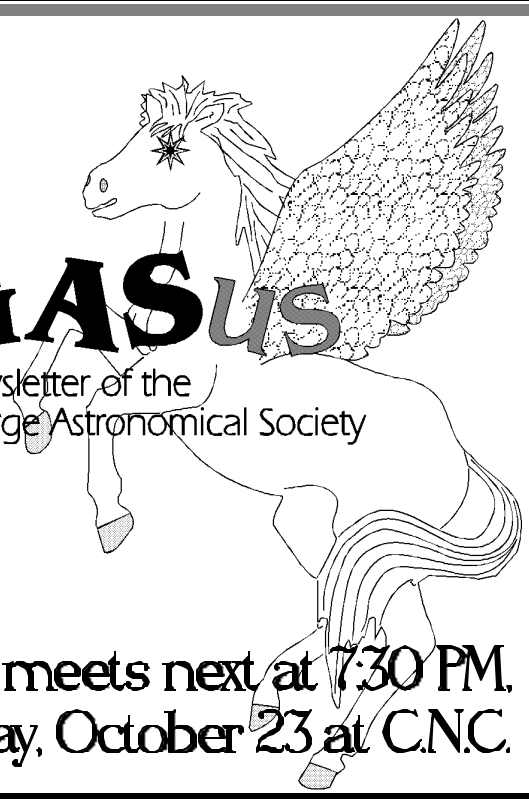
1996 OCTOBER ISSUE #68



the PeGASus

Newsletter of the
The Prince George Astronomical Society

The PGAS meets next at 7:30 PM, Wednesday, October 23 at C.N.C.

INSIDE :

the PeGASus
is published
monthly by the
Prince George
Astronomical
Society.

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 *OCT 18*

Send correspondence to
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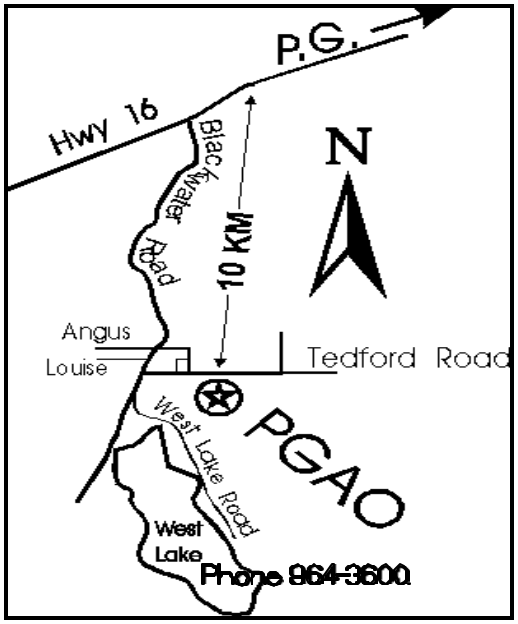

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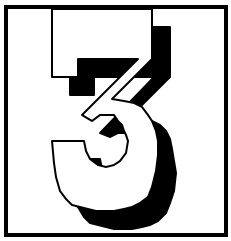


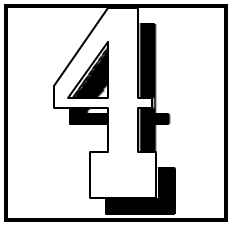
EDITORIAL

by Gil Self

These last few weeks have certainly brought some major adjustments to the PGAS. First off, we have some pretty big shoes to fill, several active members have moved on to other endeavors. We now need to find members who can pitch in and use some of their skills to take on some of these vacated tasks. It was suggested by the executive that we look for several people that can each add a little. So if you can write an article; visit a class; host a tour; give a talk; paint-hammer-saw-rake-patch-mend-repair-(do first-aid); help with fund raising; staff the observatory...We need you.

Our Friday night open house has been very successful in raising our community profile but it has greater returns than that. If you have not had the opportunity to take part, it is very difficult to describe the satisfaction you feel when you see a young face light up the first time they see something through a telescope. I think that child is frequently started down the same road we are all following ...."science junkie" . Perhaps even more noticeable is the occasional adult who, perhaps has never had the opportunity to "gaze at the skies", ask questions and get hooked. There are a lot of projects underway from fund-raising to construction, newsletters and hosting guests. Each of these present opportunities for us to participate in our community and, I think, take away more than we give up.

Gil Self



Coming Events

If you are involved with any astronomical or otherwise scientific activity on behalf of the PGAS, please list the activity here.

Oct 23 - Annual General Meeting at CNC. Election of officers.
Nov 27 - PGAS monthly meeting.

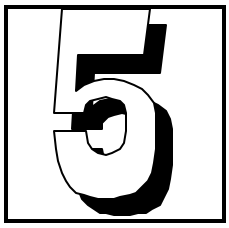
Dec14 -Open House, welcome back Orion//Geminid peak

Comet Hale-Bopp reaches perihelion on **April 1, 1997.** See article in previous PeGASus (Issue 66) for details.

The closest total solar eclipse to North America visible from land until the year 2017 will occur on **February 26, 1998.** Start planning your 1998 vacation to Palm Beach, Florida now. The eclipse will last 3.5 minutes. Jupiter will be 2 degrees and Mercury 4 degrees away from the eclipse, and should be visible within the sun's corona. I understand that Alan Whitman is going.

Have you ever had an astronomy question,and didn't know who to ask ?
Beginning next month we will have a column in Pegasus that you can send your questions to.
No names will be used,so, no matter what the question ask us and we will try and find someone to answer.
Questions to -- NELSON@cnc.bc.ca
or mail to
The PGAS
3330-22nd Avenue
Prince George, v2n 1p8

ABOUT THE NEWSLETTER



Once a month for a few days everyone anticipates another newsletter arriving in the mail. You will all notice several changes in our newsletter in the coming months. One change, apparent next month, will be the all-electronic newsletter. We will have contributors in other parts of the country as well as locally, sending their material over the Net to our "mailman". As well, much of the material in the newsletter is gathered from surfing the Net (if you have the technology, you might as well use it). We are also soliciting articles from any reader. Any submissions should be sent to our mailman (see below) or supplied on floppy in DOC. or TXT. format. After the material is gathered, it will be e-mailed to me and assembled into the newsletter. The next step we will try as soon as all the connections are established with the University is printing on-line. The equipment at the University takes data directly off-line and prints it with no originals required. This means a tremendous increase in photo quality . If you are submitting an article, please feel free to include pictures in GIF or JPEG format.

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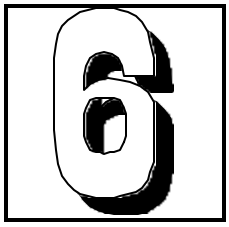
THANKS FOR YOUR HELP

Gil Self

P.G.A.S. WEB SITE http://www.pgweb.com/astronomical/



The Night Sky

Welcome Back Orion

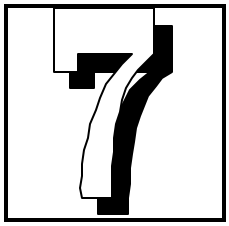
by Gil Self

The arrival of the cooler fall evenings brings the promise of the coming cold weather. The cooler air and earlier sunset offer sky-gazers a view of one of the most interesting areas in all the night skies. A cool fall evening is often the result of a high pressure air mass hanging over us, this usually means clear stable viewing with less moisture in the air to cloud the seeing. Add to this the early arrival of darkness, and how can you resist seeking out some spectacular sites found in the constellation of Orion.

By the end of October Orion is rising early enough to present itself for your enjoyment. On October 30 a third quarter moon rises in the constellation of Orion at 7:10pm . Since the moon is up this will limit seeing some of the fainter nebula but not too seriously. By midnight the familiar shape of the hunter with belt and sword should be about 20deg above the horizon in the south east (a palm's width at arms length is about 10 degs) .This would be a good time to take your binoculars to see the differences in the major stars in this constellation.

Alpha Orionis a.k.a. Betelgeuse (BET -el-jooze)magnitude 0.2-1.8 The bright star at the hunters right shoulder is a red *supergiant* .This is a truly an enormous star at between 500 and 1000 times our sun's size. This range is not from lack of accuracy but because this star is what's known as an intrinsic variable, it changes it's size on a complex two to five year cycle. Even at it's minimum, if Betelgeuse were at the center of our solar system, it's rim would be beyond the orbit of Mars, it's mean diameter is 640 million miles. This is a relatively cool star with a surface temperature of about 3,400 degs K. compared to Sol's 5,600 degs. K., combined with its tremendous size, and gluttonous use of fuel (about 10,000 times faster than Sol) - puts it in the stellar geriatrics ward. Sol's life expectancy is in the order of 12 billion years whereas Betelgeuse has an expected life of about 100 million years, and that's approximately how old it is already. Betelgeuse is already far into it's helium burning stage. So look quick - Betelgeuse will probably super- nova in the next 100,000 years. Since it is located only 590 light years away, it will be **spectacular..**

Beta Orionis a.k.a. Rigel magnitude 0.14 No less magnificent is the



second star in Orion. Complementing Betelgeuse's ruby glow is Rigel's diamond sparkle. Rigel is the star located on the hunter's left knee (lower right hand star to we mortals). This is another supernova bound star. Rigel is unique in another way. With a small telescope or perhaps binoculars you should be able to see a second star ... Rigel is a binary star system - wrong - Rigel is a triple star. Although you can split Rigel in two, the third star is a spectroscopic double (two stars so close together that you require special equipment to detect the presence of the close companion). Each of the pair of close stars are about five times the diameter of our sun. Rigel A - the primary star of this combination has a very high surface temperature - 12000 degs. K. which gives it a very brilliant blue diamond color. Rigels' absolute magnitude (the brightness of a star if all stars were the same distance away) is -7.0 , making it one of the brightest stars in the universe. Rigel is located approximately 950 light years distant.

Gamma Orionis a.k.a. Bellatrix magnitude 1.64 On the hunter's left shoulder, this star is even bluer than Rigel, although it's absolute magnitude of -3.3 shows it to be dimmer, but still among the most luminous stars. Bellatrix is located about 470 light years distant and is another giant star, like Rigel and Betelgeuse.

Kappa Orionis a.k.a. Saiph magnitude 2.06 This star has an absolute magnitude of -6.8, making it almost an equal to Rigel, but it's apparent magnitude (the brightness that we actually see on earth) of a dimmer 2.06 is because it is much farther away - about 2500 light years. This is probably the hottest, brightest star visible to us with a luminosity of 50,000 times that of our sun.

The multitude of remaining stars in Orion are each unique, but still share many similarities due to their common heritage. Eta Orionis (the handle of the sword) is of interest. Telescopes reveal it to be a close optical double, and each of the parts apparently are doubles as well. This may actually be four stars. There are many more stars worth your attention in Orion . These are all young stars located in the Orion arm of the Milky Way Galaxy.

Next issue we will look into the stellar nursery of Orion, the nebulous regions , in preparation for the best opportunity this year coming in mid-December, to view these regions. We can look forward to Dec.14. Orion will be at it's greatest elevation and the Geminids' Meteors peak that night as well. Let's hope for a clear night . The PGAS Observatory will be open to the public that evening.

P.S. Dec.14 is also the 450th anniversary of Tycho Brahe's birth

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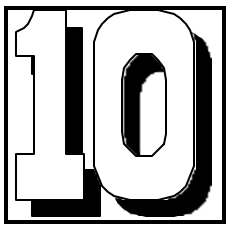

The Sky Over Fort McMurray
by Orla Aaquist

Given that I am real astronomer, you might think that I should write about the stars as seen from Fort McMurray compared to the stars as seen from Prince George. After all, I spent the last four years as a member of the Prince George Astronomical Society and I just moved to Fort McMurray, and the least I could do is describe all the wonderful new sights in my new night sky. Right?

Sorry, but there aren't any differences to speak of. Prince George is at a latitude of 54 degrees and Fort McMurray is about 2.5 degrees farther north. This means that there is 2.5 degrees less of southern sky at Fort McMurray than at Prince George; and it gets dark about 20 minutes later during the summer and 20 minutes earlier during the winter, local time; but because I am east of you by one time zone, the sun sets here one hour before it sets there so I get to see the night sky one hour before you do. But it's the same night sky. Polaris is still the north star, and the handle of the Big Dipper still arcs towards Arcturus, and I'll still see Orion in the winter.

I have spent some time contemplating other differences, but I can't think of any significant ones. The only thing that came to mind is that I may not see the same aurora or the same meteors as you. According to the Anchor Dictionary of Astronomy, meteors burn up in the atmosphere between 70 and 115 kilometers above the surface, and the aurora is generated about 100 kilometres up. So if you see these events in the earth's atmosphere do I see the too?

In order to answer this, draw a great circle that passes through Prince George and Fort McMurray. The centre of this circle corresponds to the centre of the earth. Put a dot on the circumference where you think Fort McMurray should be. Relative to Fort McMurray, Prince George is about 800 kilometres along the same great circle. Since the circumference of the earth is 40,000 kilometres, 800 kilometres is 1/50th of this, so the angular separation along the great circle joining Prince George and Fort McMurray is 360/50 = 7.2 degrees.

Using a protractor, measure 7.2 degrees along the circle and put a dot to represent Prince George. Now draw a tangent to the circle at Fort McMurray, making sure to extend the tangent well over Prince George. Then draw a line through the centre of the circle and Prince George and extend it outward until it intersects the previously drawn tangent line. The two lines should intersect above Prince George. If you are good a simple mathematics (grade 12 trigonometry should do) you can show that the height, H, above Prince George to the point of intersection is given by the formula $H = R (\sec A - 1)$ where R is

the radius of the earth (about 6000 km) and A is 7.2 degrees.

If you are not this good at mathematics, you can trust me and plug in the numbers, or you can make a few measurements on your carefully drawn scale diagram to find that H is about 50 kilometres. Therefore, when I look at my horizon in the direction of Prince George from Fort McMurray I am seeing your sky about 50 kilometres above the ground. Another way of saying this is that the first 50 kilometres directly above you is hidden from my view, but if something happens at a height somewhat greater than this I should be able to see it at the same time. Therefore, it seems that we will indeed be sharing the same meteors and aurora.

So, you see, we are not really so far apart, astronomically.

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Note: Orla's e-mail address is Orla.Aaquist@keyanoc.ab.ca

The Sky Over Fort McMurray

by Orla Aaquist

Editors note : Orla Aaquist has been a past president of the PGAS as well as long time editor of Pegasus .----and a really nice guy!

AstroSurfing

Details of the Science News posted here are available on the astronomy forum on the Prince George Free-Net.

HUBBLE SEES EARLY BUILDING BLOCKS OF TODAY'S GALAXIES

New Hubble Space Telescope images reveal what may be galaxies under construction in the early universe, out of a long sought ancient population of "galactic building blocks." These detailed images reveal a grouping of 18 gigantic star clusters that appear to be the same distance from Earth, and close enough to each other that they will eventually merge into a few galaxy-sized objects. They are so far away, 11 billion light-years, that they existed during the epoch when it is commonly believed galaxies started to form. These results add weight to a leading theory that galaxies grew by starting out as clumps of stars, which, through a complex series of encounters, consolidated into larger assemblages that we see as fully-formed galaxies today. The finding is another step back into the dim past where astronomers ultimately hope to uncover the earliest seeds of galaxy formation which arose shortly after the birth of the universe, or the Big Bang.

SECOND NEW MILLENNIUM FLIGHT WILL SEND MICROPROBES TO THE SURFACE OF MARS

Two small science probes will be sent to Mars in 1999 to demonstrate innovative new technologies brought to the forefront by NASA's New Millennium program. The microprobes will hitch hike to Mars aboard NASA's 1998 Mars Surveyor Lander. "Scientific investigations which require a relatively large number of surface stations distributed over the surface of Mars, such as seismic or meteorology networks, will be made possible by the microprobe concept," John McNamee said. "In addition, microprobe penetrators may be the most efficient and effective way of obtaining soil samples and measurements from below the sterilized Martian surface."

The 1998 Mars Surveyor Lander will be launched in January 1999 and spend 11 months en route to the Red Planet. Just prior to its entry into the Martian atmosphere, the microprobes, mounted on the spacecraft's cruise ring, will separate and plummet to the surface using a single-stage entry aeroshell system. Chosen for its simplicity, this aeroshell does not separate from the microprobes, as have traditional aeroshells on previous spacecraft, such as the Mars Pathfinder and the Viking landers of the mid-

1970s.

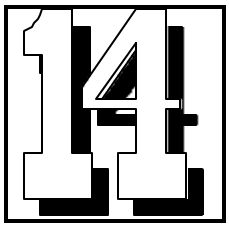
The probes will plunge into the surface of Mars at an extremely high velocity of about 200 m/s to ensure maximum penetration of the Martian terrain. They should impact the surface within 200 km of the main Mars '98 lander, which is targeted for the planet's icy south polar region.

INTERNATIONAL ULTRAVIOLET EXPLORER PREPARED TO RECEIVE ITS FINAL COMMAND

After nearly 19 years of operation, NASA's international Ultraviolet Explorer (IUE) spacecraft will receive its final "shutdown" --marking the end of one of the longest and most productive missions in the history of space science. Originally designed for a three-year life, the observatory and its spectrographic instruments enable studies of astronomical and cosmic phenomena that emit ultraviolet radiation, which is blocked from ground-based telescopes by Earth's atmosphere. Some of IUE's most recent research includes observations of Comet Hyakutake during March 1996. Scientists using IUE tracked and observed the nucleus of Comet Hyakutake for five days, obtaining exposures of up to five hours in duration that provided new insights into the chemical processes taking place inside the comet. The comet was found to be ejecting ten tons of water every second as it passed near the Sun. IUE has contributed to many branches of astronomical research over the years, ranging from studies of objects in the Solar System to observations of distant galaxies. This includes the historic first identification of the star that exploded and became known as Supernova 1987A.

A HALE-BOPP HIATUS?

Observers report that in recent weeks Comet Hale-Bopp has dimmed by about a half magnitude to roughly 6.0. That alone is not a particular cause for concern, in part because right now Earth's orbital motion is carrying us farther from it. However veteran comet watchers John Bortle and Charles Morris have noticed that, more generally, the comet has not been brightening as fast in the last two months as it was prior to July. Does this mean Hale-Bopp is starting to fizzle? Opinions differ rather wildly. For example, Bortle says that on its current pace Hale-Bopp will get no brighter than 2nd or 3rd magnitude next spring. Morris is opting for a peak somewhere between 1.6 and 0.3. But comet specialist Daniel Green says it's really too early to get concerned, and he remains confident that Hale-Bopp will break the magnitude-0 barrier. "Don't forget," he reminds us, "Hale-Bopp is a *big* comet," and it's still a long way from the Sun.



NEPTUNE AT 150

September 23rd marked the 150th anniversary of the discovery of the planet Neptune. It was spotted in 1846 by Johann Galle and Heinrich d'Arrest using the 9-inch refractor at Berlin Observatory.

SO MANY STARS, SO MANY PLANETS...

The year 1996 has been a banner year for finding planets around other stars. But we've only scratched the surface, according to astronomers Steven Beckwith (Max Planck Institute) and Anneila Sargent (Caltech). As they report in the journal NATURE for September 12th, planets could be circling up to half of the 100 billion stars in our Milky Way. However, researcher David Black (Lunar & Planetary Institute) thinks the fraction of stars with planets is closer to 10 percent.

Either way, that's a LOT OF PLANETS

SHUTTLE SUPER LIGHTWEIGHT FUEL TANK COMPLETES TESTS

NASA and Lockheed Martin engineers recently completed a successful series of tests to demonstrate the capability of the new super lightweight external fuel tank for the Space Shuttle. The lighter fuel tank will improve the Shuttles' capability to carry cargo to the high inclination 51.6-degree-orbit where the International Space Station will be built. The aluminum lithium is a lighter, stronger material than the metal alloy currently used in the production of the Shuttle's external tank. The new external tank will be the same size as the current one, but 7,500 pounds lighter. (Hence programs will benefit from an additional 7,500 pounds of payload per flight.)

GALILEO's FLYBY OF GANYMEDE

The Galileo orbiter made its second close flyby of Ganymede on Sept. 6th, skimming just 262 km above the giant moon's surface. That's three times closer than the pass back in late June and closer (NASA points out) than Space Shuttle flies around the Earth. Galileo's instruments spent about 4 hours mapping Ganymede with unprecedented resolution and probing its atmosphere

PGAS CONTRIBUTORS

The PGAS would like to thank the following individuals, corporations and government agencies who, since 1991, have donated money, goods or services to the construction and operation of the Prince George Astronomical Observatory.

Ministry of Adv. Ed. Training and Tech.	$25,000
BC Science Council	16,000
BC Lotteries	3,900
Helmar Kotsch (Acme Mas.)	1,932
Northwood Pulp and Timber	1,665
Electrical Services Ltd.	1,583
Royal Bank of Canada	1,500
Regional District of Fraser-Fort George	1,000
Prince George Rotary Club	1,000
The Pas Lumber Co	750
Rustad Broth & Co Ltd	750
Canfor Polar Division	744
A.V. Jay Roofing	600
Xerox Canada	500
Russelsteel	465
Lakeland Mills Ltd.	460
Canfor Clear Lake Division	270
Lutz Klaar	200
Canfor Netherlands Division	200
Carrier Lumber Ltd.	160
Tom Laing	150
Pine Drilling	150
Cloverdale Paint Inc.	100
Claus Schlueter	

The greatest contributors to the construction and operation of the observatory are from PGAS members who have generously contributed their time to this project. The value of their contribution surpasses all external contributions.

The PGAS is a non-profit organization dedicated to the advancement of astronomy and science in general in Prince George and the neighboring northern communities. Donations of money or materials to the society are greatly appreciated and tax deductible.