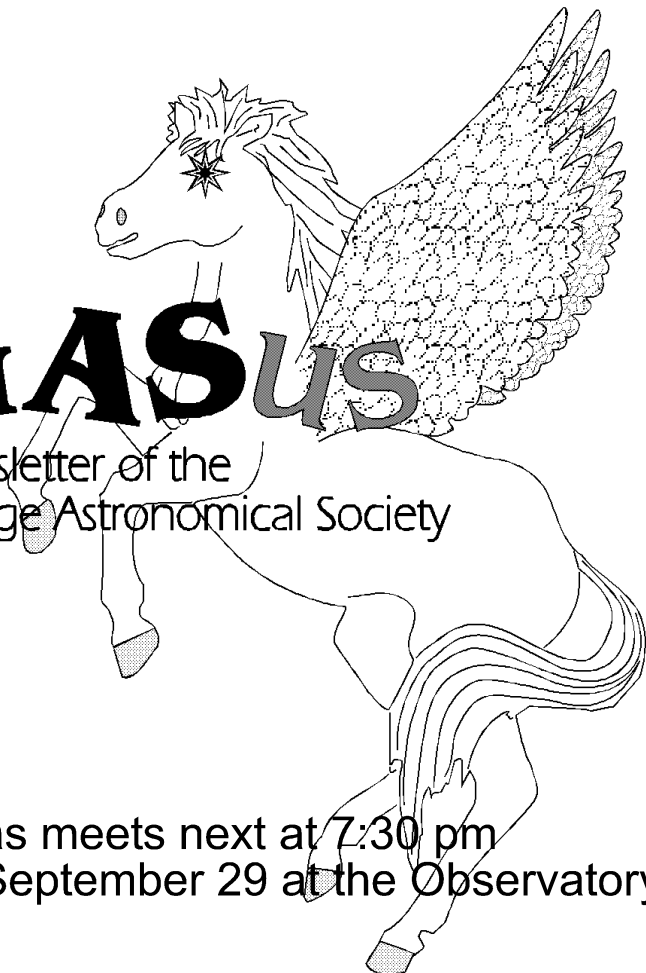


1999 SEPTEMBER ISSUE #96

*the*  
**PeGASus**

Newsletter of the  
The Prince George Astronomical Society



The pegas meets next at 7:30 pm  
WEDNESDAY September 29 at the Observatory

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is published  
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Astronomical  
Society.*

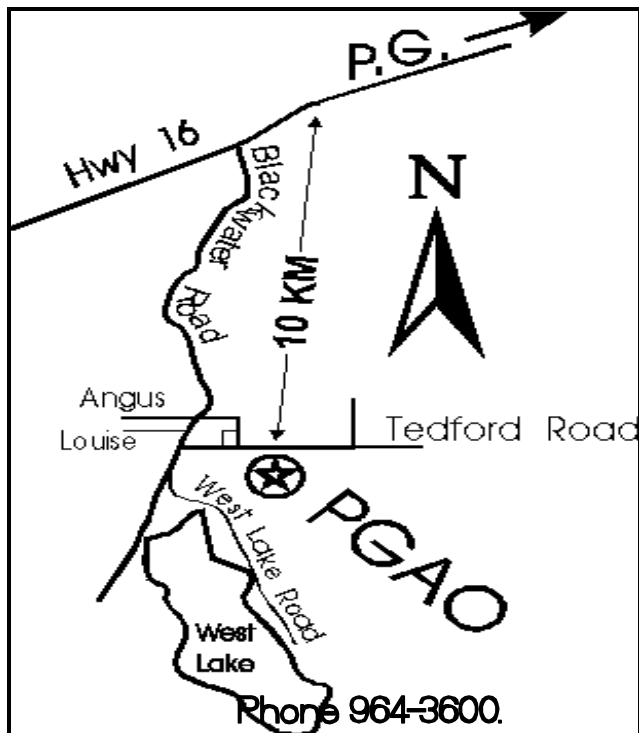
Our pursuits are out of this world.  
Our activities are astronomical.  
Our aim is the sky.

Contributions to the newsletter are  
welcome.

**Deadline for the next issue is**

**OCTOBER 15**

Send correspondence to  
The PGAS  
3330 - 22nd Avenue  
Prince George, BC, V2N 1P8  
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[selfs@attcanada.net](mailto:selfs@attcanada.net)



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

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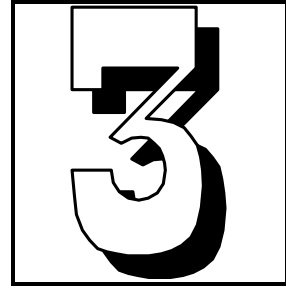
Owen Salava

**PeGASus Editor**

*Gil Self*

# Editorial

by Gil Self



You might remember from previous newsletters I wrote about front porch astronomy, one of my favorite summer activities. A warm summer evening, clear skies, a cool beer and a pair of binoculars. Well this summer was somewhat of a bust on the first two counts, most of my observing for the past few months has been cumulus and strato-cumulus. But things really started to turn around in mid September, we have had many good nights and I hope you have taken advantage of some of these opportunities. If you haven't spent an evening at the observatory lately you should soon. If you get a chance ,catch an asteroid. Bob and I photographed one Tuesday night (page 7). We took several frames over an hour and then blinked the first and last, there was no doubt even in that short a time . Asteroid 4709 is a Trojan , at about the same distance as Jupiter but an hour gave good movement. I think as soon as we tune up the setting circles we can start producing very good asteroid orbits. I have always favored deep sky objects, and never bothered to find an asteroid, I am very glad we took the time it was well worth it.

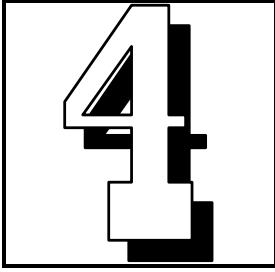
And speaking of the observatory, almost all the proposed work I wrote about in the spring has been completed. The outside of the building is no longer dreary grey blocks, but now a bright fresh coat of paint, the class room is all but finished. When you read this our new camera should be up and running. And the entire new computer system should be operating in about two weeks. I don't think we will ever be able to say the observatory is finished, but we are finally at the point where most of what we work on is no longer carpentry but astronomy.

There have been so many people working so many hours at the observatory this summer , I hesitate to name them in case I miss someone , we really need to thank Doug Wayland ,, Don Clapper ,, Steve Senger ,, Kane Sanders ,, Brian Battersby, for the many long hours they spent working at the observatory.

On the horizon — an ST 9 on our convertible F/4 24inch ( soon )  
— a bathroom ( pretty soon )  
— an observing deck ( just over the horizon )

Clear Skies

G. S.



## Coming Events

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

*PGAS Meets next Wednesday September 29  
7:30 pm at the observatory*

*Home Hobby Horsepower at the Multiplex October 22, 23, 24. We have a prime location at this show thanks to Arby's and Don Clapper.*

---

### The Night Sky for October '99

by Bob Nelson, PhD  
Hi Folks,

Well, it's the start of a new season, it's the club's 20th anniversary, public observing is going well, we are at the dawn of a new millennium, we have several new members, and the telescope is working better than ever. (What more good news do you want?)

Several important modifications to the 24" telescope are planned. First of all is a new Newtonian focus (electrically switchable from and to the cassegrain setup in only a few seconds) which is being built by yours truly and is nearing completion. This will permit wide angle views at focal ratio f/4 for either a 35 mm camera or, more importantly, my new ST9 CCD camera (I'm in line for the upgrade in early November). The ST9, a 512 by 512 array with 20 micron pixels, will permit 14' by 14' views at the Newtonian position and will be a big improvement over the ST6 (with its 5' x 7' views). It also has BVRI filters and will be able to take colour images as well as be suitable for scientific work. With its self-guiding chip, it promises to be a sweet combination.

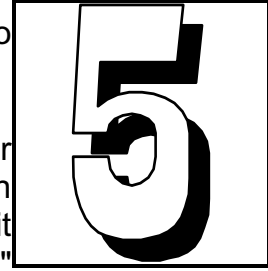
In addition, we've ordered a 0.04 lux video camera which will be attached to the club's Celestron 8 telescope already mounted on the 24" telescope. This will give wonderful images of stars to 8th magnitude on a video monitor and will largely avoid (we hope) the craning of one's neck to look through the 4" finder.

Also planned is an upgrade to the entire drive system that will be more reliable, have a wider range of speeds, and be capable of self-guiding.

All this augers well for more and better public and club observing, and for more projects. If we can only get some good weather this fall, much should be possible!

Here is what is happening in the sky this month:

MERCURY sets soon after the Sun in October and is not visible to northern observers this month.



VENUS, in Leo all month, is a morning object in October (great for all you early risers). It rises about four hours before the Sun on the first and about 4 1/2 hours at the end of the month (when it also reaches the greatest elongation west). On the 15th, it's a 29" crescent disk of magnitude - 4.5. At this magnitude, it looks like a distant aircraft with its landing lights on! A fine sight.

MARS, in Ophiuchus until the 12th, then Sagittarius, is an evening object all month. On the first, it sets about 2 1/2 hours after the Sun; on the 31st, it sets 3 hours after the Sun. On the 15th, it's a 7" disk of magnitude 0.6. (You certainly won't see many surface details at all from our latitude!)

JUPITER, in Aries (until Oct 11 when it moves into Pisces), is an evening object all month, rising soon after the Sun sets. On the first, it transits (passes the south point) at 2:37 AM, and at the end of the month, at 12:20 PM. It reaches opposition on the 23rd. On the 15th, it's a whopping 50" at a very bright magnitude -2.9. In addition, there's a double shadow transit on Set 28th at 4:05 PM. If you know where to point your telescope, you should be able to see the event.

SATURN, in Aries all month, rises about an hour after the Sun on the first of the month and at about sunset on the 31st. On the 15th of the month, it's a 20" disk at magnitude -0.1. Good viewing. How many satellites can you see?

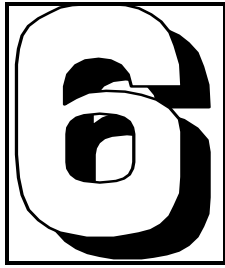
URANUS, in Capricornus all year, is an evening object all month, transitting at 9:30 PM on the first of the month, and at about 6:30 PM on the last. On the 15th, it's a 4" disk at magnitude 5.8 (theoretically visible to the naked eye under very good conditions if you know where to look).

NEPTUNE, in Capricornus all year, is also an evening object all month. It transits at 8:45 PM on the first and at 5:47 at the end of the month. As usual, it's a 2.3" disk at about magnitude 8.0.

PLUTO, in Ophiuchus all year, is low in the southwest at sunset all month. As usual, it's a 0.1" disk at magnitude 13.8

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

**Pisces Austrinus** (PsA, "The Southern Fish"), visible only on the extreme southern horizon here in Prince George and lying as it does off the Milky Way, contains only a few galaxies and no star clusters or nebulae. It does contain the well-known star Formalhaut (= Alpha PsA = Al Rischa, "The Cord"), the 18th brightest star in the night sky. It is a fine binary star, discovered by William Herschel in 1779. The galaxies visible are NGC 7172 and 7154 but these are very, very close to the horizon when on the meridian and represent challenge



objects from here.

**Capricornus** (Cap, "The Sea Goat"), lies on the Zodiac but it too lies out of the Milky Way (to the northwest of PsA) and contains only M30, a fine globular cluster. Of the brighter stars, Delta and Epsilon are both variable stars. Delta is an eclipsing binary of the Algol type (fully detached, with flat regions in the light curve between eclipses); its period of 1.023 days makes it hard to study. Epsilon is a variable of the Gamma Cassiopeia variety. These are young stars that are rapid rotators; in fact, they are rotating so fast that the star's gravity is only just strong enough to retain the stellar material. With instabilities, material gets ejected every once in a while, resulting in irregular light variations and emission lines in the spectra.

**Aquarius** (Aqr, "The Water Bearer"), to the north of Cap, lies on the Zodiac and contains a number of variable stars but no deep sky objects (!) -- at least as listed in Norton's Star Atlas.

**Delphinus** (Del, "The Porpoise"), to the northwest of Aqr, is another boring little constellation, containing only two globulars, NGGs 6394 and 7006.

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

**Equuleus** (Equ, "The Little Horse"), a tiny constellation (the second smallest in the sky, after Crux) and contains NO deep sky objects at all. Delta Equulei, however, is a close visual binary. It was discovered by Otto Struve in 1852; it was for many years at period 5.7 years, the shortest known for any visible binary. According to Burnham, the system has made 19 revolutions in the last 112 years. It is, however (as you might expect) a difficult close binary, never separated by more than 0.35 arcseconds.

**Pegasus** (Peg, "The Winged Horse", "The Great Square" and our mascot), also lies off the Milky Way. It contains a few faint galaxies, an open cluster, and M15, a fine globular.

Clear Skies,  
Bob

#### **NEW BOOKS AT THE PUBLIC LIBRARY**

**By Yvonne Whebell.**

#### **AN INTRODUCTION TO ASTRONOMY: THE SOLAR SYSTEM.**

Second Edition. By Jerry Wasman. Kendall/Hunt Publishing Company, 1992.

This is a text book, complete with exercises. Has some excellent black and white photographs, and many diagrams and charts.

#### **JOURNEY BEYOND SELENE: REMARKABLE EXPEDITIONS PAST OUR MOON AND TO THE ENDS OF THE SOLAR SYSTEM.** By Jeffrey Kluger.

Simon & Schuster, 1999.

A fascinating book focusing on NASA's exploration of the incredibly diverse moons within our solar system.



Citizen photo by Dean Miron

Members of the local astronomy society held a work bee to prepare their observatory on Telford Road. While Brian Battersby, left, and Gil Self painted the dome, Doug Wayland knocked down the weeds.

## Astral light show expected

by CARRIE BRECKENRIDGE  
Special to The Citizen

Every year, Earth passes through the debris left by the Turtile comet. This year, predictions indicate Earth will pass through more dense debris than usual, said Gilbert Self, a director of the Prince George Astronomical Society (PGAS).

On Wednesday, Aug. 11, the society will be inviting the public to their observatory on Tedford Rd., to witness the Perseid Meteor Shower, which is caused by the Turtile comet. The show will be a natural fireworks exhibition, said Self.

The PGAS has been active for more than 30 years, and its observatory is

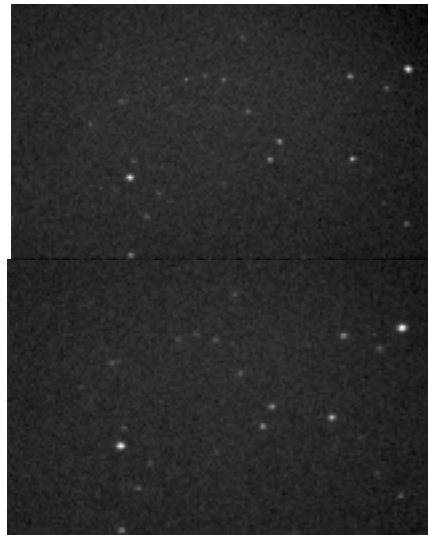
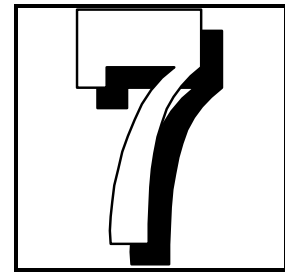
one of the largest public access observatories in Canada, said Self.

"We have a 24-inch reflecting telescope, and several smaller ones. Every Friday night beginning August 6 and running through to the end of October, our observatory is open to the public," he said.

The PGAS has several projects going on all the time, said Self. "Astronomy is one of the few scientific endeavours where the amateur can stand beside the professional. Many amateurs with smaller telescopes contribute much information to international databases on astrology," said Self.

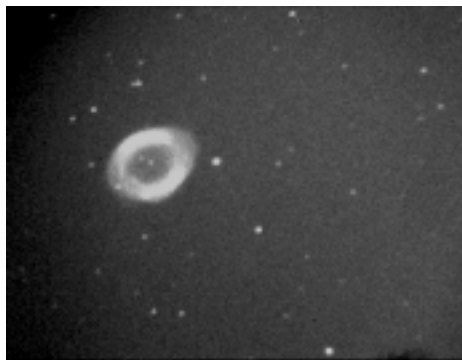
For more information call Gilbert Self at 964-7279.

## Photo Gallery



See if you can find the asteroid

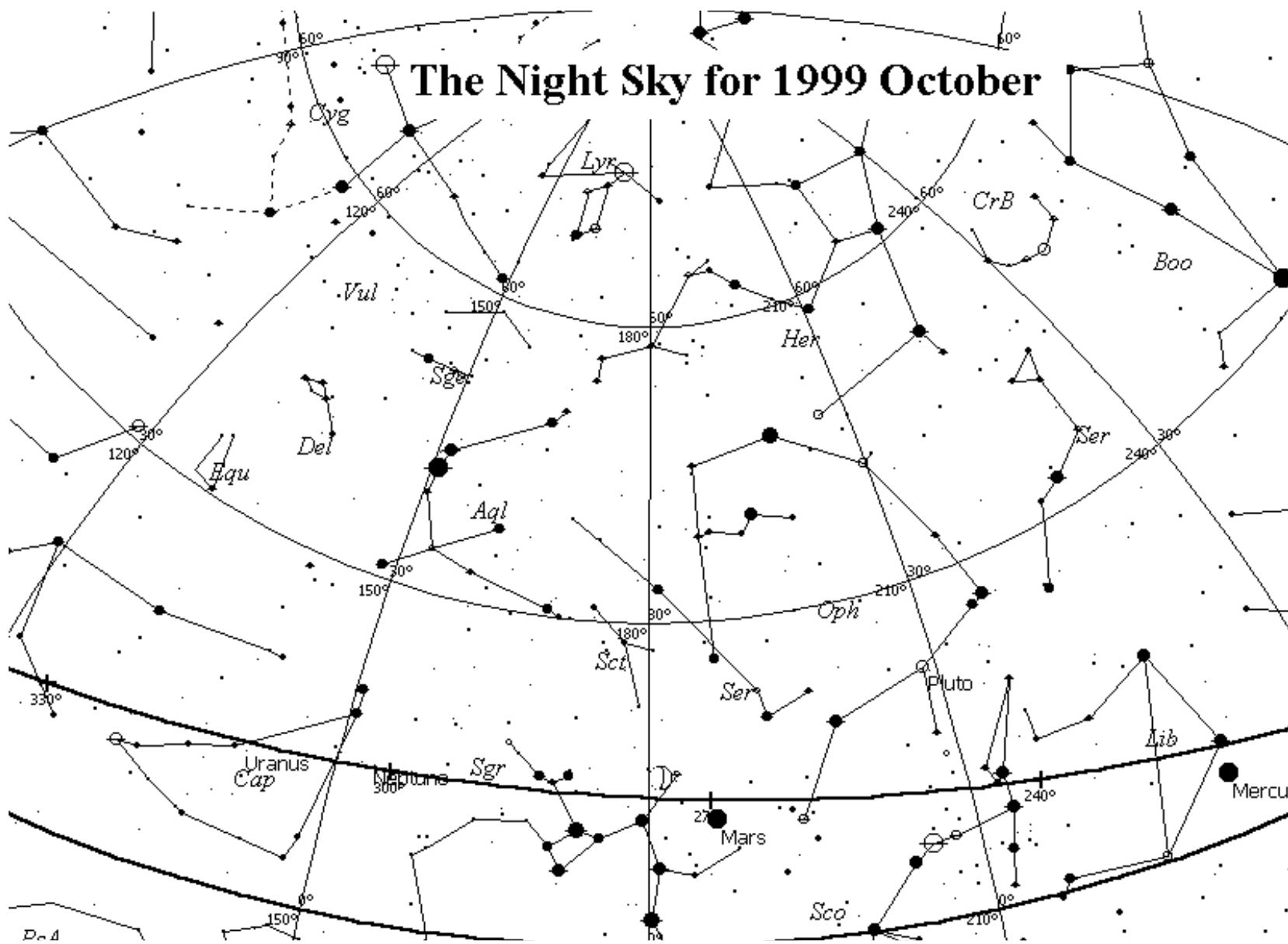
The Prince George Citizen



We have all seen pictures of M57 The Ring, but this is my picture, 09/17/99. The equipment has never worked better. Gil S



Owen and Doug at work, Doug has a great ATV.



October 15 Skys for Prince George courtesy Dr Bob Nelson



10

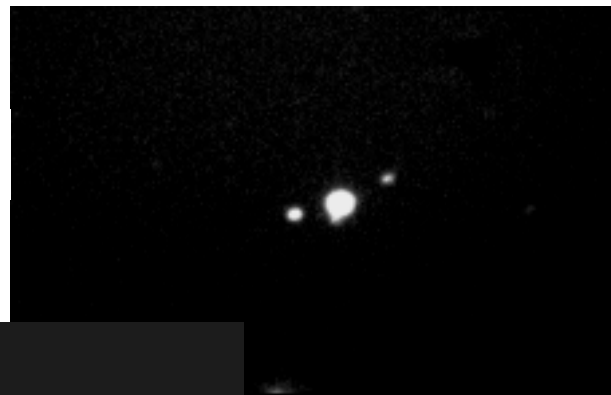
The Gas Giants September 14 1999  
Dr. Bob Nelson

Saturn



Uranus

Neptune



Jupiter

**NEW BOOKS AT THE PUBLIC LIBRARY.**

By Yvonne Whebell.

**A WALK THROUGH THE HEAVENS: A GUIDE TO STARS AND CONSTELLATIONS AND THEIR LEGEND.**

Second Edition. By Milton D. Heifetz and Wil Tirion.

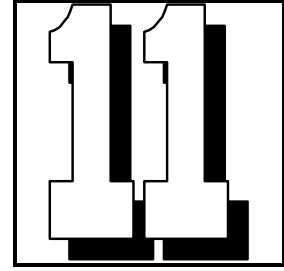
Cambridge University Press, 1998.

A very simple book, this book contains the legend and a diagram for each constellation and tells you how to find the constellation in the night sky.

Also tells you how to locate the planets and lists the brightest stars.

# Galileo: Dialogue Concerning the Moon

Orla Aaquist



One of the first things that Shannon and I did after moving to Edmonton was to visit the various flea markets. We did this believing that it was an inexpensive venture while we waited for our house to sell in Fort McMurray. It was there that we located a copy of the second revised edition (1967) of Galileo's 'Dialogue Concerning the Two Chief World Systems' translated by Stillman Drake. I purchased the book at the unreasonable price of \$6.00 because I inadvertently revealed my excitement about the book to the vendor.

**Ferengi Rule of Acquisition #7:** Never reveal your true desire about an item you are trying to buy.

I don't think that this is a book I would have had the patience to read earlier in life, but now I am trudging through it at a slow pace and discovering a most entertaining dialogue, while rediscovering some of the roots of my scientific beliefs.

Galileo wrote the original text in 1632, twenty-two years after he first looked through a telescope and 10 years before his death in 1642, which, incidentally, coincided with the birth of another genius, Isaac Newton. As Albert Einstein states in the forward to this book,

*"... the Dialogue gives an extremely lively and persuasive exposition of the then prevailing views on the structure of the cosmos ... within it there is a preferred point, the center of the universe [to which] matter ... tends to approach ... as closely as possible. The Sun, moon and stars are prevented from falling toward the center of the universe by being fastened onto rigid (transparent) spherical shells [that] revolve around the immovable [Earth]."*

Galileo, in his Dialogue, refutes this view using a discussion between three learned individuals: Salviati (representing Galileo, himself), Sagredo (the ordinary, but learned citizen), and Simplicio (a learned scholar of the church doctrines based on the teachings of Aristotle).

As an example of the dialogue contained in the text, on page 67 Salviati is in the process of explaining the similarities between the earth and the moon. He says,

*"I state that the sixth agreement between the moon and the earth is that just as the moon supplies us with the light we lack from the sun a great part of the time, and by reflection of its rays makes the nights fairly bright, so the earth repays it by reflecting the solar rays when the moon most needs them..."*

Excitedly, Sagredo interjects,

*"Stop there, Salviati, and allow me the pleasure of showing you how from just this first hint I have seen through the cause of an event which I have thought about a thousand times without ever getting to the bottom of it.*

*"You mean that a certain baffling light which is seen on the moon, especially when it is horned, comes from the reflection of the sun's light from the surface of the earth and the sea; and this light is seen most*



*clearly when the horns are the thinnest. For at that time the luminous part of the earth that is seen from the moon is greatest...*"

A little later, Simplicio argues that the 'earth shine' is not illumination from earth's reflected light but due to the moon's own intrinsic light source. On page 69 he says,

*"...I do not believe that the moon is entirely without light, like the earth. On the contrary, the brightness which is observed on the balance of its disc outside of the thin horns lighted by the sun I take to be its own natural light; not a reflection from the earth, which is incapable of reflecting the sun's rays by reason of its extreme roughness and darkness."*

It becomes apparent during the discussion that Simplicio believes only perfectly smooth surfaces, like mirrors, reflect light while rough surfaces, like walls, do not reflect light, and consequently the moon must be perfectly smooth like a mirror. As a rebuttal Salviati demonstrates that generally a mirror will appear dark when light strikes it compared with the surrounding wall on which it hangs.

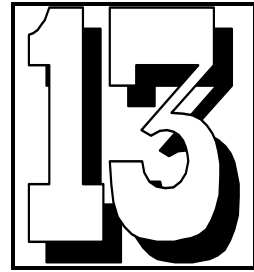
The discussions are interesting because they center on some very basic notion that we now take for granted in our daily discussions. However, the three actors patiently run through the arguments why we should hold these beliefs. For example, that the moon is smaller than the earth is apparent from the fact that the earth's shadow covers the entire moon whereas the moon's shadow covers only a small portion of the earth. The reading is difficult not because the arguments are complex, but because the style is archaic, so it takes a little getting used to.

During my early reading I encountered a description of a portion of the moon's surface that may be of interest to some amateur astronomer wishing to reproduce a bit of history. On page 65 Salviati is explaining his belief that observers on the earth's surface can actually see slightly more than half of the moon's surface.

*"If the moon did have a natural agreement and correspondence with the earth, facing it with some very definite part, then the straight line which joins their centers would always have to pass through the same point on the surface of the moon so that anyone looking from the center of the earth would always see the same lunar disc bounded by exactly the same circumference. But for anyone located on the earth's surface, ... when the moon is to the east or west, ... some part of the edge of the moon's hemisphere is revealed. ... A similar variation should be observable also at the northern and southern extremities ... according as the moon is at its most southerly or most northerly point along the meridian.*

*"Now the telescope has made it certain that this conclusion is in fact verified. For there are two special markings on the moon, one of which is seen to the northwest when the moon is on the meridian, and the other almost diametrically opposite. The former is visible even without a telescope, but not the latter. The one toward the northwest is a small oval spot separated from three larger ones. The opposite one is smaller,*

*and likewise stands apart from larger marks in a sufficiently clear field. In both of these the variation mentioned already is quite clearly observed; they are seen opposite to one another, no close to the edge of the lunar disc and now farther away. The difference is such that the distance between the northwesterly spot and the edge of the disc is at one time more than twice what it is at another. As to the other spot, being much closer to the edge of the disc, the change is more than threefold from one time to the other. From which it is obvious that the moon, as if drawn by a magnetic force, faces the earth constantly with one surface and never deviates in this regard.*



Sagredo immediately replies to this illuminating description,

*“Will the new observations and discoveries made with this admirable instrument never cease?”*

And Salviati predicts the future by saying,

*“If its progress follows the course of other great inventions, one may hope that in time things will be seen which we cannot even imagine at present.”*

It was this passage that inspired me to write this article. I thought that perhaps I could locate the lunar features to which Salviati referred. However, because my teaching term has started, I have decided to leave it as an exercise to the readers of this wonderful journal. Let me know what you think. I hope to submit a version of this article to the RASC Journal as soon as I have a good argument for what features Galileo / Salviati was referring to.

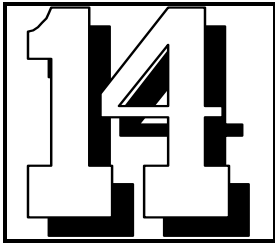
O.A. \_\_\_\_\_

## **NEW BOOKS AT THE PUBLIC LIBRARY.**

**By Yvonne Whebell**

### **FIREFLY GUIDE TO SPACE: A PHOTOGRAPHIC JOURNEY THROUGH THE UNIVERSE.**

By Peter Bond. ISBN: 1-55209-230-5. Firefly Books, 1999. This is a children's book, but I felt I had to list it as it has been so well done. Terrific photographs appear on every page, including some recent photos from the Hubble Telescope, showing stars, planets, nebulae, as well as satellites, machinery, rockets, and the space station, interspersed with descriptive text, history, interesting facts. This would be a terrific book for a kid hooked on space!



## Calling All Members

A New Year of stargazing is about to start. The building has a freshly painted floor, trim around the doors and baseboards have been installed. The exterior has been sealed and painted including the dome, and the scope itself has been improved. In the year to come we can expect to see these improvements continue as plans for new computers, new slide shows, a new scope configuration, and (keep your fingers crossed) a new working toilet system, among other projects become realized. Also guaranteed to be on the clubs agenda for the year is should we or should we not become a RASC centre?

A New Year also means it is time to elect a new executive out of the general members pool. The items mentioned above could not have been done without the hard work of our executive. Members on the executive implement and organize almost all of the projects we do every year. The executive is responsible for the ongoing health of our organization and the growth of the club members by guiding them to new understandings of amateur astronomy.

In the past year, I have met some very dedicated, enthusiastic club members who are or would make great executive members. The only problem is I have only met about a dozen of the 40 or so club members out there. Where are the rest of you? If you don't come to the meetings we can't use your ideas. I have heard rumors of the club being a "serious astronomers only" club or an "old hands club". These accusations are only made true because the "old hands" and "serious astronomers" are the only people that show up to more than one meeting a year. I view myself as an example that this club is not an "old hands club" or a "serious astronomers only" club because I am neither of these and I feel that the club has accepted me quite well. Granted sometimes I feel I am being talked over my head but by keeping my ears open I have learned a lot about astronomy that I never knew existed.

Long story short, I encourage you to be more active in the club. I encourage you to come to the critical first few meetings of the year so we can elect the best executive possible and set our goals for the year. I encourage you to help make the club better for young, and old, experienced and inexperienced, for "serious" and "amateur" astronomers alike.

By Brian Battersby

Here is link to build you own Dobsonian  
<http://members.aol.com/sfsidewalk/dobplans.htm>

Thanks Brian B.

Here is the web site for satellite predictions at the observatory site.

<http://www2.gsoc.dlr.de/scripts/satvissatvis.asp?>

[Lat=53.750&Lng=-122.850&Loc=PGAS+Observatory&TZ=PST](http://www2.gsoc.dlr.de/scripts/satvissatvis.asp?Lat=53.750&Lng=-122.850&Loc=PGAS+Observatory&TZ=PST)

Under edit manually you can put in the coordinates for any location you like. Just bookmark each location and you can go to it very quickly. Go to FAQ at the bottom of the page to learn more about the program.

Doug W.



## **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
Xerox Canada	1,300
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
Bisque Software	500
Canfor Clear Lake	500

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.*