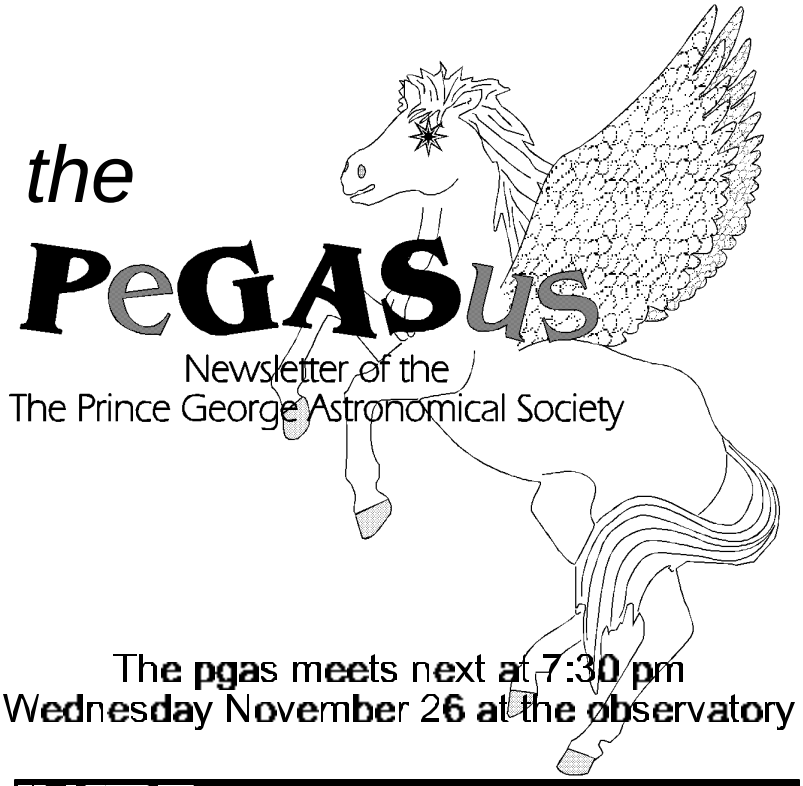
1997 NOVEMBER ISSUE #79



the PeGASus

Newsletter of the
The Prince George Astronomical Society

The pgas meets next at 7:30 pm
Wednesday November 26 at the observatory

INSIDE :

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

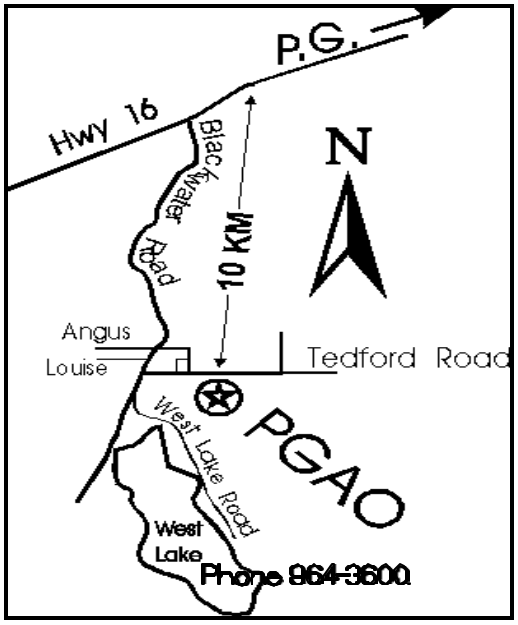
Our pursuits are out of this world.
Our activities are astronomical.
Our aim is the sky.

Contributions to the newsletter are welcome.

Deadline for the next issue is

DEC 19

Send correspondence to
The PGAS
3330 - 22nd Avenue
Prince George, BC, V2N 1P8
or
Nelson@cnc.bc.ca



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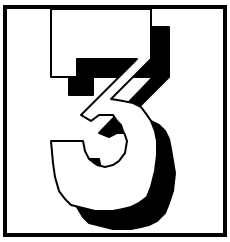


EDITORIAL

by Gil Self

I was reading my e-mail, with the responses to my request for articles for this month's newsletter . As Bob stated at the last meeting , we really do have a facility that we can be proud of, but even beyond that we have some great people.

There are always several projects going on in the background, work being done or a project being worked on. A lot of this you may not even see. It takes precious time for folks to write these articles for the newsletter for example. Did you know that Orla's research is being referenced and published again, or did you know that Al Whitman writes for national publications.? There are several opportunities for you to participate

We have started a new project to photograph in detail all the northern constellations. These photos will be used for future slide presentations. This is a great project we can all take part in. A detailed instruction sheet and log book will be provided as well as well as the camera and film - details at the next meeting.

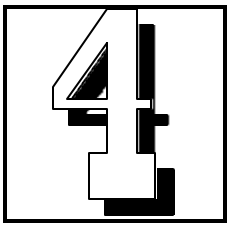
I think it is time we took on a really big project. I propose we initiate a group wide, comet and/or nova search. This could be done a number of ways but I think it would take at least 10 members all willing to commit a portion of time over the next year.

Two basic methods to accomplish this would be for a lot of people to work on a small area of sky, each person would not need to promise too much time but the odds of success are smaller, the detail would be better and the time for each person would be short.

The other way would be for each person to take on a small portion of sky, after a while you would have that area memorized and the time involved would become much shorter. The drawbacks of this method are mainly a higher time requirement per person (and if someone else discovers a nova in your piece of sky) .

Astronomy is the only science that I know of that the amateur is as welcome as the professional. Most of the really good stuff comes from amateurs. The pro's have their big expensive instruments but they have to work hard to get observing time and there is only so much time available. Many notable discoveries are made by an amateur observer, shivering in his/her back yard, hunched over a small telescope, wondering if this is his Eureka moment

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.

November 26— General meeting at the observatory
elections !!!
December 31— Canceled

The Night Sky for December '97

by Bob Nelson, PhD

Hi folks! As November (with its expected early snowfalls and cold weather) gives way to December and winter, it's hard to believe, as always, that winter officially does not begin until solstice on Dec. 21. November is not my favourite month for observing (or anything else, for that matter -- it's too late to hike and too early to ski, except in the high country). December is not far behind in my preferences (although the skiing is better). Winter storms come in succession from the Pacific, leaving us cloudy night after cloudy night. Yet we must be prepared for the odd clear spell which can occur without warning. It is in this spirit that I take my fingers to the keyboard (and mouse), work my favourite planetarium program (usually Redshift v 2.0) and talk about the sky for December. As usual, all comments refer to the 15th of the month, unless otherwise stated.

In the first week or so of December, a curious event occurs. The Moon, which must be high in its orbit (which is inclined 5 degrees to the ecliptic), passes successively a few degrees to the north of seven planets: Mercury (Dec 1 at 20 h UT), Mars (Dec 3 at 5 h UT), Venus (Dec 3 at 17 h UT), Neptune (Dec 3 at 22 h UT), Uranus (Dec 4 at 12 h UT), Jupiter (Dec 5 at 8 h UT), Saturn (Dec 9 at 7 h UT). The separation varies from 0.2 degrees for Saturn (see below) to 7 degrees for Mars and Venus. Although events like this must have occurred zillions of times since the formation of the solar system, it is still interesting and spectacular to see the planets lined up in the same part of the sky.

MERCURY is at inferior conjunction on December 17th. Later on, it appears in the morning sky but is not a good target.

VENUS, in Capricornus for most of the month, is a fine object of magnitude -4.6 (bright!) in the southwest at sunset lying about 20° above the horizon. It sets about three hours later. This month, Venus moves through spectacular phases -- on the first of the month, it is a modest crescent, 34% illuminated, and of angular size 35"; on the 15th it is a more spectacular crescent 22% illuminated and of angular size 44" (about the same size as Jupiter); however, by the end of the month, it is a very thin

crescent, 8% illuminated and of angular size 56". It is brightest on the 11th, reaching magnitude -4.67 (according to Redshift 2). Furthermore, on December 21, there is a close approach: Mars will lie about 1 degree south of Venus and Neptune will lie a little less than 5 degrees to the west. Watch for it if the sky is clear. You may be able to see the crescent shape of Venus from the city with higher power binoculars, finder scopes, etc.

MARS, in Sagittarius (until the 17th when it passes into Capricornus), is a difficult object low in the south southwest at sunset and sets about two hours later. Its magnitude has dimmed to 1.2 and its only 4.5" in size. An unspectacular object.

JUPITER, in Capricornus, is low in the south at sunset and sets around 9 P.M. It is a 36" disk at magnitude -2.2. It is receding as Earth speeds past in its orbit but is still worthy of view (along with its 'big four' moons). According to the 1997 edition of the Observer's Handbook, there are double shadow transits of Jupiter on Dec 14 and 31 (but Jupiter is below the horizon here in Prince George for these events).

SATURN, in Pisces, is in the southeast at sunset and sets around 2 A.M. (PST). It's a 18" disk at magnitude 0.6. On the night of Dec 8/9, the Moon occults Saturn. Unfortunately, we are too far north to see it (the Moon misses it by some 12' here) -- you'd have to go to Portland OR (latitude 46 degrees) to see a grazing occultation, further south to see the full event. [If the unlikely event that you are planning to go, Redshift 2 predicts that a sliver of Saturn is occulted at 23:42 PST; Guide 5 predicts rather more is occulted with the maximum at 23:43 PST. Even if I can't go, it's still fun playing with the planetarium programs! Redshift 2 gives wonderful views in full colour -- why bother going outside?]

URANUS, in Capricornus, is low in the southeast at sunset and sets around 2 A.M. (PST). This month, Uranus is a 3.4" disk at magnitude 5.9. You should be able to find it with binoculars, if you know where to look.
(There will be finder charts, I am sure, in Sky & Telescope and Astronomy magazines.)

NEPTUNE, in Sagittarius (until Jan 20), is low in the southeast at sunset and sets about three hours later. It is a 2.2" disk at magnitude 8. It is best found with our 24" telescope. Stand up, all those of you that have not seen Neptune with our fine telescope.

Winter solstice occurs on December 21 at 12:07 PST. Winter at last!!! (joke)

The is an event of note this month. On the night of Dec 12/13, one day before it's full, the Moon occults (passes in front of) Aldebaran (a.k.a. Alpha Tauri). According to Redshift 2, the disappearance (on the darkened limb) occurs here in Prince George (at the observatory, to be exact) at 8:26 PM, PST (Guide 5 gives 8:25) and the reappearance (on the bright limb) occurs at 9:13 PM, PST (Guide 5 gives 9:13:30). This is an interesting event, occurring every

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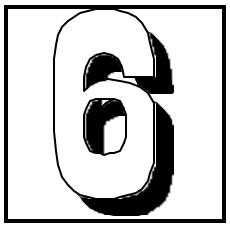


Life, the Universe & all that Jazz

by Steve Senger

My neighbor a few weeks ago invited me to attend a lecture at UNBC.

It was about the creation of the universe and if there was a designer involved. The lecturer had a Ph. D. And a Masters in Astronomy and Physics. I believe he has done a lot of work in Radio Astronomy as well. I thought this should be quite interesting and I attended the lecture. I agreed with some of the things said and disagreed with other things he stated. One thing interesting was he referred to the 2nd law of thermodynamics a few times, which stirred up some Ideas about entropy that have been kicking around in my head for the last few decades. This led me to write another article about Life, the Universe, and everything else. (The answer is not "42"(read hitchhikers guide to the galaxy)).
It is interesting to know that elementary particles are so finally balanced between themselves and the forces of nature.

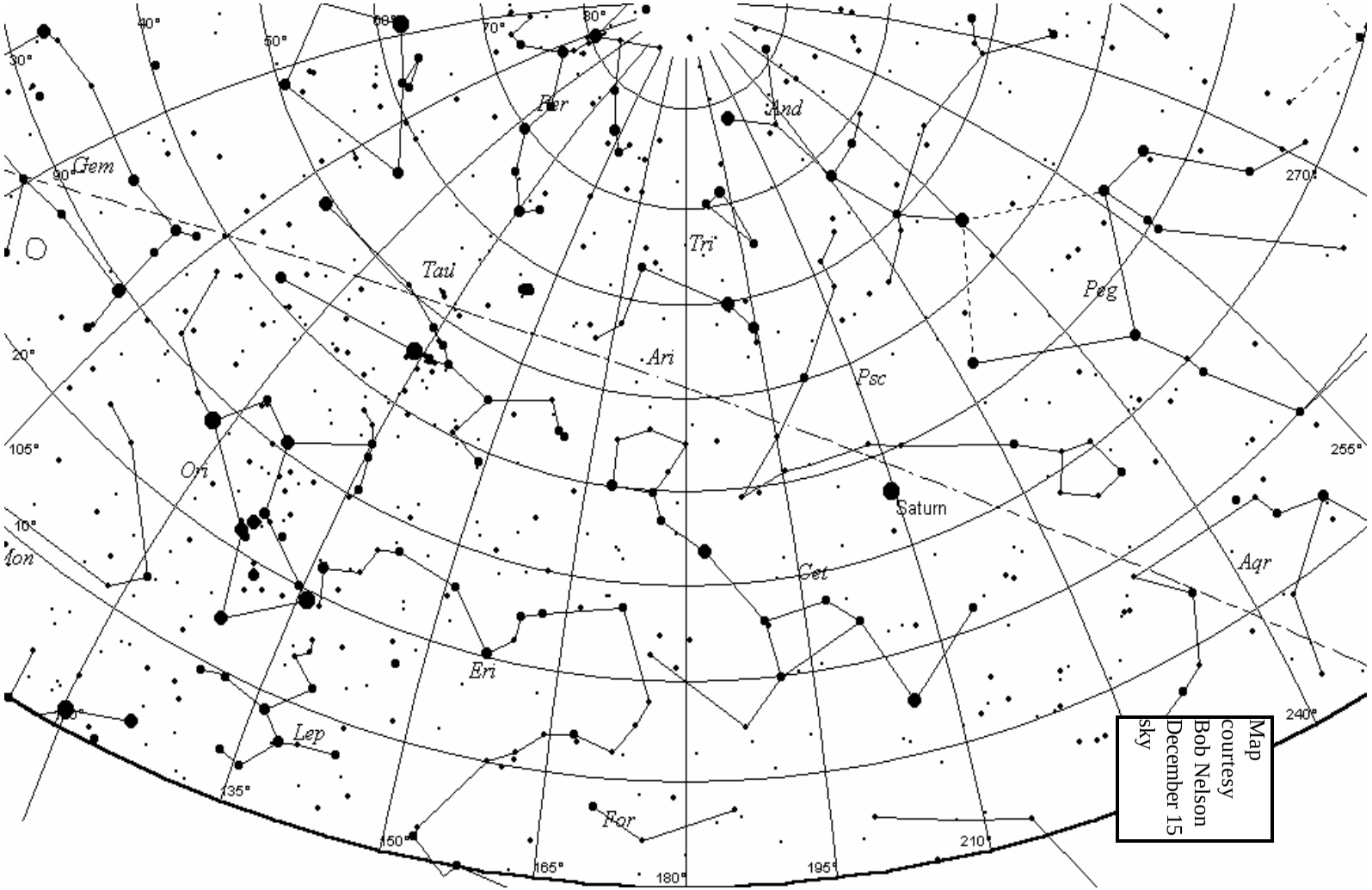
The strong force which hold the quarks together in the proton and neutron, and also holds the neutron/protons together in the nucleus of the atom is highly tuned, if this force were ever so slightly stronger it could cause a collapse of all the surrounding matter into one humongous nucleus. If the force were ever so weaker the protons would fly apart due to the coulombic forces between the protons so take your hats off to Mr. Gluon & Pi Mesons they are the critters responsible for the Strong Nuclear force. The orbiting electron's charge (e-) is exact and opposite of the proton's charge(+). Any of the above mentioned changes could prevent atoms as we know them from ever forming. Take the expansion of the universe. If it started out with a slightly less critical rate ie. 1/ one hundred thousand million million, the universe would have collapsed.

So it appears that the particles and the universe as a whole were highly tuned to give us what we see today. The strong anthropic principle states that the Universe is as we see it because if it had been any different we would not be here to see it and state the question why is the Universe as we see it. Are you confused yet ? Perhaps there has been billions of universes created before our time and (someone quoted) our universe is something that happens from time to time. There is no way to prove these ideas with today's technology so they are more an interesting philosophical debate.

Probability of life in the Universe?…….. I dragged out the famous Drake equation for this. There are a lot of unknown variables in this equation so an optimistic or pessimistic VIEW can be obtained depending on what values you choose. Regardless of what values are chosen most scientists would agree that the universe is teaming with life. (It's one of those probability things).

The equation goes : N = Rs Np Pf Fb Fi Fc Lc Now 'Rs" stands for…. opps so sorry but I'm out of time. Gil's deadline for articles has reached a critical mass. So stay tuned and I will finish the rest of my article for the next issue of PGASus

STEVE_SENGER@bc.sympatico.ca


Per
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Map
courtesy
Bob Nelson
December 15
sky

Twenty Easy Messiers to Start With

The idea was expressed on an e-mail discussion list that I belong to that it was too difficult for beginners to hunt down Messier objects. That is a complete fallacy: observers have started at age 11 without anyone to guide them. Here is a list of the easiest ones to start with under country skies. This list just rearranges the Messiers from easiest to hardest. Refer to your OBSERVER'S HANDBOOK for other details about them such as their constellation and magnitude.

I recommend Terry Dickinson's book NIGHTWATCH as a beginner's observing guide. But you can find most of the easy ones on the monthly sky charts in SKY&TELESCOPE or ASTRONOMY. Many charts do not plot M24 since it isn't a star cluster but rather a star cloud, a bright Milky Way patch. Look for the bright patch between M23 and M25.

The five easiest are naked eye objects:

M45 The Pleiades open cluster; naked eye stars
M44 The Beehive open cluster; naked eye patch; stars in binoculars
M31 The Great Andromeda Galaxy; naked eye patch; huge in binoculars
M24 The second brightest patch in the Milky Way
M7 The third brightest patch in the Milky Way; naked eye open cluster; a very low southern horizon is needed from latitude 54 but Bob Nelson has spotted it from Tabor Mtn; obvious from Mt. Kobau

Fifteen easy ones to continue with:

M42 The Great Orion Nebula in Orion's Sword
M6 Open cluster north of M7; naked eye patch
M8 The Lagoon Nebula; naked eye Milky Way patch
M41 Open cluster just south of Sirius
M13 The Great Hercules Globular Cluster; faint and small naked eye dot; fuzzy in binoculars
M35 Open cluster; find in binoculars then try with naked eye
M34 Open cluster; find in binoculars then try with naked eye
M23 Open cluster for binoculars near M24
M25 Open cluster for binoculars near M24
M4 Globular cluster for binoculars near Antares
M5 Globular cluster; rivals M13 in telescope
M47 Open cluster; the brightest patch in the winter Milky Way; naked eye
M46 Open cluster found in binoculars beside M47
M11 Patch in binoculars; superb open cluster in a telescope
M92 Overlooked globular cluster near M13

The rest of the relatively easy ones:

M2 (globular), **M3 (**globular), **M10** (globular), **M12** (globular), **M15** (globular), **M16** (open cluster is easy but the associated emission nebula is tougher), **M17** (emission nebula in binocs), **M22** (globular in binocs, superb in telescope), **M27** (the Dumbell Nebula, planetary nebula), **M32** (dwarf companion galaxy to M31), **M36** (open cluster), **M37** (superb open cluster), **M38** (open cluster), **M39** (naked eye open cluster), **M48** (bright open cluster), **M49** (elliptical galaxy), **M50** (open cluster), **M67** (open cluster), **M81** (spiral galaxy in binoculars), **M93** (southern open cluster), **M94** (bright compact spiral galaxy in binoculars).

The 62 not mentioned are of moderate difficulty.

These ones are considered tough by some people:

M1 (supernova remnant), **M33** (face-on spiral galaxy for binoculars--need fine dark skies; difficult naked-eye object at PGAO), **M76** (faint planetary nebula), **M97** (large planetary nebula), **M101** (very large face-on spiral galaxy).

These are the two toughest Messiers:

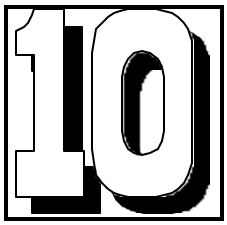
M74 face-on spiral galaxy; clean dark sky and clean optics required (this is even tough in the 24" when the mirror is dirty) (which it is)
M83 far southern face-on spiral galaxy (but this is one of the finest southern hemisphere galaxies so plan to observe it when on a tropical winter vacation; magnitude 8.0 in Burnham and in my experience; the Observer's Handbook magnitude of 10.1 seems very pessimistic)

Start with the five easy ones and go from there, learning as you go.
Finding the easy ones will improve your observing skills and prepare you for tackling progressively more challenging ones.

Alan Whitman
PGAS

note: If you haven't used the obsevatory lately you may not know that we now have a reference book, on the observing deck that has lots of details on each of the Messiers. It is cross-referenced many different ways to aid you in deciding which Messiers are available to you. Also if you are not a purest the setting circles make Messier hunting a snap. The Messiers chart still has some blank spaces for your name.

G.S.



The Mystery of K3-35

by Orla Aaquist

Recently, I related my summer activities to you. I wrote of spending my summer trying to do research and its culmination in an observing proposal to the Very Large Array radio telescope in New Mexico. Despite my fears, expressed to you at the time, I did submit the observing proposal.

Now I am waiting.

While I was waiting, a research paper arrived in the mail. Strangely, I was among the authors. But how could this be?

The mailing address on the paper, below my name, was 'University Transfer Division, College of New Caledonia, Prince George, BC'. Perhaps part of me is still in Prince George, living at the Prince George Astronomical Observatory, doing research. I don't recall doing any research here in Fort McMurray. Could my identity have been split when I left? Has anyone there seen me? Check the basement at the observatory. Check behind the furnace. Look for empty O'Henry bar wrappers.

The title of the mystery paper contained the name of an old friend, K3-35. I first encountered K3-35 while analysing Very Large Array radio data during the first years of my graduate work at The University of Calgary. On the monitor, K3-35 looked like a mistake, a side lobe, some bad data, a piece of lint on the hard drive. It was too small to show much detail, even at sub-arcsecond resolution. Yet, it was clearly elongated with three distinct emission peaks, the strongest being at the geometrical centre. I went to the library to scan the journals for similar images.

This is the good part about doing research at a university. You can go to the library and look for almost anything. In Fort McMurray I can also go to the library, but the only scientific references I will find is Scientific American and Discover Magazine. In Prince George you are a little better off. There you will also find Nature and Sky and Telescope.

At the U. of C. library, many years ago, I found an almost perfect match to the image of K3-35: a galaxy. But K3-35 could not be a galaxy. Galaxies are generally not visible a few degrees from the galactic centre, even with a radio telescope. The object was intriguing, but I was blinded by 50 compact planetary nebulae awaiting processing, so I did not pursue my discovery.

Five years later, I observed K3-35 again, this time for much longer in order to obtain an image with greater dynamic range. Also, I observed it at four wavelengths to obtain images at various optical depths and resolutions: 20, 6, 3.6 and 2 cm. At 20 cm wavelength, K3-35 looked like an unresolved elliptical blob (basically, because it was). At 6 cm it still looked like a little, nearly edge-on, galaxy with a bright core. At 3.6 cm it looked like two faint propeller blades attached to a

really bright core. At the time, the shape reminded me of a seahorse. Unfortunately, the tail of a seahorse is curled in the same direction as the snout, whereas the tail of K3-35 at 3.6 cm was curled away from the snout. Moreover, the snout of K3-35 looked more like the beak of a duck with fat lips. So I abandoned the name, Seahorse Nebula.

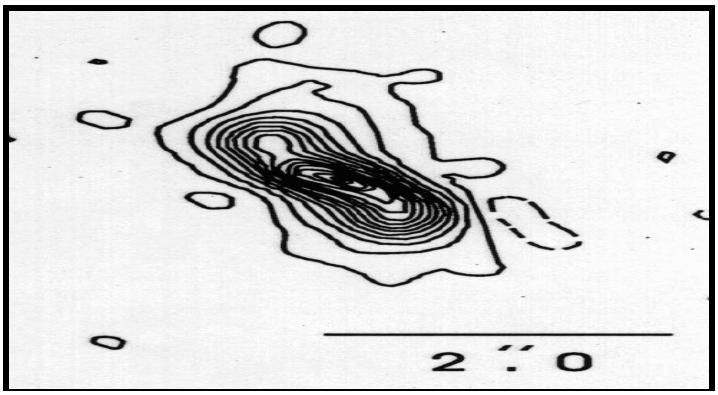
At 2 cm, K3-35 looked like a tiny elongated blob. I had no idea what it was. I dedicated a chapter to this strange object in my thesis wherein I concluded that I didn't know what it was.

Five years later, while teaching physics at the College of New Caledonia in Prince George, BC, I published a paper on 'The Peculiar Nebula, K3-35' wherein I concluded that I didn't know what it was. Five years after that, while teaching physics at Keyano College in Fort McMurray, I received a paper on 'K3-35. Planetary Nebula or Star Forming Region?' wherein the authors concluded that they didn't know what it was. My name was among the authors, and I wasn't sure why.

I pulled out my old publication and reread it. I read the mystery paper. After seven years of teaching first and second year physics, I was pleasantly surprised that I could still follow the jargon and understand the astrophysics. Just like riding a bicycle. It wasn't a bad paper. A little too long, perhaps, but so were my own publications, so was my thesis, and so was my last trip to Edmonton.

I read the paper thoroughly, generated three typed pages of comments and asked a few meaningful questions. Like riding a bicycle. The first author thanked me, then he swore me to secrecy until the paper was accepted for publication in the Monthly Notices of the Royal Astronomical Society.

Who are these other authors? Why am I involved? Where did the paper come originate? Where does the rain fall mainly on the plain? To you , it must remain a mystery, at least for a little while. O.A.



The image is of the nebula K3-35 taken with the VLA at 6 cm wavelength. It is a countour map, so each connected line represnets a level of intensity or brightness. The line at the bottom right corner is two seconds of arc long, so the object is very compact. O.A.

AstroSurfing

Internet update:

We have secured a new location for our internet home page. The new location is: **"www.pgweb.com/astronomical"** and is sponsored by the **Borealis Group Communications Company.** If some of our club members get an internet account with the Borealis Group they will grant us more space.

The biggest reason for going to the new location is that we have FTP access to the web page. This makes the process of updating the page enormously easier and much less time consuming. Another huge advantage is it makes it easier to experiment with the page while it is on-line. I could not get FTP access at the University. Another huge advantage is the address,
"**www.pgweb.com/astronomical**" is much easier to remember than
"**andreae.unbc.edu/kubert_html/PGAS/pgas-hp.html**" (don't forget it is case sensitive!).

I am getting close to completing the conversion to new address. So far I have duplicated the entire web site to the new location. I have added 55 new pages and deleted one. All of the new pages were archives of the News Letter. Eventually I will add all of the old news letters to the site. This way we will have a permanent archive of all our club activities in one location that is instantly accessible. New club members can browse through the old News letters to find out what we have been up to for the last 11 years.

Other improvements:

1. I have added a Java counter so we can tell how many people have accessed the site.
2. Changed the Virtual tour section to Just the P.G.A. Observatory added some really nice photos of the Observatory.
3. Removed some graphics from the index page to allow faster download
4. Updated the upcoming events section, removed the graphic calendars and replaced them with tables. This will allow for faster download time and it will be easier to update the calendars.
5. Updated the club information section.
6. Removed some out of date links from the Astronomy link section.

Future improvements:

1. Updated image Gallery. Please scan any astronomical photos that you may have and send them to me!
2. Complete updating the "Upcoming Events Section" (and keep it up to date).
3. Possibly add a discussion section where anyone on the web could drop in and post astronomy related stuff. Maybe look and see if the Freenet Discussion area could be merged somehow.
4. Update the Astronomy links section.

If you would like a preview of the new page drop in and take a look around. Just type **www.pgweb.com/astronomical** into the address section of your Internet Browser. If you notice any errors or if you have any comments please send me an e-mail at **avro100@netbistro.com** or phone me at 964-4012.

Happy surfing!

Mathew Burke

SECRETARY'S REPORT

By Brian Potts

OCTOBER GENERAL MEETING *held at the observatory on the 29th*

Bob gave a introduction on the status of our facility and how we all have a building we can be proud of. Roof repairs and a finished basement were discussed. It was decided that Elections of Officers and appointment of Directors would be held at our next meeting.

It is time to renew your 1997/98 PGAS membership. Dues can be collected at the next meeting or sent to our Treasurer,

Old business - the next casino night will be some time in April,

Any volunteers, give it some thought.

Financial- That would be Steve

Our regular account as of Sept 1 is $1192.29

Our casino account is $4600

And we figure the repairs on the roof will cost around $1500

Observing Director- That would be me

One of the Observing programs we will start is to photograph the different constellations of the sky. These will be used in our slide presentations when we have tours at the Observatory. The club will purchase the film. We will shoot long and short exposures of the same area. Steve will look after buying the film.

Technical Director-That would be Bob

The ST4 autoguider will only operate one axis at a time and needs to be fixed so both axis will operate simultanously. The 6mil plastic in the basement needs to be sealed before concrete can be poured. Brian will look after lining upm concrete and finisher for wednsday Nov 12.

We need a promotional Director! Anyone out there looking for a great job with no pay. Call one of your Elected Officers.

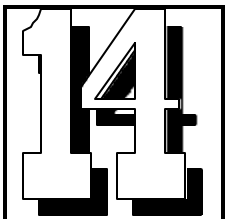
Program Director-That would be Gil

Gil and Steve are looking into making another slide set featuring the Apollo Space Program. We will apply to the Dark Sky Society for membership and prepare for a talk to the Regional District in January concerning light pollution in our area. We will fixt the shutter rails on the back of the dome so they will not get frozen to the roof in the winter.

Calls for public tours are still rolling in and if you are interested in helping out with one of our seasoned members we would really appreciate your help. Tours can happen any night of the week. Right now we have alot of Cubs and Brownies wanting tours and we try to accomodate them on there regular meeting nights. Most tours run from 7-8P.M. and if there is more than 10-12 children we like to split the group in half. One half watching slides and the other half looking through the 24inch if its clear. Then swap them around at 7:30 and do it all over again. We are putting up some cork boards in the class room and hallway. I would like to start displaying photos of some of our personal telescopes and projects that weare working on. This way the general public knows the membership of the PGAS is alive and well.

Brian Potts

Secretary PGAS



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accuract timings are of value to the scientific community, since they help to redefine the orbit of the Moon. An organization, called the International Occultation Timing Association (IOTA) collates the data and distributes it. Let me know if you'd like to have a go at timing the event. [I have done one timing in the past -- the Moon occulted Regulus during the day, and I was fortunate enough to get it timed.]

Another event this month is the Geminid meteor shower, occurring on Dec 13 at 10 PM PST; but with the Moon near full, much of the event will be washed out in the glare of the Moon.

DEEP SKY observing: At the middle of the month at 9:00 PM, the constellations of Pisces, Aries, Taurus, Gemini and Orion are high in the sky. The preeminent object, of course is the Orion Nebula, which is simply spectacular in any telescope, but is fantastic in our 24". On a clear moonless night with steady air (which often occurs later in the evening), I find it hard to drag my eyes away from the Trapezium and many other features this object has to offer. This is a good time for photography, for our telescope makes it easy -- a 5 or 10-minute exposure will yield great images. Other objects to look for are the Horsehead Nebula (we must get an O III filter!), and the northern Milky Way, which runs overhead at this time of year. Look for the Double Cluster in Perseus, amongst other things. Further south are the constellations of Cetus, Fornax, Eridanus and Lepus, which are little known to us northerners.

Let's have a look, weather permitting! B.N.

Astrophoto Tip of the Month

When you are using regular lenses on 35mm cameras, remember to always remove any filters, such as UV or polarizing, before taking your photgraph. If not, you will end up with two images of the same object from the light bouncing off the lens, hitting the filter and being recorded on the film.

Clear skies, Brian Potts

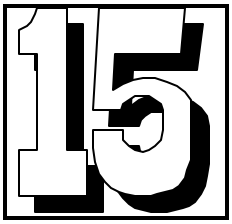
Please Take Note

Congradulations are in order to Alan Whitman who ran his first (of many) columns in 'The Journal of the RASC'. His column is entitled 'At the Eyepiece: Atlantic and Pacific Star Parties'. It ran in the latest issue (October 1997) on page 228. Alan Whitman is now a member of the Okanagan Centre of the RASC. Alan's columns will be about objects to view and the obsrving experience. His articles will primarily concern deep-sky objects. He is asking for quotable reports from experienced amateurs (such as PGAS members) who have completed their Messier list.

If you are interested to contribute to Alan's column, he can be contacted at AWHITMAN@VIP.NET.

Orla

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	74 4
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Xerox Canada	500
Russelsteel	465
Lakeland Mills Ltd	460
Canfor Clear Lake	270
Lutz Klaar	200
Canfor Netherlands	200
Art Beaumont	150

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.

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