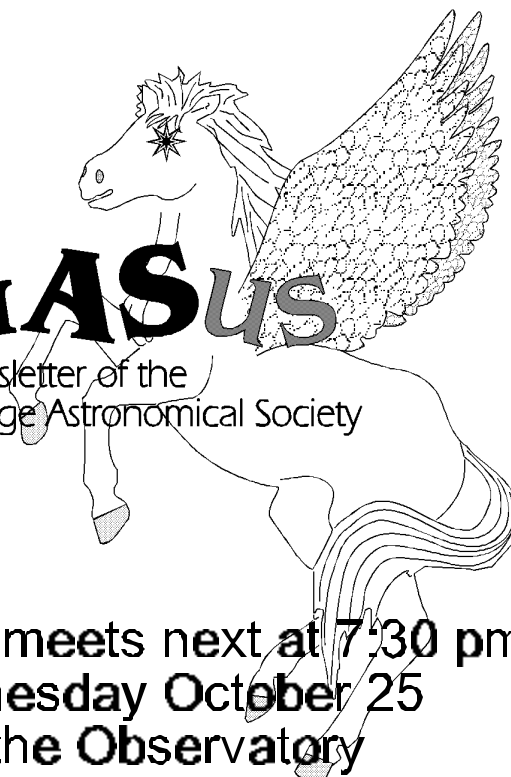


OCTOBER 2000 ISSUE #106

the

PeGASus

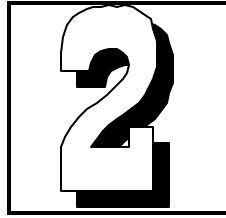
Newsletter of the
The Prince George Astronomical Society



The pgas meets next at 7:30 pm
Wednesday October 25
at the Observatory

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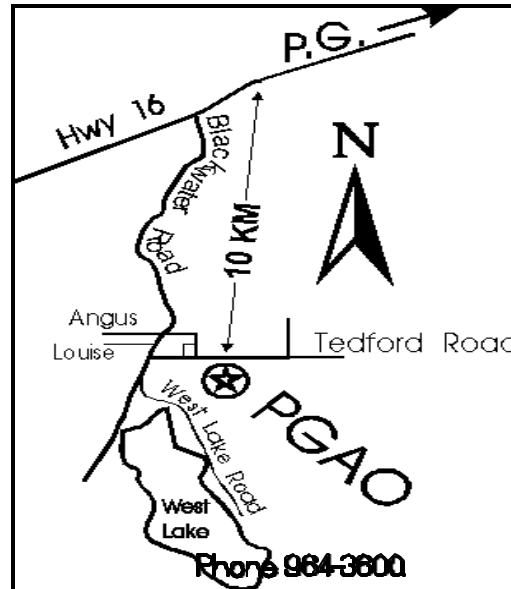
the PeGASus
is published monthly
by the *Prince
George
Astronomical
Society.*

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
November 17**

Send correspondence to
The PGAS
3330 - 22nd Avenue
Prince George, BC, V2N 1P8
or



<http://www.pgweb.com/astronomical/>

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Astronomical Society
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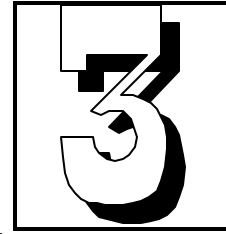
Promotional
Brian Battersby

Building
Owen Salava

PeGASus Editor

EDITORIAL

By GIL Self



There is a new observatory in Prince George, and it's in Bob Nelson's back yard. I don't want to give away too many details because I am sure he would like to give each of you a tour. But I would like to say that I had the good fortune to help out at a few stages during the construction. I don't think I know anyone as careful about details as Bob. This care and attention has always been evident at the observatory, not just in the technical projects that he designs and builds, but also the detailed observations that he is always happy to share with us.

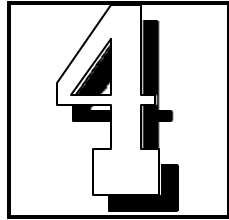
Now, this isn't idle praise, dotting i's and crossing t's really pays off. It is nice to work on something where there are two pieces to go together, they fit, exactly. Or, pieces that come from the U.S. manufacturer mate with the piece made in Prince George, no hammers or pry bars required.

The gem at the center of all this is the Paramount Robotic mount. I suspect if you look in your Funk and Wagnalls you will find a picture of this mount next to the word precision. I know a little bit about fine machinery, and this is one of the nicest examples I have seen. There are many problems left to solve before this observatory is fully functional, but there is no doubt this is quite simply going to be one of the best, and well worth all the effort. Well done Bob!

I want to take this opportunity to ask you to consider for a moment how important this society is to you. Our organization has no lack of ideas and plans. There are many projects in various stages of completion. We are never short of good ideas, just people to help carry them out. We spend a fair amount of time trying to insure that the meetings will be interesting and draw members out. We speculate on the best ways to attract new members. We try and think of activities and projects that will catch members interest. One of the best is Brian Battersby's recent addition of Saturday "Members Night". This is a perfect example of club members giving their time to an activity to help other members. Please support this initiative, some of the very best times I have had with this club have been the evenings when several club members have come out and everybody has their knowledge and abilities to share with each other.

We are having elections in a few days, at the same meeting we will be deciding if we are going to join the RASC. Come out and insure that the PGAS is going the direction that you want it too. Take on a project. Help decide on future activities— should we have a pagan Druid celebration of summer solstice next June? Maybe not, but whether or not we proceed on either the super-nova search or on the near-earth object search at this time will depend on how many members are interested in these projects. These are just a couple of examples of things we have the capabilities and the resources to do.

See you at the meeting.



Coming Events

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

The **PGAS**.

meets next October 25, 7:30pm at the observatory

This months preliminary agenda is on page 15

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The Night Sky for November 2000

by Bob Nelson, PhD

Hi Folks,

Well, as fall advances for another year (with winter not far behind), we can be glad of a few improvements at our observatory.

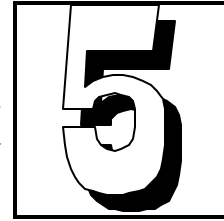
First of all, I believe that I have finally got it right regarding baffles to our telescope. A few words of explanation: Last month I added a permanent aluminum baffle (ring) at the open end of the collimator tube to replace the (temporary!) cardboard baffle that had been shifting around. [This ring is necessary to mask out light that would pass around the secondary and hit the focal plane without going through the optics.] However, CCD images taken afterwards during aurora resulted in bad flat-fielding. [Flat-fielding is the division of all the pixel numbers in your image by those of a standard image - or 'flat' - taken of a uniformly-illuminated source, like the dusk sky. This process corrects for a number of problems: a) the doughnut-like shadows caused by dust particles in the system, b) vignetting, the uneven illumination caused, in our case, by the telecompressor lens, and c) uneven sensitivity of individual pixels. In spite of this process, my images just didn't have an even background. I then realized that the problem must result from internal reflections in the collimator tube (very visible to the eye in room light). There's a simple geometric construction that shows you where to put the baffles and how large to make them (I'll show you sometime) and it called for just one more baffle. I then added it and the results are much improved (but not perfect ...).

Next, things are improving re the installation of the Newtonian focus. Although the mirror is still sitting in a box in my living room, my thoughts as to EXACTLY how to make the locking mechanism in the rotatable secondary are nearing completion, and that's half the battle. So we should have a Newtonian focus in a month or so that will permit wider-angle CCD images of the sky than at present. If we use my

(Continued on page 5)

(Continued from page 4)

camera (temporarily on-loan from my backyard observatory), we'll get images in colour too. However, don't get all excited about visual images - first of all, the viewing position will be half a mile up a ladder and, owing to the HUGE exit beam diameter that human eyes cannot accommodate, the images - certainly for low magnifications - will be not be a lot brighter than that of my 13" f/4.5 telescope. (At higher magnifications - like 120 x - yes the larger mirror will make a difference, but then it's little different from what we have now.) The big difference is in CCD imaging where you can omit the telecompressor lens and use a filter wheel.



Other things - like washrooms, sound-deadening measures for the classroom, and other 'goodies' - are still in the works. Stay tuned!

Here is what is happening in the sky this month:

PLANETARY ROUNDUP:

MERCURY is a morning object in November (and into December). On the 15th, it reaches greatest elongation east of the Sun, when it is some 19 degrees to the west (right) of the Sun along the ecliptic. Owing to the inclination of the ecliptic (where the Sun and planets move) to the celestial equator, this is a favourable apparition for northern observers. At month's start, forget it; but at mid-month, it rises two hours before the Sun. It should be visible then in binoculars in the east-southeast about 10 degrees above the horizon, 30 minutes before sunrise. Great for all you early birds.

VENUS is still an evening object all month but is again low in the southwest at sunset. The visibility will improve each night until maximum eastern elongation (angle from the Sun) occurs in January.

MARS, in Virgo until the end of the year, is a morning object all month. On the 15th, it rises at 3:05 AM and is a tiny 4" disk of magnitude +1.7.

JUPITER, in Taurus for the rest of the year, rises on the 15th at 4:46 PM and is a 48" disk of magnitude -2.8. It reaches opposition on the 28th of the month. According to the Observer's Handbook, there don't seem to be any satellite phenomena, but the system is always worth looking at. Don't forget that viewing will be best around midnight, when Jupiter is high in the sky, and the atmosphere has settled down.

SATURN, in Taurus for the rest of the year, rises on the 15th at 4:28 PM and is a 20" disk of magnitude -0.3. It reaches opposition on the 19th. Ditto for viewing hints because Jupiter and Saturn are close together in the sky. I find Saturn's satellite system is more interesting than Jupiter's because, unlike Jupiter's when you see only 4 (regardless of telescope size), Saturn's system gives you satellites ranging from Titan, at a very bright magnitude 8.4, to Iapetus, at 11.0 and Phoebe, at 16.5. Therefore it's a

(Continued on page 13)



Members Night

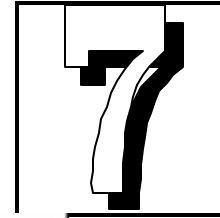
By Brian Battersby

On Saturday, September 23 I held the first official Members Night. For those of you who do not know what Members Night is, here is the explanation. Members Night is a night for P.G.A.S. members. If you want to bring a friend or family member please do, this is how our club will grow! However, Members Night will not be open to the general public. Members are encouraged to come with astronomy projects in mind. So before you come out look at some sky charts, find something you are interested in trying to see or image with the CCD camera and whatever else you can think of. I will be there to help you with your project as best I can. Members Nights are held every Saturday night. I will arrive at about 8:00 pm. (weather permitting) If you would like to be phoned before I go out let me know (Call Brian @ 564-4789) I will also notify people via Email. If you have email and have not been getting my messages please send me your email address (lfaux@bcgroup.net).

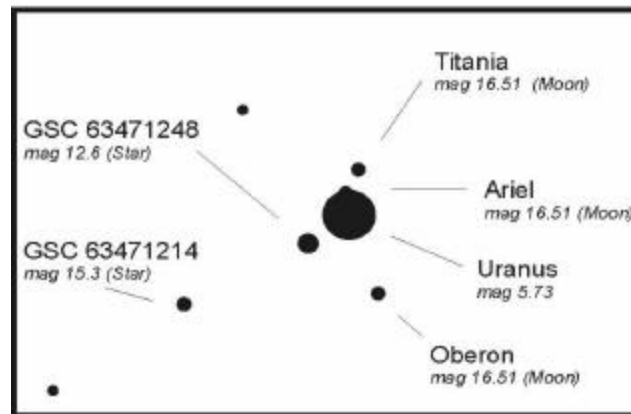
The first Members Night was fantastic. The skies were clear, temperature not too cold and the stars were beautiful. Kane Sanders and I snapped a photo of Uranus (I'm sure it's around here somewhere) As you can see by the graphic a couple of moons are clearly visible as well as some faint background stars. My daughter, Alyssa, also got into the act by taking out the 10" Dob. As a practice exercise I had her look at all the stars in the Big Dipper. When she got to the second to last star in the handle she "discovered" a double star. She also got her first view of the Andromeda Galaxy.

The second Members Night was a bust. I went out under clear skies and by the time I got to the observatory the weather had turned completely cr*.*y. I did however get a quick look at a double star Doug Wayland had in his 8" Meade SCT. Nice! While we were waiting for the clouds to clear I noted that I could see Deneb in Cygnus... only by using averted vision! I left about an hour after I arrived beaten once

Since then I have not gotten out due to bad weather and Thanksgiving. I have noticed some nice aurora and had some good views of the Moon, Jupiter, Saturn and Andromeda in my binoculars... all from downtown Prince George. So keep looking up and I'll see you at the next Members Night. B.B.



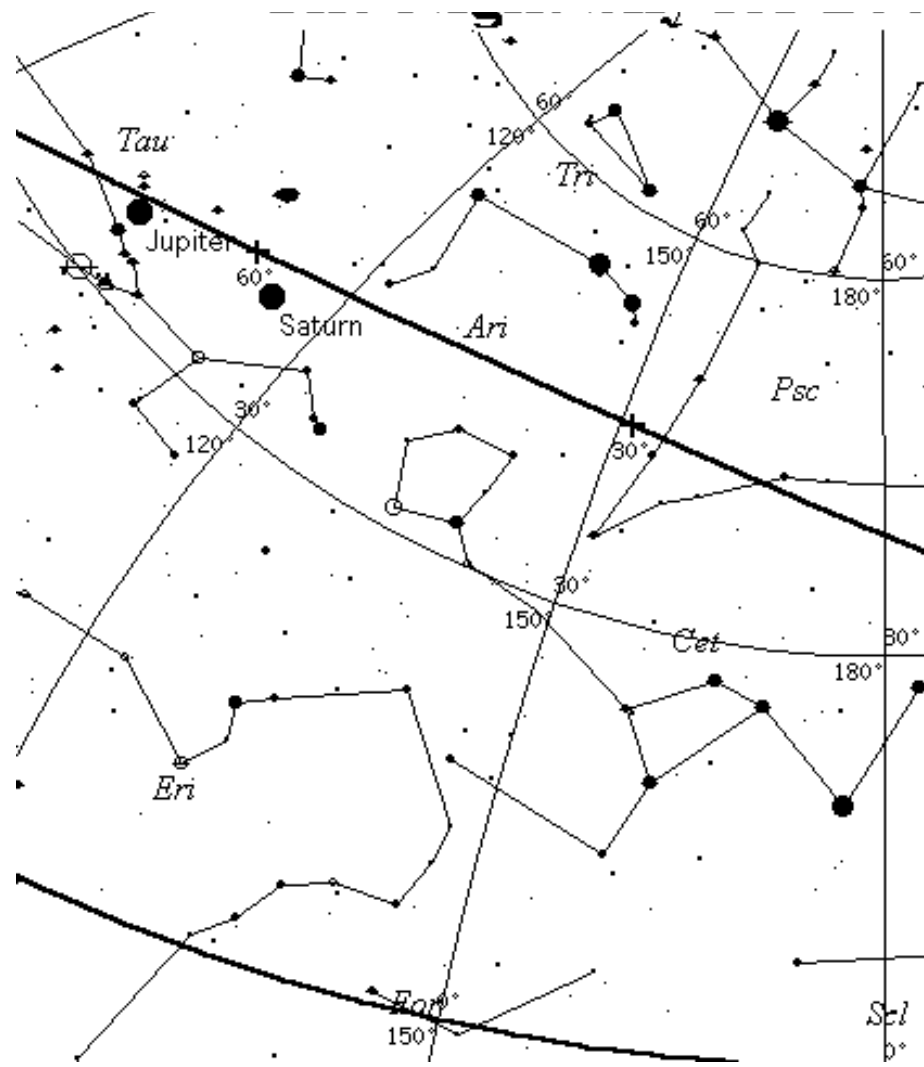
Sept 23, 2000
9:01:56 pm (local- PDT)



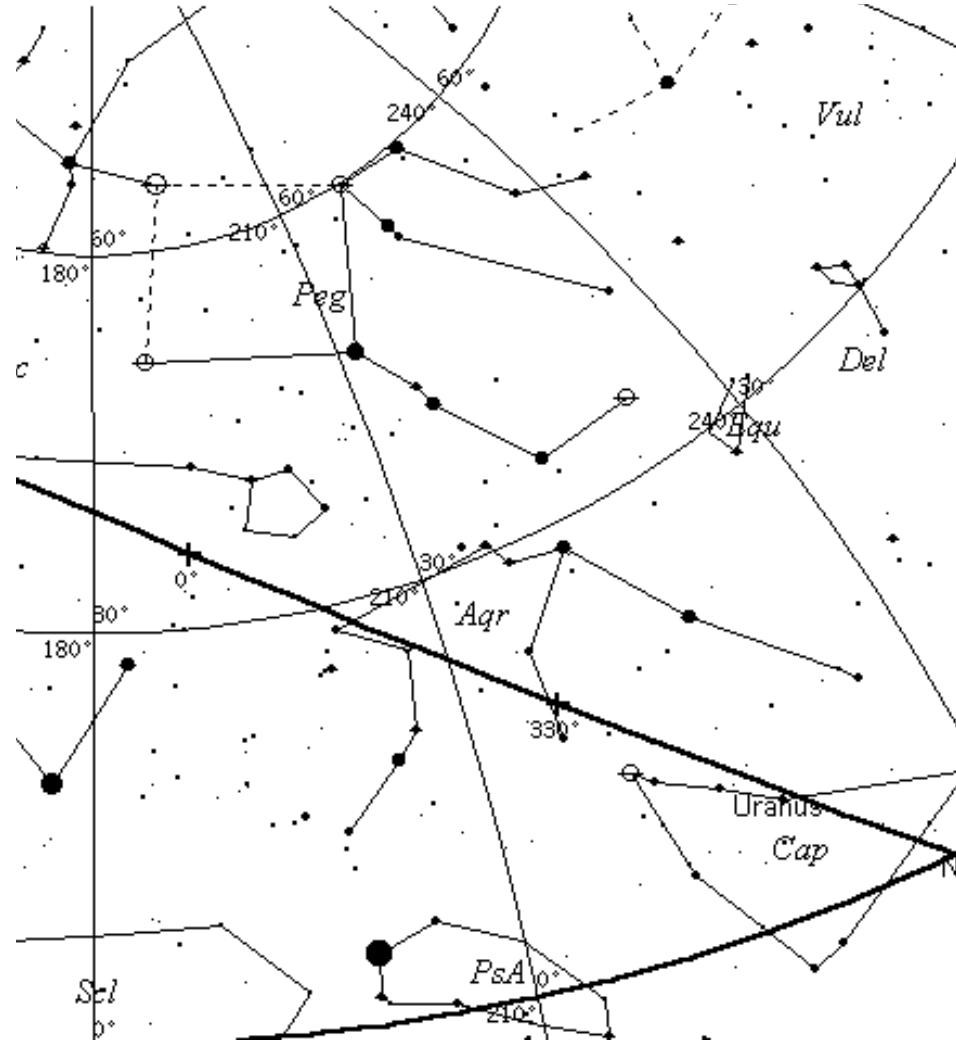
Sept 23, 2000
9:01:56 pm (local- PDT)

Note: The moons Miranda & Umbriel are technically in the picture but are completely enveloped in the glare of Uranus.

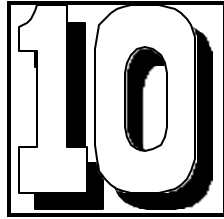




Night Sky for November, courtesy Dr. Bob Nelson



Night Sky for November, courtesy Dr. Bob Nelson



TWIN-TELESCOPE SKY SURVEY "GIVES YOU THE STARS"

Your home computer can become a portal to a wonderland of stars, thanks to a massive release of images from an infrared sky survey sponsored by NASA and the National Science Foundation.

"Any computer with a web browser can be transformed into a desktop observatory," said Dr. Michael Skrutskie, of the University of Massachusetts, principal investigator of the sky survey, which has scanned the nighttime sky and produced an online image potpourri of half a million galaxies and 162 million stars.

"The general public can see a menagerie of objects in infrared wavelengths that they couldn't see in any other way," said project scientist Dr. Roc Cutri. The 1.9 million images would fill 6,000 CD-ROMs, equivalent to 4,000 gigabytes or four terabytes of computer hard disk space.

The images were gathered by the Two-Micron All Sky Survey (2MASS), the most thorough census of stars ever made. The survey detects infrared wavelengths that are beyond the red light in the rainbow of visible colors. Infrared light penetrates the gas and dust in our galaxy and is particularly effective for detecting the heat of very cool objects not visible with optical telescopes.

In order to cover the entire sky, the 2MASS survey uses two highly automated, 51-inch (1.3-meter) diameter telescopes, one at Mount Hopkins, AZ., the other at the NSF Cerro Tololo Inter-American Observatory, Chile.

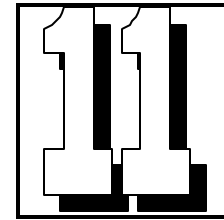
Operations for 2MASS began in 1997. Its catalogs will contain more than 300 million objects by the time observations are concluded in 2001. Final processing of the data and release to the public will be complete by 2003.

Already, 2MASS data have uncovered numerous stars with characteristics so unique that astronomers had to revise a century-old classification system of known types of stars.

Astronomers armed with 2MASS data also discovered the coolest brown dwarfs, or failed stars, known to date. They also detected previously unknown star clusters within, and galaxies beyond, our own Milky Way, and have mapped new star-birth regions. In the distant reaches of the universe, 2MASS discovered a new population of dust-obscured active galaxies, quasars and super-massive black holes.

"The current release is based on a volume of data several hundred times larger than that contained in the human genome," said Skrutskie. "Astronomers will become cosmic geneticists, searching out patterns in these sky maps to decode the structure and origin of the Milky Way and the surrounding nearby Universe."

CHANDRA CLINCHES CASE FOR UNEXPECTED BLACK HOLE DISCOVERY



There's new evidence the universe is home to a type of black hole that's not too large and not too small. As black holes go, it's a middleweight that may represent the missing link between its flyweight relatives and the super-heavyweight variety found at the center of most galaxies.

Using NASA's Chandra X-ray Observatory, several groups of scientists have zeroed in on a mid-mass black hole located about 600 light years from the center of galaxy M82. The black hole found in M82 packs the mass of at least 500 suns into a region about the size of the Moon. Such a black hole would require extreme conditions for its creation, such as the collapse of a "hyperstar" or the merger of scores of black holes.

"This black hole might eventually sink to the center of the galaxy where it could grow to become a supermassive black hole," said Dr. Hironori Matsumoto of the Massachusetts Institute of Technology (MIT), Cambridge, the lead author on one of three Chandra papers scheduled to be published on the mid-mass black hole.

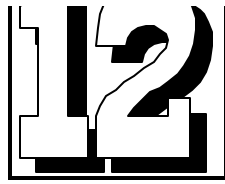
Although previous X-ray data from the German-U.S. Roentgen Satellite, and the Japan-U.S. Advanced Satellite for Cosmology and Astrophysics (ASCA) satellite, suggested that a mid-mass black hole might exist in M82, the crucial breakthrough came when astronomers compared the new high resolution Chandra images with optical radio and infrared maps of the region. They determined that most of the X-rays were coming from a single, bright source.

Repeated observations of M82 over a period of eight months showed the bright X-ray source gradually peaking before dimming. Another critical discovery was that the intensity of the X-rays was rising and falling every 600 seconds.

"This flickering of the X-ray intensity is similar to the well-studied characteristics of black holes swallowing gas from a nearby star or cloud," said Dr. Philip Kaaret of the Harvard-Smithsonian Center for Astrophysics, lead author on the paper reporting the 10 minute variations. "Explanations other than a massive black hole for this object are implausible."

Observations with Japan's Nobeyama Millimeter Observatory by Dr. Satoki Matsushita of Harvard-Smithsonian and colleagues have revealed a large expanding superbubble of gas centered on the mid-mass black hole in M82. The energy of several thousand supernovae would be required to produce such phenomena.

In the past, our Milky Way galaxy could have produced mid-mass black holes during periods of vigorous star formation. Hundreds of these massive black holes may exist unseen in our galaxy, in addition to the dozen or so known stellar black holes and the supermassive black hole that is safely confined to the galaxy's nucleus.



New Astronomy Software

by Mathew Burke

I have downloaded a new program called HNSKY (Hallo Northern Sky). I have found it to be a really nice program considering that it is free. With the proper databases you can find millions of objects. The best of all the program is totally free. I have downloaded the program and burned a CD ROM. After getting all of the Databases the total size is over 89Mb so if you are on a modem it could take a while to download. If anyone would like a copy let me know and I can lend you the CD ROM. Along with the program comes two spread sheets, one for calculating photography exposure times for any object / film speed / telescope!, and another for calculating orbital elements. The program is also tied into a help file which describes observations made on hundreds of deep space objects.

Below is the description of the program which I extracted from the Help File:

"This astronomy program Hallo northern sky plots the night sky for any time and location. It displays all stars to about magnitude 12 (Tycho-2 2.5 million stars) and 10607 SAC deep sky objects. It also shows all planets, Moon, Sun, moons of Mars, Jupiter, Saturn, Uranus and Neptune, phases of the Moon and inner planets, solar and lunar eclipses, rings of Saturn and minor planets and comets. HNSKY has the ability to use the GSC or "Guide Star Catalog" and or USNO SA1.0 / A2.0/SA2.0 CD-ROM databases with a limiting magnitude of about 15 or more.

The intention of the program is to familiarize you with the night sky and prepare yourself with a map for a night with your telescope. To help you with this, all deepsky objects are displayed in the correct size and orientation if available.

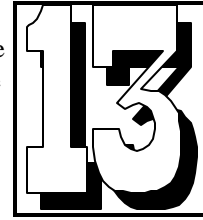
Here you can download the latest version of HNSKY: http://ourworld.compuserve.com/homepages/han_kleijn/software.htm

E-mail: han_kleijn@compuserve.com"

M.B.

(Continued from page 5)

challenge, both visually and with a CCD camera. Our software like Guide 6 can give you a chart of what's what. Brian and Kane were successful a month back in identifying a handful of satellites in a CCD image.



URANUS, in Capricornus all year, sets on the 15th at 10:18 PM and is a 3" disk of magnitude 5.8. It's low, but you can still catch it. Uranus also has satellites ...

NEPTUNE, in Capricornus all year, sets at about 9 PM on the 15th in the southwest. As usual, it's a 2.3" disk at about magnitude 8.0.

PLUTO, in Ophiuchus all year, is not visible this month rising as it does 40 minutes after the Sun and setting 2 hours after the Sun.

Don't forget the Leonid meteor shower which peaks on Saturday November 18 at 1 PM (PST) but hopefully, there should be something left over by midnight <grin>.

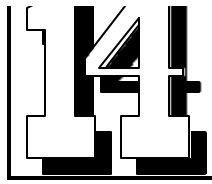
CONSTELLATIONS to look for in November (at 9:00 PM, PST) are Sculptor, Western Cetus, Pisces and Andromeda.

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 to 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 identifi-

(Continued on page 14)



(Continuea from page 13)

able 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 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 "Great 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) and was discussed at length last year. 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. Who will be the first in our group to get an image?

Clear skies to all,
Bob Nelson

NEW BOOKS AT THE PUBLIC LIBRARY.

by Yvonne Whebell.

THE DREAM OF SPACEFLIGHT. by Wyn Wachhorst.

This book explores the dream of space flight from historical, philosophical, and psychological perspectives, and is written by a historian. In some places the writing is poetically beautiful, and seeks to describe the visions and motives of people who dreamed of and developed space flight.

THE BOOK OF THE COSMOS: IMAGINING THE UNIVERSE FROM HERACLITUS TO HAWKING.

Edited by Dennis Richard Danielson.

Inside the dust jacket reads "What is the Cosmos? How did it come into being? How are we related to it, and what is our place in it?" These are the big questions this book examines from many perspectives, by everyone from Edgar Allan Poe, Maria Mitchell (the first American female astronomer), John Archibald Wheeler (who coined the term 'black hole', Arthur C. Clarke, George Bernard Shaw, Richard Feynman, and many more very interesting people with very interesting ideas.

Yvonne Whebell,

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Agenda
October 25/ 2000, Meeting of
P.G.A.S



- 1. Brief review of old and new business**
- 2. Tech update and news**
- 3. ELECTIONS**
- 4. A very special treat from an old friend**
- 5. Constellation of the month (time permitting)**

Please note that we need a good turn-out since this is when we hold our elections .

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.

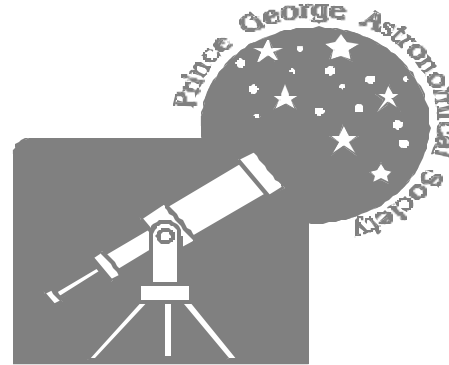
	\$25,000
Ministry of Adv. Ed. Training and Tech.	16,000
BC Science Council	3,900
BC Lotteries	1,932
Helmar Kotsch (Acme Mas.)	1,665
Northwood Pulp and Timber	1,583
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Canfor Polar Division	500
Bisque Software	
Canfor Clear Lake	

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



Join the PGAS



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for their donation of
THE SKY (Level 4 software)
To The Prince George Observatory

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