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

# The RASC-PG meets next at 7:30 pm Wednesday January 26 at The Observatory

Map on Page 2

# January 2005

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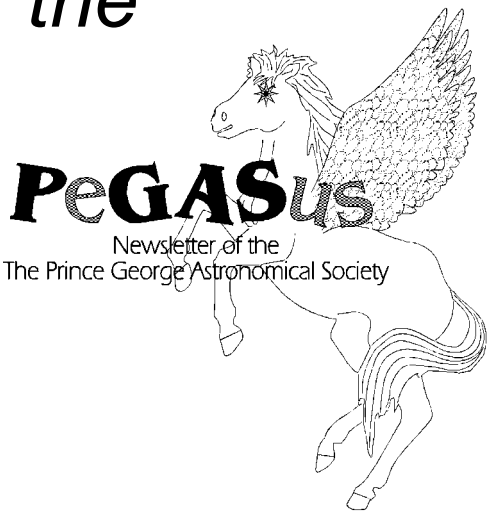


In Issue # 141



*Also This Month;*

***the PeGASus***
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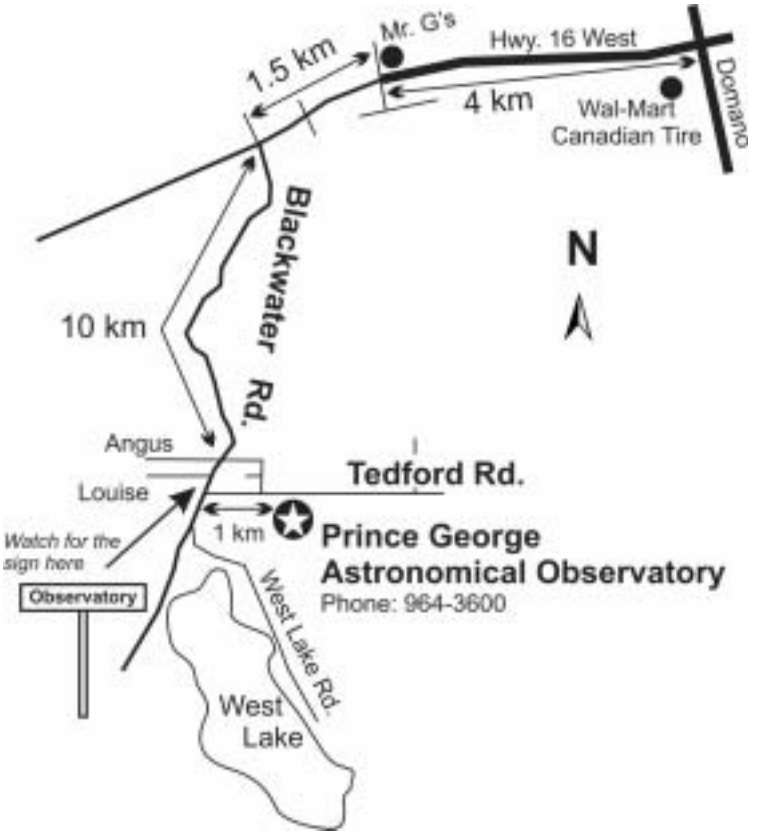
**Royal Astronomical Society Canada**
**Prince George Centre**

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***

***February 11 2005***

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# Editorial

By Gil Self

I remember a year ago saying here that we had a really interesting year ahead. Well we can add an order of magnitude to that this year. We are dramatically increasing our involvement with the young people in our community. We already have an excellent program in place for "pro-dee " days thanks to Wayne and Robin. In the coming months we will be increasing our involvement in the school astronomy curriculum, offering our assistance to teachers with programs that will fit into the teaching plans.

The building and equipment are in the best shape they have ever been in. We have never before been fortunate to have as many active and involved members. This is going to be a great year!

If you have not read Art Beaumont's paper on gravity and tides, you should try and get a copy. Art's theses is very involved and complex. You may not follow it all , I didn't . But recall how many great works in the past were initially ignored and discredited. But I think I've got Art figured out… A .Guru ,, People travel from miles around to the top of Baldy Hughes mountain. There sits Art dispensing wisdom and the meaning of life.

I present " Art of the North "——— :-)

# The Origin of Life and/ or New Years Message.

Several years ago I attended a funeral of a neighbour at a church in Prince George. During the service the preacher kept asking over and over "What is the meaning of life?" Unfortunately he did not give an answer so that non can be offered here. However at least the question gives rise to wondering about the reasons for life in the scheme of things.

In my November talk to the club I tried to suggest that all energy is associated with gravity. My belief is that gravity is the supreme entity, tides are the child of gravity (being the rate of change of the gravitational field) and energy is the all-encompassing spirit. So what purpose does life serve? What benefits from life? If there was no life then multiple organisms would not be available to transform potential energy into motion or kinetic energy. Therefore kinetic energy benefits from life. One test for life is motion. Life serves energy so perhaps that is the reason for life.

Scientist trying to determine where life commenced on earth frequently suggests that it originated in the tide pools on the shores of shallow seas. One scientist suggests that the moon therefore is ultimately the source of life. However the sun with about half the potential for tide producing force compared to the moon plus abundant radiant heat must be the most likely candidate for producing life on earth in the tide pools. (The tidal force accelerates the earth in various places, which produces motion of air, water, soil and rock.) The sun is of course the main source of energy gathered by earth but the sun also suppresses life when ultra violet radiation is excessive.

Others suggest multitudes of theories for extra-terrestrial origins of life but this subject is left to them to enunciate.

So what message am I trying to convey? It seems that the Supreme Being (Gravity) cares only that we obey Her laws with unquestioning faith and the Her Child (Tides) only relates to changes of energy (the Ultimate Spirit) This is not the message as this aspect of this discussion belongs to religion. The message is: get out there and convert all that extra energy on your body into kinetic energy through physical exercise to keep life going! Slim people who are fit can ignore this message.

Art Beaumont

# Coming Events

**Members night –every Saturday Night Rain or Shine**

Jan 22 - NOVA Workshop - 7:30 pm - Observatory
Jan 26 - General Meeting - 7:30 pm - Observatory
Feb 9 - Executive Meeting - 7:30 pm - SpeeDee (5th and Brunswick)
Feb 10 - Tour Booked - 6:15 pm - Observatory
Feb 23 - General Meeting - 7:30 pm - Observatory
March 5 - Astronomy Booth - 9:30 am to 6:00 pm—Pine Centre Mall
March 6 - Astronomy Booth - 12:00 pm to 5:00 pm—Pine Centre Mall

## The Night Sky for February 2005

by Bob Nelson, PhD

Hi Folks,

Wow!! It's been cold of late, (reaching -38° C at one point). One really does not feel like going outside when it's like that, certainly not if one doesn't have to. However, my backyard robotic telescope works just fine at these temperatures (while I remain in my warm den gazing at the images coming in). That's the way you do science in astronomy these days. [Most of you know that I determine accurate times of minima of eclipsing binaries with my setup; I have 14 to date this year.] I know, though, that I've grown soft! I do look forward, however, to milder temperatures when we will again be doing visual observing out at the observatory, taking advantage of our wonderful night sky. We should also get a chance to use my ST-9 CCD camera at the Newtonian focus of the 0.61 m telescope. (Gil and some others, I believe, did the final collimation while I was away in Australia.) There should also be some more "goodies" this year – stay tuned!

Anyway, here is what is happening in the sky next month.

**PLANET ROUNDUP**

**MERCURY** is at superior conjunction (on the other side of the Sun) on February 14th, and is basically out of sight for us this month.

**VENUS**, also, is pretty well lost in the glare of the Sun for us "northies" until May.

**MARS**, in Sagittarius, is a morning object this month. On the 15th, it rises almost two hours before the Sun, lying low in the southeast at sunrise.

**JUPITER**, in Virgo until 2005, has become an evening/morning object this month. On the 15th, it rises about 22:00, some four hours after sunset. It makes a transit around 03:35, so the best views will occur later on -- in spring. It's a 41" disk of magnitude -2.3, if anyone that can stay up late.

**SATURN,** in Gemini until 2005, is an evening object in February. At sunset, it lies high in the east, making a transit at about 22:00, PST. It's a 20" disk of magnitude -0.59. As usual, you should be able to see several moons with just about any telescope. Ivan Semaniuk, the astronomy reporter on Daily Planet (appearing on Discovery Channel), says that you can see Titan with binoculars. Is that true? Would anyone like to check and report back? (I meant to, but got tied up with something else on the clear nights we've been having …)

**URANUS**, in Aquarius until 2009, is an evening object still (going, going, … gone!). At mid-month, it

sets some 40 minutes after sunset. As usual, it's a 3.6" disk at about magnitude 5.7

**NEPTUNE**, in Capricornus until 2010, is lost in the glare of the Sun this month.

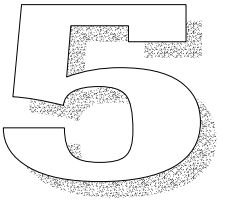
**PLUTO**, in Serpens until Sept 2006, is a morning object in February, rising at mid-month some four hours low in the east before sunrise. As usual, it's a star-like object of magnitude 14.

**CONSTELLATIONS** to look for in February (at 21:00, PST) are Eastern Eridanus, Taurus, Canis Major, Lepus, Monoceros, Orion, and Gemini.

**Taurus** (Tau, "The Bull"), contains The Hyades, the well-known V-shaped open cluster which represents the head of the bull. For astronomers, it's the closest open cluster (after the Ursa Major Group), lying at about 40 parsecs (=130 light years) distant and probably containing several hundred members. It's important because the distance is too great to be measured by normal stellar parallax, but can be determined by a method known as the "moving cluster method". After that, its Hertzsprung-Russell (HR) or colour-magnitude diagram can then be used to determine the distance to clusters lying further away. This cluster is then an important rung in the cosmic distance scale.

Taurus also contains M45, the Pleiades star cluster (the 'Seven Sisters') which lies about 3 times further away -- 126 pc (= 410 light years). On deep exposures, many of the stars exhibit circumstellar nebulosity which is the tip-off that these are young stars. Another attraction in Taurus is M1, the well-known Crab Nebula. The subject of much study, the Crab is thought to be the result of a star that exploded in 1054 (on July 4th, of all days!). It's not too hard to find -- give it a try -- but the image is just an amorphous blob in the sky. Better images are obtained with a CCD camera (yeah!!).

**Gemini** (Gem, "The Twins"), is a well-known northern constellation that lies just to the east of Auriga. Just missing the Milky Way as it does, it lacks a lot of deep sky objects. (It does have open clusters M35, and NGCs 2158 and 2392 however.) Some of the stars are quite interesting. Alpha Geminorum, better known as Castor (one of the twins), lies about 45 light years from us and has a total luminosity of about 36 Suns. It is a multiple system: Castor A and B form a visual binary making an orbit of about 6 arcseconds in radius (corresponding to a real distance of about 90 astronomical units) and a period of about 400 years. There is a third star, Castor C, which orbits the other two at a distance of about 72". The fascinating thing about Castor is that each of the three stars (A, B, and C), as revealed by the spectrograph, is also a binary system.

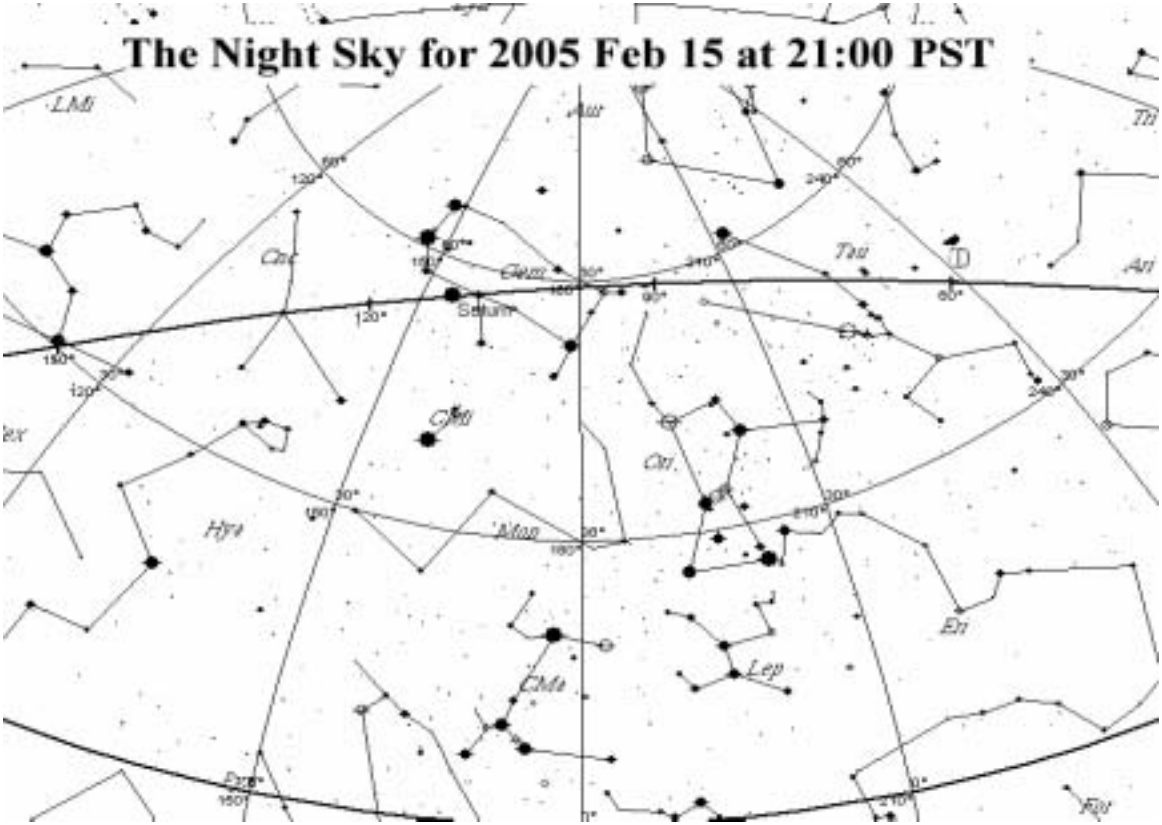


Gemini also contains U Geminorum - discovered variable by J.R. Hind in 1855 - which is a typical example of a rare class of objects called "dwarf novae". Normally quite faint at magnitude 14.9, every 17 days or so, it suddenly flares up to magnitude 8 or so staying at that brightness for a week or two. (Needless to say, these figures are averages; on occasion this system has gone 200 days between eruptions). Today we know that stars of this class (SS Cyg is another) consist of a white dwarf primary (the hotter star) with a red dwarf main sequence (cooler) secondary star. Now white dwarf stars are remnants of stars that have gone through the nova stage - exploding as they reach the end of their lives, settling down to an electron-degenerate compact object (sorry about that mouthful). What the term means is that it behaves like a giant atom, prevented from collapsing further by the laws of quantum mechanics. Anyway,

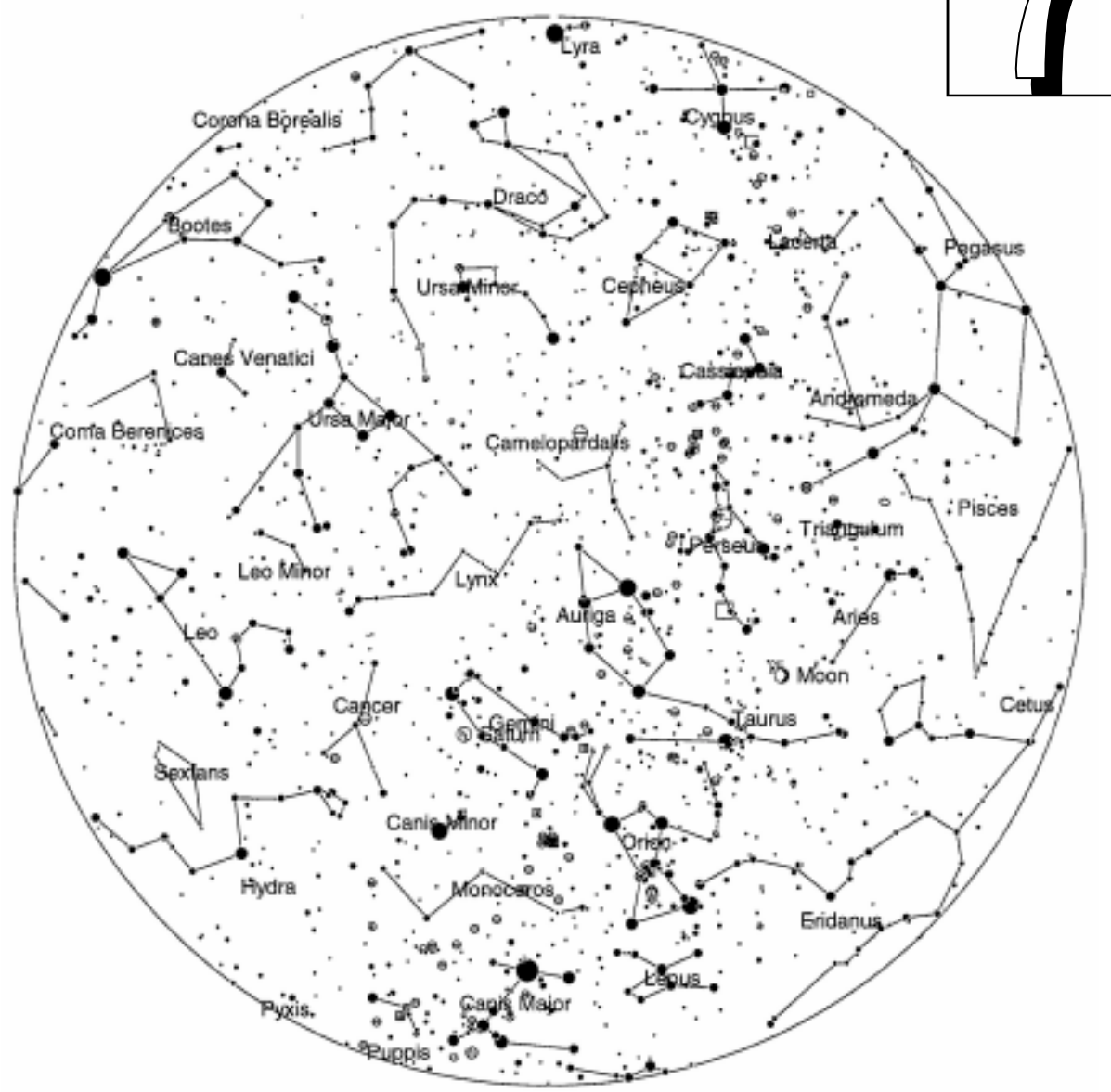
*From page 5*

there are rules for the mass and temperature of this object. Now usually, at a slow rate, mass spills over from the secondary to the primary star. Owing to rotation, this material does not fall to the white dwarf directly but enters a disk surrounding the latter. Periodically (and we are not sure what initiates the process), some of this material - which is mostly hydrogen - falls to the white dwarf, breaks the rules and ignites into a thermonuclear explosion. Much material is expelled in a large hot shell, and that is what produces the extra luminosity. The total light output increases by a factor of 100 or more in these outbursts. In a few weeks or months, the whole process repeats. Studies of these objects continue using the latest space telescopes. In order to coordinate these observations, NASA relies on the many amateur astronomers in the AAVSO (American Association of Variable Star Observers) to send the professional astronomers timely outburst notices.

Clear skies,
-Bob




Map courtesy of Dr Bob Nelson




**SOUTH**

All sky map for February 15th 9:00 pm
Location: Prince George Astronomical Observatory

# Venus & Jupiter

Photo by Dan Hicks

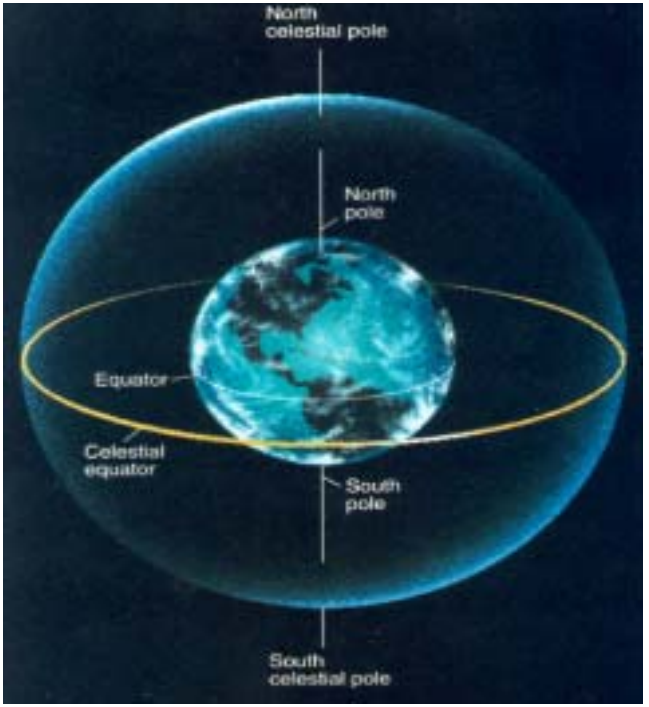
041105 Venus & Jupiter, Alexis Creek.
CAMERA : E995V1.5 Nikon Coolpix 995 2001
METERING : MATRIX
MODE : S
SHUTTER : 8.00sec
APERTURE : F2.6
EXP +/- : 0.0
FOCAL LENGTH : f8.2mm(X1.0)
IMG ADJUST : AUTO
SENSITIVITY : ISO100
WHITEBAL : AUTO
SHARPNESS : AUTO
DATE : 2004.11.05 06:07
QUALITY : FULL HI
SATURATION : +1
FOCUS AREA : CENTER

# The Celestial Sphere

Part 1

9

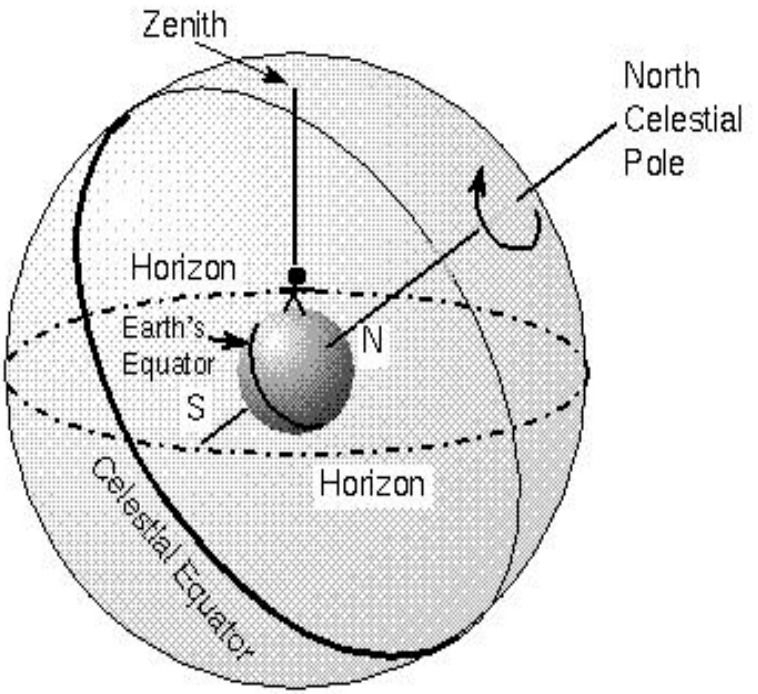
Finding your way around the sky is fundamental to astronomy. Fortunately, the system we use is borrowed from geography. The geographers have a north and south pole. Astronomers have a north and south **celestial pole**. As the name implies, the celestial poles are just projected points on the sky from the north and south poles. The land lubbers have the equator. The sky watchers have the **celestial equator**. Again, this is just a projection of the land equator onto the sky. Finally, map makers use latitude to mark north and south locations and longitude to mark east and west locations. We have the equivalent in astronomy but we refer to latitude as **declination** and longitude as **right ascension**. So, the only new words here are **right ascension** and **declination**. Take a look at the figures below to get yourself oriented to the system we are using. We will start with the celestial pole and the celestial equator.




You can see the maritime in the upper center of the picture. B.C. Is in the upper left of the earth. The great lakes are a little left of the line from the north and south poles. As you can see the celestial poles and the celestial equator are just projections from the Earth onto the sky. I know that from this picture it looks like the north star should be straight up. Well, it is if you live at the north pole. But notice that we in Prince George have a different "overhead" than the north pole. We are standing on the Earth a little sideways. Remember, because of gravity your feet point toward the center of the Earth. So. Our heads make an angle of about 40° away from the line of the pole. So let us now throw this little complication into the next picture.

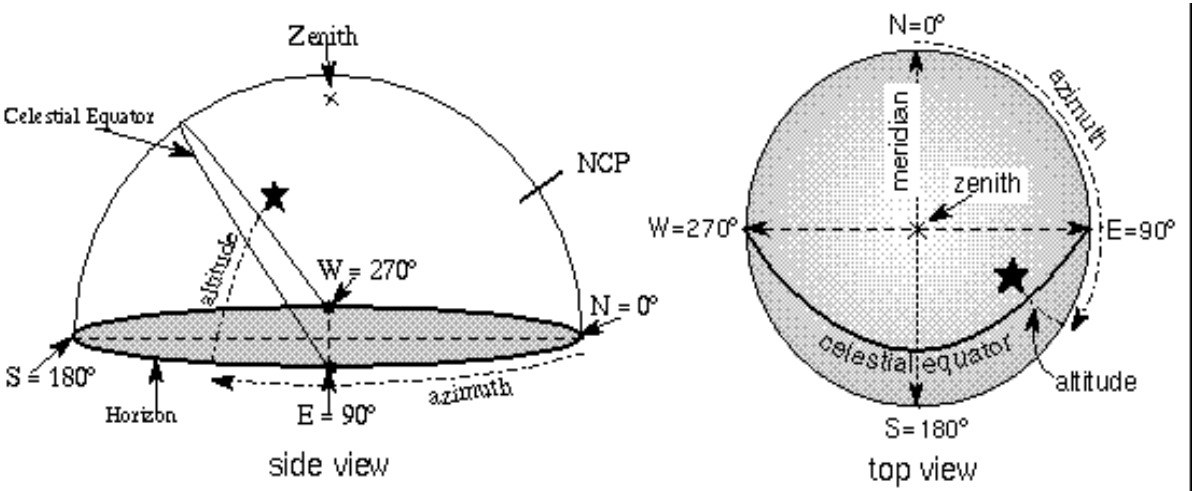
( continued on page 10 )

# 10




I got tired of standing on an angle, so I tilted the Earth over so that our overhead would be overhead. The tilt (angle) on this is a bit off because I copied this as it appears for the folks in Los Angeles, CA. We are actually closer to the north. For Prince George the angle between the zenith (point overhead) and the north celestial pole is 40°. As you can see the horizon is a circle 90° from the zenith. If you wish to find the celestial equator at any time just point one arm toward the north star and extend your other arm southward to make a 90° angle with the other arm. You can also see from the diagram that there is an angle between the celestial equator and the horizon. As you might have guessed, that angle is the same 40 degree angle we see between the celestial pole and the zenith. For our friend who lives at the north pole there is no angle between the north celestial pole and the zenith, and there is no angle between his horizon and the celestial equator. Astronomy is simple at the North Pole, just very cold. The last thing we are going to do this month is look at how things are measured relative to our horizon. We will leave the declination and right ascension for next month.

The easiest way to tell someone standing next to us where a sky object can be seen is to say how high it is, this is called **altitude**, and how far it is from due north, which is the **azimuth**. The altitude is pretty obvious. We say something like 30° above the horizon. The azimuth is a bit trickier because we have to agree which way to go, east or west. As it turns out we measure from the north toward the east. Since we have a full circle around the horizon we will measure from 0° for north to 90° for east to 180° for south to 270° for west and then to 360°, which is actually 0° for north. Remember that as you face north east is to your right. Here is a picture.




A star's position in the altitude-azimuth coordinate system. The azimuth=120° and the altitude=50°. The azimuth is measured in degrees clockwise along the horizon from due North. The azimuths for the compass directions are shown in the figure. The altitude is measured in degrees above the horizon. The star's altitude and azimuth changes throughout the night and depends on the observer's position (here at the intersection of the N-S line and E-W line). The star's position does not depend on the location of the NCP or Celestial Equator in this system.

This month we have located the celestial pole, celestial equator, zenith, and the horizon. We have even learned how to locate an object by specifying its altitude and azimuth. This coordinate system is our foundation. Next month we will look at the right ascension and declination of objects in the sky. So, brush up on you knowledge of longitude and latitude because right ascension and declination are just the sky versions of these familiar terms.

Robin Riordan

# Winter Starhop in Cassiopeia

by Doug Wayland

*Star chart is from Sky Tools, North is up, West is to the right.* *( map on page 15 )*
*Technical information is from Night Sky Observers Guide by George Robert Kepple and Glen W. Sanner and from Sky Atlas 2000 Companion by Robert A. Strong and* Roger W. Sinnott

**The numbers on the map correspond with each numbered 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. Also knowing the true field of view of your eyepiece helps a lot. Usually a low power of 35x is one degree or more. To figure it out for your particular scope, eyepiece configuration divide the apparent field of the eyepiece by the magnification it gives you with the scope you are using. ie: True field = Apparent field divided by magnification.**

Gil and I had a good time hopping through this constellation one evening, I hope you enjoy it too. It is super-imposed on the Autumn Milky Way and therefore has some very nice open star clusters and double, multiple stars. While our home galaxy obscures most everything beyond, we can still find a few galaxies viewable near the edge of the constellation.

**1)** Start at Shedir, look to Beta Cass and follow that same direction about the same distance to open cluster **M52**. It will be an obvious glow in your finderscope or binoculars. In your scope at low to moderate power it is a beautiful bright compressed cluster. M52 is about 13 light years (ly) wide and 3,000 ly away from us.

**2)** Now go back to Beta Cass and in your finderscope look for the two fairly bright stars about 2 1/2 degrees NNW as indicated on the map. Center your low power eyepiece on the western one of those two stars and pan about 1/2 degree west and you should see the small E-W oval of **NGC7790**, a faint star cluster slide into view. Just a little further NW and in the same field of view you will see a small knot of stars that is **NGC 7788**, a little brighter than the first. Both of these clusters stand out from a background of many stars. You may need about 6 or 8 inches of aperature to appreciate them. Sky Atlas Companion says 7790 is 10,400 ly away

**3)** For the next target, which is one of my favorite colour contrasting doubles, you can stay at the low power eyepiece and slide slowly about 1 degree SSE through a crowded star field to a beautiful orange and blue double, **WZ Cass**. This double is a pair of mag 8 stars oriented E-W and separated by 58 arc seconds ("). If it wasn't for their obvious color they wouldn't stand out from the rich star field. This was one of the first colourful doubles that I ever observed and I remember thinking the orange one looked like a glowing cigarette ember. Tapping your scope while viewing this will make the colours jump out even more.

**4)** Starting at Shedir or Alpha Cass go to Beta Cass and turn 90 degrees right or SW and go a little over half the distance from Alpha to Beta again and you will see a nice glow in your finder or binoculars. This is **NGC 7789**, a large and very pretty open cluster. In my 8" SCT at 57x there is a sprinkling of stars over a background mist of light. This is an excellent binocular target. From a dark sky site you should be able to see a glow with the naked eye. 7789 is about 6,000 ly away from our solar system.

**5)** Next will be the galaxies in this hop. Using your finder start at Shedir again and starhop due South along the brighter stars indicated on the map until you come to Omicron and Pi Cass. For this, unless it is an exceptionally dark night, you will likely need an 6" scope to see. From Omicron use a low power eyepiece and watch as you slowly pan directly West about 1 degree,

you should see the fairly large, round, very diffuse glow of galaxy **NGC 185** come into view, it is situated between two mag 8 stars oriented NE-SW. I found it easier to see with averted vision and a little scope movement. I think there was a little haze that night and it may be easier on a more transparent night. Now continue looking in the eyepiece and slowly move another 1 degree West, you will pass a couple mag 7 stars and come to another galaxy, **NGC 147**. This is a fairly large glow as well, but seems to have a brighter core and therefore a little easier to see. 185 and 147 are members of the local group of galaxies and are satellites of the great Andromeda galaxy, so they are about the same distance away as the big one, about 2.3 million ly.

**6)** Now put your crosshairs at the Eastern point of an equilateral triangle formed with Omicron and Pi Cass. In my 57x eyepiece I could easily see the small concentrated glow of galaxy **NGC 278**. This one looks like a planetary nebula and is situated directly below a mag 9 star. It sort of reminded me of the view of the Eskimo nebula as it is paired with a star. NGC 278, while being close in the sky to the local group galaxies we just looked at, is actually far in the background at 38 million ly.

**7)** Go back to **Shedir or Alpha Cass** and this time take a look at it with about 50x, you will see a bright, light orange primary with a dim purplish secondary space 64" away at a PA of 280 degrees. The magnitudes for these two are 2.2 and 8.9.

**8)** For the next target, put your finder on the eastern point of an equilateral triangle formed with Shedir and Achird (eta Cass). This is a challenging target. There is an unimpressive open cluster, **IC 1590**, superimposed on top of an emission nebula, **NGC 281**. You will need at least an 8 inch scope to see. I could make out a loose cluster on a barely detectable background haze. With a UHC filter, the nebula was easier to see, but the stars dimmed as to be hard to see. The club 24" would probably show this target much more impressively.

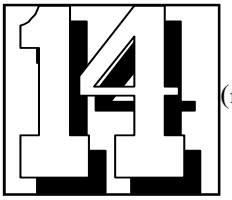
**9)** Go back to **Achird or Eta Cass** and have a look with a fairly high power. This famous double is very pretty to look at. The primary is bright yellow and it has a dim reddish secondary tucked close on the NW side. This pair is mag 3.4 and 7.5, separation is only 13" and PA is 317 degrees.

**10)** Now go to Gamma Cass, the middle point of the W of Cassiopeia, and look about 2 degrees NW or halfway along a line to Kappa Cass. Once on the correct spot, and with medium power, you should see a nice bright loose open cluster of stars, known as **NGC 225**. It sort of has two parts, an arc NE and a V asterism to the W. This cluster is about 2,000ly away.

**11)** The next target is **NGC 457**, the beautiful open cluster that is a favorite of the public open houses at the observatory. It is also known as the ET cluster, and once you see it in the eyepiece you will know why. To find it I start at Segin, go to Ruchbah and continue out along that line for about a third the distance again. There is a naked eye double star there, Phi Cass. The double, which is a beautiful yellow and blue mag 5 and mag 7 pair, form the eyes of ET. There are dimmer chains of stars North and West of the eyes that form outstretched arms and a torso and you can easily imagine the legs of the stick figure ET NW of that. Depending on the scope you are using, he may be near standing on his head. If you continue NW along the line formed by his torso and legs, you will see another small obvious open cluster, **NGC 436**. It fits into the same low power field as ET. I have been looking at ET for a few years now and this is the first time I noticed NGC 436 close by, it's a cool sight. The eyes of ET aren't actually a part of the cluster. They are foreground to the rest of the body which is about 9,000 ly away. I don't have a distance for 436.

**12)** This hop bags four distinctive starclusters, all while staying at the eyepiece and moving the scope small distances.

( Continued on page 14)



(from page 13)

To begin put your finder one degree NE of Ruchbah and in a low power eyepiece you should be able to see the open

cluster **M103**. It is a triangle cluster that looks a lot like a christmas tree draped with garlands. There is another cluster in Monoceros that is called the Christmas tree cluster, but I think this one looks more like one. While continuing to look in the eyepiece move your scope 1 1/2 degrees due East and you will pick up a nice faint cluster that is 10' NE of a conspicuous triangle of stars. This is **NGC 659**, a granular open cluster in a rich star field. After studying this view for awhile nudge the scope 1/2 degree N to **NGC 663**. You will see a larger, fairly bright open cluster situated 1/4 degree SE of a mag 6.5 star. With my 8 inch scope I could see a gap or dust lane in the NNW part of the cluster. Watch the star field as you now nudge the scope 3/4 degree NNW of 663 and a small knot of faint stars will appear, this is **NGC 654**. Moving around between these clusters is easy with a low power eyepiece, but as you visit each one don't be afraid to increase the power to bring out more detail in the clusters, especially the small ones. M103 is about 15 ly wide and 8,500 ly away. NGC 659 is 6,900 ly away, 663 is 7,200 ly away and 654 is 8,200 ly away.

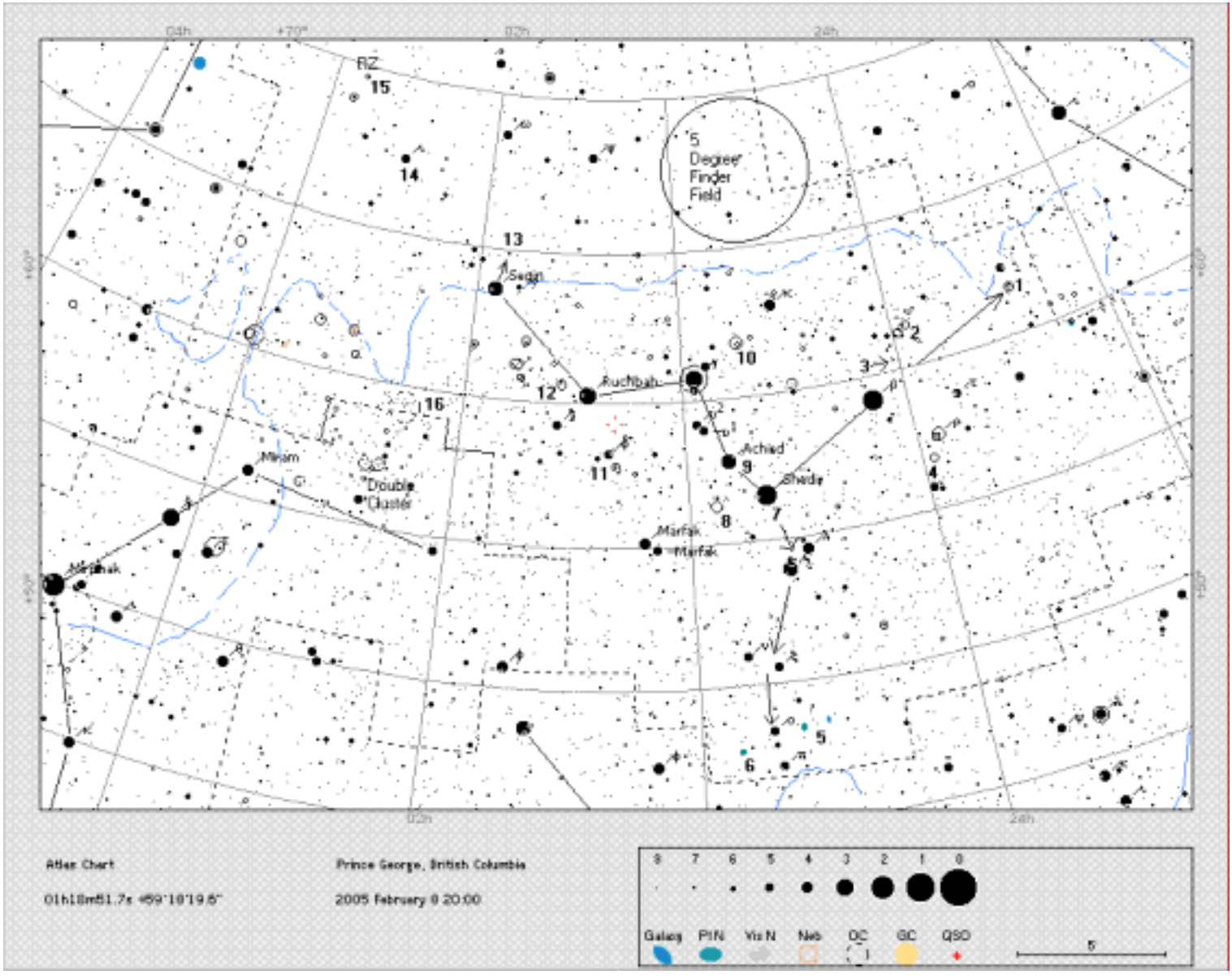
**13)** A nice colour contrasting double resides just North of the East end of the W of Cassiopeia. You can put Segin in a low power eyepiece and slide 1 1/2 degrees NNW to find **Struve 163**, the star just under the 13 on the map. In your finder you will see the triangle of stars just to the East pointing just below the target star. It appeared to me like a dim Alberio. The primary is an orange mag 6.8 star and the secondary a blue mag 8.8 star positioned 34.8" away at an angle of 35 degrees or NE.

**14)** Next take the line from Ruchbah to Segin and follow it out the same direction about the same distance to find the naked eye star **Iota Cass**. This easy find is a fine, tight triple that requires good seeing to appreciate. The primary is a bright white mag 4.6 star. One secondary is a yellow mag 6.9 star tucked in close, 2.5" away on the WSW side. The other secondary is a bluish mag 8.4 star 7.2" away on the opposite side. This triple needs high power as well as good seeing. It is very rewarding if you are able to split the three.

**15)** The next target is **RZ Cass,** a short period eclipsing binary variable star. To find it follow the same line you did to find Iota Cass another 3 1/2 degrees. A finder or binoculars helps here, note that RZ is perched on the top of a pentagon asterism of stars. Once found it is best to look in a low power eyepiece. RZ is normally mag 6.18, but every 1.19 days it dips to mag 7.72. It takes 2 hours to dim to minimum and another two hours to brighten back up again. Check it often and compare with other stars in the field, if you catch it right, you should be able to see it go from bright to dim and back to bright again in one evening.

**16)** The last object of the hop is a perfect binocular or very wide field scope target. Use your binocs to find the beautiful double cluster 1/2 way between Cassiopeia and Perseus. From the double cluster you will see an obvious arc of stars leading away to the North. This arc takes you two degrees, right to **Stock 2**, a large open cluster that needs the low power of binocs to set it apart from the rich background of stars. There are several strings of stars that form a stick figure. The figure has the stance of a weight lifter, only it is on it's side oriented E-W. The arms arc up towards the West and the legs have a wide stance open towards the East. I have read that this cluster is called the Muscle Man Cluster.

This has been a very long star hop, but being that Cassiopeia is a circumpolar constellation, you can spread out your viewing sessions over a long time.
Please e-mail any comments about this or any of my other StarHop columns to me at: djwayland@hotmail.com
Doug Wayland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