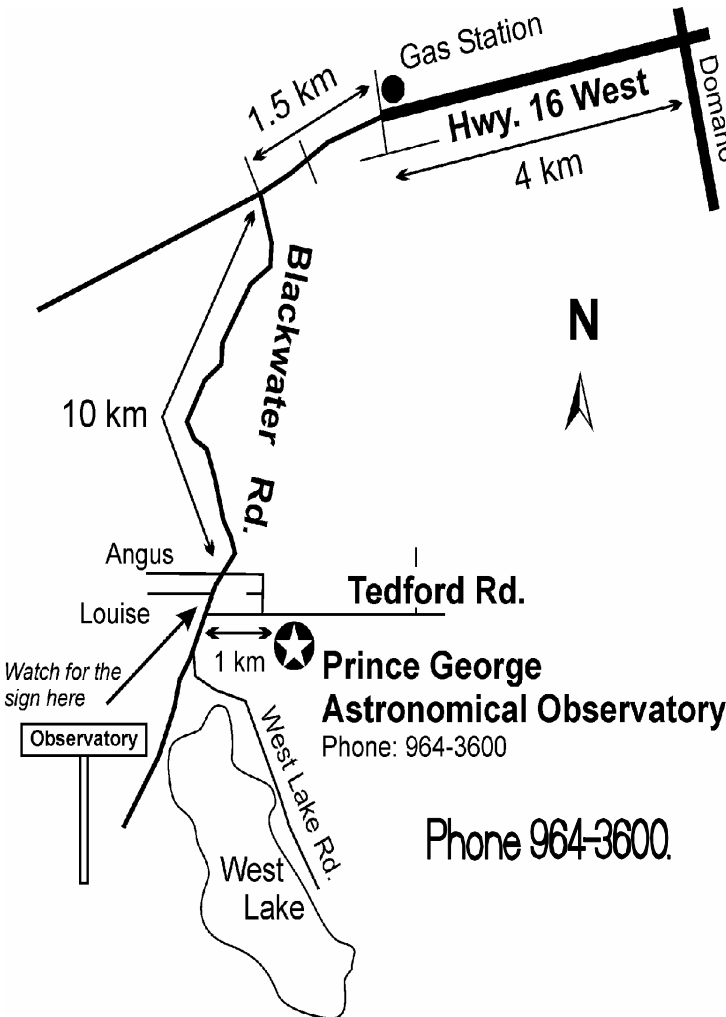
**Deadline for the next issue**  
**is**

**November 12**

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**Astronomical Observatory**  
 Phone: 964-3600

**Phone 964-3600.**

## Editorial

By Gil Self

I had an idea for an item for the newsletter, and perhaps you can help me make it happen. We have made a good start advocating Dark Skies. I think the best thing we can do is keep at it, little by little. Become the community conscience, not loud and annoying but constant and persistent. There have been some great improvements in the last two years, but I don't think responsible lighting is necessarily the first thing a builder or an owner think about. Likely it is style and economy, and it's not probably not going to change. But maybe we can make a difference if they find out that you can satisfy those requirements and save the night sky as well.

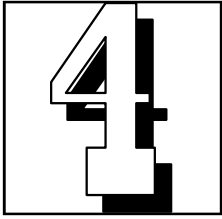
My idea— be on the lookout for good and bad lighting, take a picture and send it to me. I thought of this while I was looking at some really poor Dark Sky lighting on a brand new building—sigh. Perhaps we should be careful not to highlight the business but you be the judge. I think if people realized how little effort it would take to preserve the sky, we really wouldn't get a lot of opposition. Informed people are generally pretty cooperative. We just need to do our part and let folks know. Maurice has done an excellent job heading up our Dark Sky committee, but we all need to help him. Have you checked out the link at the bottom on the Clear Sky Clock. The link shows the light pollution maps,,, it's scary. We have seen some changes in Prince George, some changes that I am sure would not have happened without our input. But if we keep at it and all of us become Dark Sky spokesmen ( spokespersons ), we can really make a difference.

G.S.

**Important notice ( s )**  
**the Annual General Meeting**  
*will NOT be held on the usual last Wednesday of the month but rather*  
**October 20, 2004 7:30 pm at the observatory.**

**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 SpeedDee 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

Oct 20	General Meeting and AGM	7:30 pm	Observatory
Oct 27	Total Lunar Eclipse	6:00 pm	Observatory
Nov 10	Executive Meeting	7:30 pm	Gil's office #30-1839 1st ave
Nov 16	Leonid Meteor Shower	8:30 pm	Observatory
Nov 24	General Meeting	7:30 pm	Observatory
Dec 8	Christmas Party (potluck)	7:00 pm	Observatory

Open House – every Friday night (August to end of November) Rain or Shine

Members Night – every Saturday night (August to end of November) Rain or Shine

### The Night Sky

Hi Folks,

I am writing this column at the same time that I submitted last month's column to Gil (i.e., mid-September). The reason for this is that, at the time you read this, my wife and I will be in Australia! We will have left Sept 28 on a direct flight from Vancouver to Sydney (via Tokyo). I am sure I am safe to say that it was a killer flight (9.5 hours to Tokyo, 3 hour wait, 9.5 hours to Sydney); however, we will have had lots of time to relax with our son in his rented house by the beach in North Sydney. After recuperating, and visiting Sydney, we will have rented a car and travelled north towards Brisbane (to see Steve Irwin's wildlife preserve?). A second

excursion will be towards Melbourne and perhaps Adelaide; while a third will be to Tasmania. We will have a total of 8 weeks there, arriving back November 28 or so. Thankfully, there will be a layover in Tokyo on the way back (at JAL's expense).

We should have some tails to tell when we return!

Anyway, here is what is happening in your skies next month:

MERCURY is an evening object all month. It reaches greatest eastern elongation (i.e., to the left of the Sun) on Nov 21, when it low in the west southwest at sunset (16:09, PST) and sets some 50 minutes later. Owing to the inclination of the ecliptic, this is a favourable apparition for southern observers.

VENUS, in Virgo, until Nov

27 when it passes into Libra, is a morning object. At mid-month, it rises about 3 hours before sunrise and is a 12.5" disk, 84% illuminated and magnitude -3.9.

Telescopically, you'll see a small, smudgy disk. Venus is in conjunction with Jupiter on Nov 4.

MARS, in Virgo until Nov 22 (when it passes into Libra), is a morning object this month. At mid-month, it rises about 2 hours before sunrise. Like last month, it's a 3.7: disk of magnitude 1.7. It's on the other side of its orbit from us, and therefore near the minimum in angular size.

JUPITER, in Virgo until 2005, is a morning object, rising at mid-month at 03:20, PST. It's a 32" disk of magnitude -1.7. See Venus

for the conjunction.

SATURN, in Gemini until 2005, is still -- for best viewing -- a morning object this month. It rises at 20:10 and transits at 04:24, PST. Go after it if you are up late.

URANUS, in Aquarius until 2009, is an evening object in November. At mid-month, it transits at 18:49 (high in the sky!), and sets just before midnight, PST. As usual, it's a 3.6" disk at about magnitude 5.7.

NEPTUNE, in Capricornus until 2010, is an evening object this month. At mid-month, it transits at 17:30 PST and sets at about 22:00. As usual, it's a 2.3" disk at about magnitude 8.0.

PLUTO, in Serpens until 2006, is an evening object this month (but barely visible). At mid-month, it sets about 1 1/2 hours after sunset. As usual, it's a 0.1" disk at magnitude 13.8

CONSTELLATIONS to look for in November (at 9:00 PM, PST) are Sculptor,

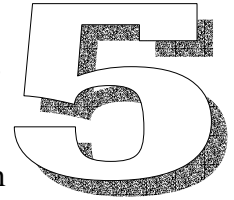
Western Cetus, Pisces and Andromeda.

Sculptor (Scl, "The Sculptor's Tools"), another southern constellation at the limit of our visibility here in Prince George lies out of the Milky Way. It contains a few faint galaxies, a faint globular, NGC 288 and, near the latter, the south galactic pole which, at declination 27.5 degrees south, is just visible from Prince George. It also contains NGC 253, a spiral galaxy which Burnham says is the most easily observed spiral after M31. It was discovered by Carolyn Herschell in 1783. It's the brightest of the Sculptor group of galaxies and lies between 6.5 and 10.5 million light years distance, depending on whom you believe.

Western Cetus (Cet, "The Sea Monster"), contains the variable star Omicron Ceti (a.k.a. Mira), the first pulsating variable star to be discovered. It varies in brightness from 9th to 3rd or 4th magnitude over a period averaging 331 days. Cetus also contains a number of galaxies, including M77.

The latter is a 10th magnitude spiral which lies around 60 million light years distant. According to Burnham, it and the Sombrero Galaxy (NGC 4594 in Virgo) were the first two systems in which a very large redshift was discovered, introducing the world to the mystery of the expanding universe.

Pisces (Psc, "The Fishes"), lies on the Zodiac. It contains M74, (a large spiral galaxy and one of the faintest and most elusive of the Messier objects), and galaxies NGC 487 and 524. It also contains van Maanen's star, one of the few easily identifiable white dwarfs in the sky. It was identified by van Maanen in 1917 through a comparison of photographs taken in 1914 and 1917. After the companions to Sirius and Procyon, it is the closest white dwarf to the Earth at 13.8 light years. In case you've forgotten, a typical white dwarf is the remnant of a nova, contains no more than 1.4 solar masses, and is



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*From page 5*

about the size of the Earth.

The material from which it's made is incredibly dense and is held from further collapse by the phenomenon of "electron degeneracy pressure". Van Maanen's star is also known as GSC 0017 1272 = Hip 3829 and is located 14.4 +/- 0.3 light years from Earth

and is incredibly dim - it would take 5500 of them to equal the output of our Sun!

Andromeda (And, "The Princess of Ethiopia"), is probably familiar to most of us; it contains the AGreat Andromeda Galaxy" M31 along with its satellite ellipticals, M32 and NGC 205 (a.k.a. M110 -- but not really on Messier's list).

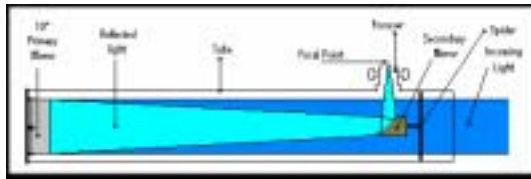
M31 has been the subject of much study over the last

century (there's a vast amount of information about it in Burnham's Celestial Handbook).

Andromeda also contains the striking edge-on spiral galaxy NGC 891.

Unfortunately, it has a low surface brightness but it should show up visually in our 24" telescope and even better in CCD images.

Cheers to all,  
Bob Nelson



## Operation of the new GOTO Scope

*Just thought I should include an e-mail from Brian re the finer points of operating the new scope*

Hey guys; I used the GOTO mount for quite a bit last night and just thought I would let you know what I figured out about it.

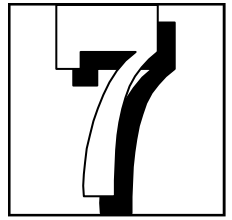
1) the polar alignment (and a level mount) is critical for the goto to be accurate. Glen and I rigged up a crude polar alignment sight by punching a small hole in the end of the film canister that serves as a dust cover for the diagonal. This got us fairly aligned and the goto seemed to

work ok on one side of the sky but not very well on the other. Then I moved the telescope to be pointing to the pole (i.e. the tube 90 degrees in the vertical to the ground and the scope looking straight along the declination back toward polaris) Using the finder I realigned the scope using the small adjustment screws at the front of the mount and reset the declination. After making these adjustments the goto could put the object either in the FOV of 26mm eyepiece or just on the edge on the west side of the sky. On the east side of the sky it was out of the eyepiece but only by a bit. I think if we could be even more accurate on aligning to the pole the goto would work really well. I only aligned on polaris not

the true pole. So sooner or later (next grant) we should buy the polar alignment scope for it.

2) don't be alarmed during the initial 3 star alignment when the scope only points in the general direction of the alignment stars (can be like 15 degrees out). For some reason this feature is not very accurate. Just keep following along - centering and aligning each star. It does not get better from star to star during the alignment phase. Once it is complete it thinks for about a minute figuring out how to correct for the errors then it works so long as the mount is polar aligned and level.

Brian



Doug Wayland



Taken March  
27/2004 at the  
observatory  
Pentax istd camera  
iso 1600  
1/60 sec eyepiece  
projection  
televue 85

John ascah

# Night sky Map for November 15, 2004



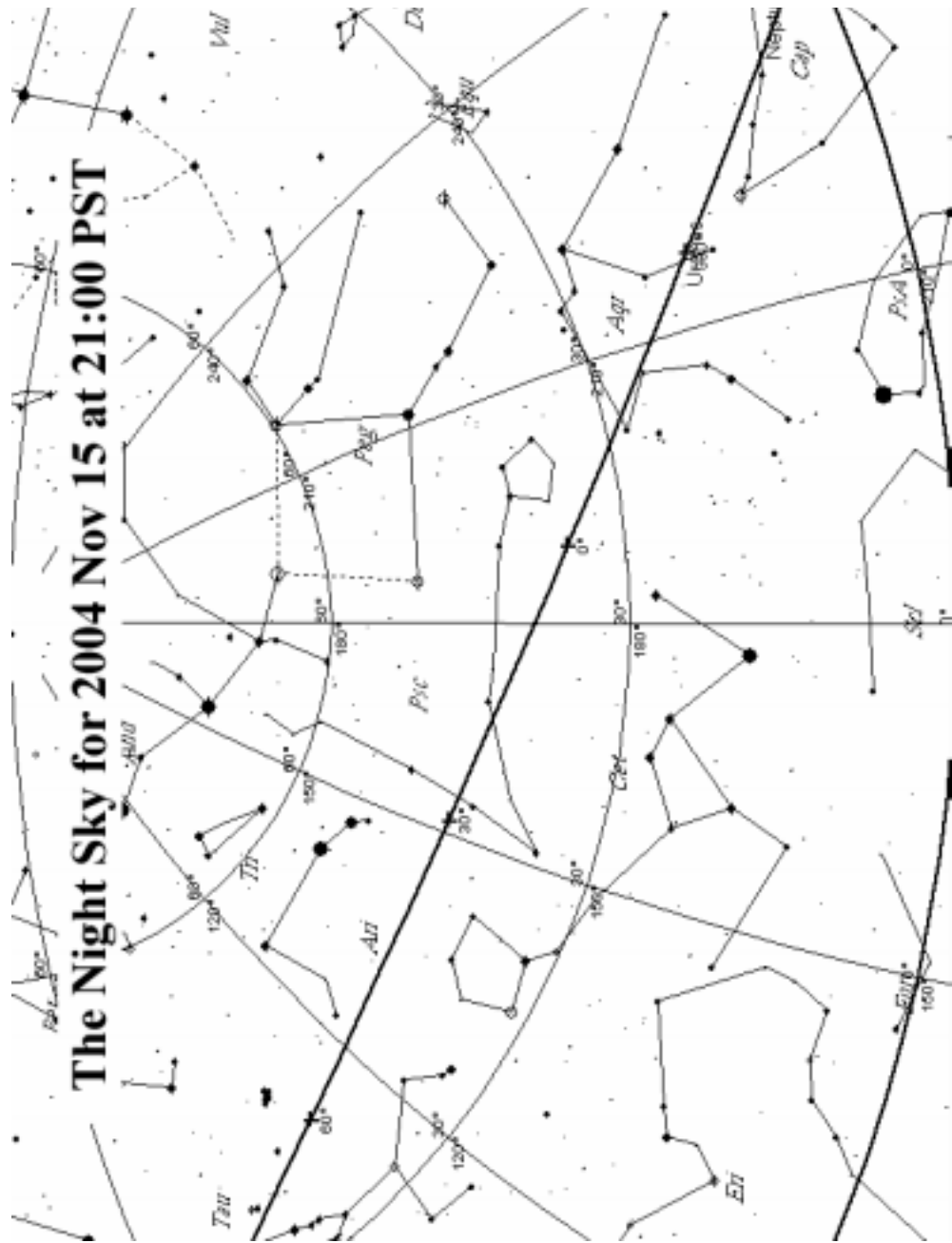
SOUTH

November 15, 2004

9:00 pm

Prince George Astronomical Observatory





Sky Map courtesy Dr Bob Nelson

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**We are fortunate to welcome two new members, Robin and Karen Riordan. Robin brings a professional background in education and astronomy. As you can see from these photos and the text of the demonstration below, he has jumped in with both feet. Things are proceeding well in the initial phases of our cooperative project with Ron Evans at North Island College (Bela Coola & Tatla Lake). Robin has agreed to meet with Ron and another professor from UCC at the Tatla Lake Observatory Thursday October 7th— Hope to hear from him soon.**

**Gil**

*Here is the pinhole lab that Wayne and I will be doing with the school kids. Might be fun to try it ourselves and compare results.*

*Robin*

## Pinholes and the Sun

The PGAS will be hosting some students this month during the teachers' Professional Development Day. Among the learning activities the students will be constructing pinhole projectors for viewing the solar surface. This brought to mind a simple method for determining the ratio of the Sun's distance from the Earth to its (the Sun's) radius.

The instrument looks like this.



The large circle is the solar disk, and the small circle is the projected image of the Sun. The radius of the Sun is  $R$ , the radius of the projected image, which we can measure, is  $r$ . The distance of the sun from the screen is  $D$  and the distance of the image from the screen, which we can measure, is  $d$ . By the method (logic) of similar triangles, the ratio of  $D/R$  is equal to the ratio of  $d/r$ . In equation form:  $D/R = d/r$ . Since we have measured  $d$  and  $r$  with a ruler, we can calculate the ratio of the sun's distance from the Earth to the radius of the Sun.

The ancient Greek astronomer and mathematician, Aristarchus of Samos, used this method. All he needed now was to estimate the size of the Sun in order to calculate its distance from the Earth. That story is for next month.

# Bringing the Cosmos to you – Binoculars – part 2

By Maurice Saluka

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In part one we covered some of the basic issues to be aware of when deciding on a telescope. There are many types of telescopes designs and grades of quality to look for depending on budget and what one wants to view. One of the best ways to get into astronomical equipment is buying some binoculars.

## Cost advantage

Good binoculars are available at a fraction the cost of an effective entry-level telescope, some approaching \$100.00 Canadian. The Chinese are producing some very good quality inexpensive binoculars, from the large telescope companies like: Meade, Celestron; and other companies such as: Pentax, Nikon, Canon, etc. The quality and costs are getting better.

## Use

The great advantage of binoculars is their versatility; they can be used for astronomy, birding, sports events, hunting etc. The other advantages to binoculars are comfort and portability. Observing with both eyes is the most comfortable and relaxing to view, you don't need to squint and your brain gets information from both eyes.

## Viewing

Observing with binoculars can be very rewarding, since you

see a wider field than typically seen with a telescope. You can scan across the sky and globular clusters pop out, as small granular patches of stars, so can be a fun way to learn your way around the sky. Most objects are easier to find and are bright with good contrast because of using both eyes.

## Design features

For astronomical use the objective lens should be at least 50mm in diameter or greater to collect as much light as possible, over 70mm they tend to get too heavy to hold steady free hand.

A wide field of view is important, above 2 degrees is good and above 4 degrees is easier to use because you can see more stars at once to navigate the sky. Fully broadband multi coated optics are very good feature for provide pleasing views, minimizes light loss by reducing light scatter, while improving contrast and maximizing the amount of light that passes through the lenses. With the number of lenses in binoculars it can be very important.

One valuable feature some types have adjusting screws accessible from the outside, so the collimation (alignment of the optics) can be fixed if they should get jarred. A small misalignment

can be compensated by the eyes and the brain, but can quickly become tiresome and straining to very uncomfortable.

Pupil size is a consideration, 6mm is typical, below 4 can be more difficult to get your eyes in the light path. As we age the maximum pupil size can go down from 8mm to 5mm over 50 years age, so getting binoculars with a very large pupil size may not be useful.

Eye relief, also known as exit pupil distance, is the distance the pupil should be from the ocular (eyepiece), and generally decreases as power increases. Low eye relief (less than 10mm) requires you to get very close to the eyepieces, while higher eye relief (greater than 15mm) allows more distance. Eyeglass wearers need a higher amount of eye relief to allow room for their eyeglasses.



**Eyeglass wearers can view without their glasses,**

**because of the wide range of focusing adjustability**

Winged eye cups are a nice option, because they shield the eyes from any stray light from the sides and decrease eyestrain, the only drawback is you cannot use them while wearing glasses. Another styles of eye cup are made of rubber and flip back to allow eye glass wearers to get closer to the eyepiece (these need to be handled carefully at cold temperatures, so they do not crack). There is a more durable design not widely used, a ring / cylinder that threads into the eyepieces, with no parts to wear or crack in the cold.

Most astronomical binoculars have a fixed magnification of 10x to 25x, some of the more expensive types have a detachable eyepieces to adjust the power. The upper limit free hand viewing is 10x to 15x, providing they do not weigh too much. As with telescopes magnification is secondary to aperture size, sharpness and brightness. Zoom type binoculars are not well suited to astronomy because the added mechanical parts reduce the field of view.

The prisms that redirect the light match the separation of the eyes

and available in BAK 7 (borosilicate glass) which are cheaper and sharpness falls off slightly and darkens the image near the edges. While the slightly more expensive BAK4 (barium crown glass) prisms are favored because they provide sharper & brighter images.

As in telescopes binoculars feature flat black painted and baffled interiors to reduce stray light scattering.

Single-coated lens surface is efficient, passing 98-99% of the light, but multi-coated lens surface is the most efficient, passing about 99.5% of the light. Binoculars that are not multi coated will typically show one green reflection, with multiple light blue (single-coated) and white (uncoated) reflections.

**There are two basic designs for binoculars used the Porro Prism (off-set barrel) and the Roof Prism (straight barrel). Porro prisms tend to be bulky and have been traditionally larger and heavier than equivalent roof prism binoculars, although new manufacturing techniques make them weigh less. The Porro design is capable of delivering a wide field of**

**view with excellent image sharpness. Also, they can usually be purchased at almost half the price of a comparable quality roof prism model. Roof prisms are better for free hand and more transportable, because they are generally smaller in size and able to tolerate rough treatment better because of their compact optical design.**

Weight is a limiting factor for free hand observing, over 50 oz. can get tiring to hold for extended periods of time. Greater weights need a solid steady support of some kind, a tripod or counter balanced offset mount. A conventional camera tripod is useful if solid enough, but becomes very awkward to use above 45-degree angle, because you cannot get under the binocular. Some bigger binoculars feature angled eyepieces, set at 45 and 90 degrees, to make high angle viewing more comfortable.

**One type of optical lens finish to be avoided is the “Ruby” tinting; this coating is not the**

mineral ruby. It is a red filter to compensate for poor-quality optics and do not properly converge the color spectrum. By eliminating red from the spectrum, the optics appear to do a better job of minimizing color aberrations, but gives the view through the binocular an unnatural greenish cast. It is a marketing scheme sometimes claiming "night vision" qualities of "ruby-coated" binoculars - "no batteries required", with no benefit to night viewing.

The new image stabilizing binoculars use an electrical motorized system to keep the view steady. This can be useful viewing at higher powers (15x and above) under conditions where tripod is not available (on the ocean, in a car, and aircraft). They do have some drawbacks such as: added weight, bulkiness, power consumption & battery dependant, and high cost. I think the better bang for the buck is still the conventional design with good optics and a solid support, for far less money and can observe for long periods of time and not get tired from the weight.

#### Good deals to be found

There are some very good deals to be found from stores like 'London Drugs', they carry the Celestion 15x70 Spymasters for below \$150.00 and sometimes even \$20.00 less. Bigger sets up 100mm apertures can cost up to \$600.00 and more. Over 100mm they increase dramatically in cost and become more difficult to

transport. For larger types there are a number of internet sellers that offer other makes, just remember to include the dollar exchange, shipping, insurance and taxes, so you are prepared for the total cost.

#### A great start

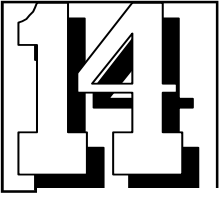
So binoculars are a great tool to find your way around the sky, for less cost than a good starter telescope and can be easily used for terrestrial viewing. With the lower entry cost it, one can learn more before shelling out a larger amount of money on a telescope and be better prepared for what type of scope suits your style of viewing.

Maurice

*Special Thanks to  
TELUS  
And Glen Harris.*

*Glen submits his volunteer hours  
and Telus generously sends us a cheque!*

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*We have an unexpected treat this month. Bob Nelson very kindly wrote the December Night Sky before he left for Australia. Since there is no December issue, we get a preview of the December night skies here.*

*Gil*

## The Night Sky for December 2004

by Bob Nelson, PhD

Hi Folks,

As I mentioned last month, my wife and I will be in Australia when you read this. Hopefully, I will have been able to squeeze in a few visits to some astronomical observatories -- I'll give you a report when I return! I also promise not to flaunt my suntan!

Anyway, here is what will be happening in our skies this month:

### PLANETARY ROUNDUP:

**MERCURY**, speedy Mercury, is an evening object until it reaches inferior conjunction (between us and the Sun) on Dec 10 and a morning object thereafter. At month's end, it rises almost 2 hours before sunrise and is therefore a favourable apparition for us northern observers when it will be a 6" disk of magnitude -0.3. For the early folks (not this writer!!).

**VENUS**, in Libra until Dec 18 when it passes into Scorpius, is a morning object all month, rising at mid-month about 2 hours before sunrise when it is a 11"

disk, 90% illuminated and of magnitude -3.9. It is in conjunction with Mars on Dec 3.

**MARS**, in Libra until just after Christmas (when it passes into Scorpius), is a morning object; at mid-month, it rises about three hours before sunrise, as the Earth once again is catching up to it in its orbit. It's still a 4" disk of magnitude 1.6.

**JUPITER**, in Virgo until 2005, is a morning object, still (hurry up!!). At mid-month, it rises at 01:50, PST and is a 34" disk of magnitude -1.8..

**SATURN**, in Gemini until 2005, now is an evening object. It rises at 18:05 and transits at 02:21, so it should be good viewing later in the evening away to the east. It's a 20" disk of magnitude -0.1 and should have plenty to offer telescopically, as usual.

**URANUS**, in Aquarius until 2009, is an evening object again. It transits around 17:00 and sets at 22:00, PST. As usual, it's a 3.6" disk at about magnitude 5.7. It's still an interesting object, together with its satellites.

**NEPTUNE**, in Capricornus until 2010, is an evening object again this month (things change slowly for the outer planets!) At midmonth, at sunset, it is in the southwest at sunset and sets at

about 22:00 PST. As usual, it's a 2.3" disk at about magnitude 8.0.

**PLUTO**, in Serpens until Sept 2006, is largely lost in the glare of the Sun this month.

Winter Solstice occurs on December 21 at 04:42, PST.

**CONSTELLATIONS** to look for in December (at 9:00 PM, PST) are Fornax, Eastern Cetus, Western Eridanus, Aries, Triangulum and Western Perseus.

Fornax (For, "The Furnace"), is another southern constellation, with the northern part visible to us in PG this month. Burnham's Celestial Handbook tells me that Alpha Fornacis (that's the Latin ending for Fornax) is a long-period visual binary first observed by John Herschel in 1835 when the separation was 5.3". During the next century, the separation narrowed to 0.9" but then started to increase. In 1963, the separation had grown to 1.9". I have this planetarium program, PC Sky, that animates visual binaries; it gives the separation and position angle as you time-step watching the simulated orbit. It tells me that in Dec 2000, the separation is 5.1". The latter will increase to a maximum of 6.1" in 2038 and will decrease to a minimum of 0.2" by 2264. The

period is around 314 years -- how's that for a long-term phenomenon? Only in astronomy. We must look for the pair; in December, they will be 18 degrees above the southern horizon; Star A is 4.00 mags and Star B is 6.60 mags.

Eastern Cetus (Cet, "The Sea Monster"). Western Ceti was discussed last month, but in eastern Cetus, we see Omicron Ceti, or Mira ("The Wonderful" - it is!). Mira was the first of the long period variables discovered since 1596 and monitored by the America Association of Variable Star Observers. Much was said a year or so ago, so I won't repeat myself.

Western Eridanus (Eri, "The River"). is a large constellation out of the Milky Way; the southern part (which we cannot see from Prince George) zigzags

its way south to -60 degrees where the bright star Achernar (Alpha Eri) resides. It also contains the multiple stars system Omicron 2 Eridani. Stars B and C (9.9 and 11.2 mags respectively) undergo a 252-year orbit. At present, their separation is 9.2" (easy) and is near maximum.

Aries (Ari, "The Ram"), is the first entry in the Zodiac and is a northern constellation out of the Milky Way. The brightest star, Alpha Ari (a.k.a. Hamal) is a red giant (sp. K2 III) and lies about 75 light years distant. It also has a couple of nice NGC objects - NGC 972 (a coarse spiral) and NGC 1156 (an irregular system). Both are relatively faint (both of magnitude 12.2) but should show up well on CCD images of moderate exposure.

Triangulum (Tri, "The Triangle"), is a small constellation just south

of Andromeda and contains the famous galaxy M33 ("The Pinwheel"), which is a member of the Local Group of galaxies. It was discovered by Messier, in August of 1764. If you've ever observed M33, you'll marvel at how Messier saw it since it's a diffuse, low-surface brightness object which can be a challenge in a small telescope. Try using moderate power in a telescope with clean, well collimated optics on a very dark night with good clarity. (CCD images taken then should turn out well.) Like M31, it has been the subject of intense study by professionals with large telescopes; many variable, novae, planetary nebulae, etc have been discovered.

Cheers,  
Bob Nelson

