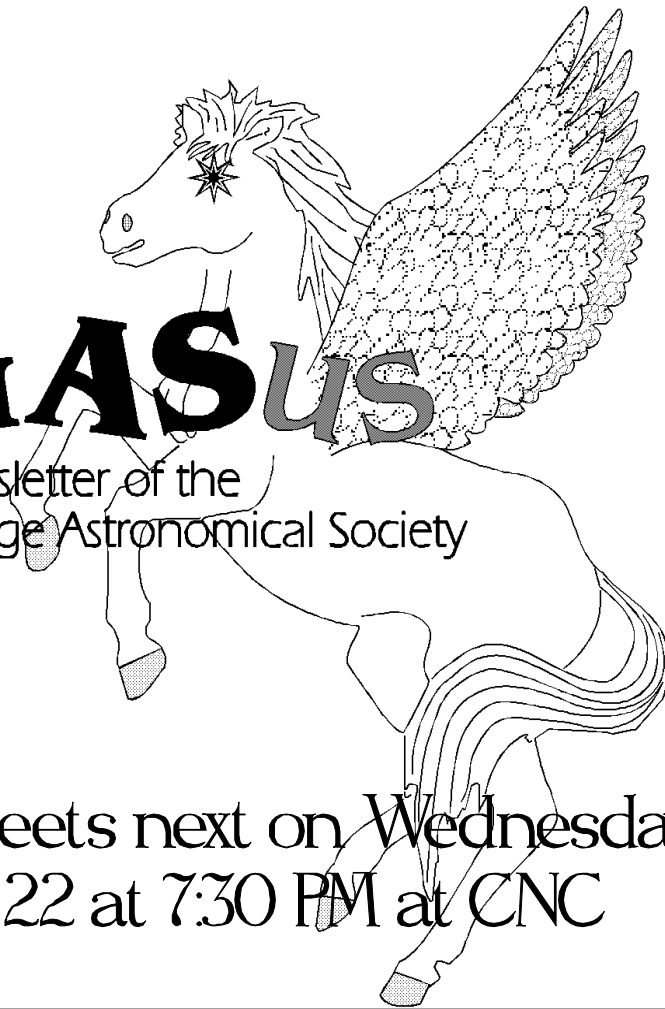


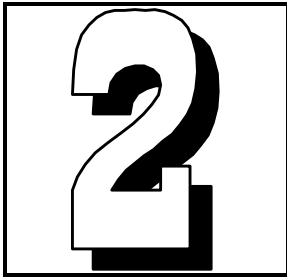
*the*  
**PeGASus**  
 Newsletter of the  
 The Prince George Astronomical Society



The PGAS meets next on Wednesday  
 February 22 at 7:30 PM at CNC

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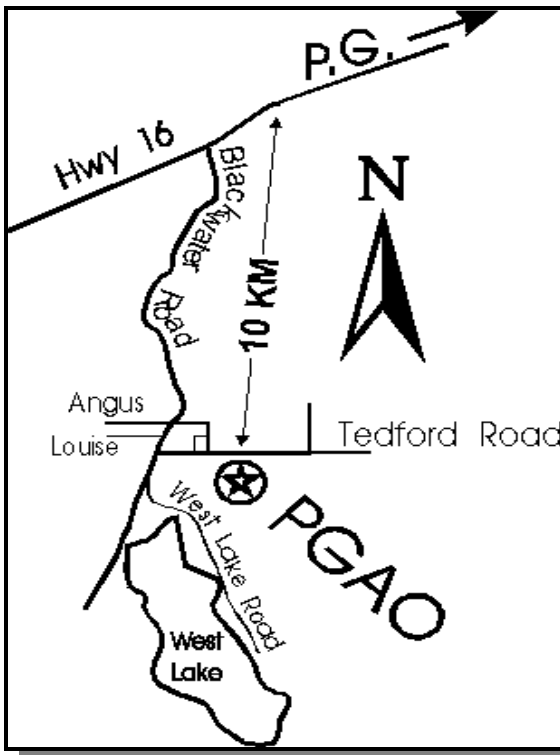


*the  
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*Prince George  
Astronomical*

*Society.* Contributions to the  
newsletter are welcome.

***Deadline for the next  
issue is March 17, 1995***

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Astronomical Society  
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### **Nominated Positions**

*Technical Director*  
Bob Nelson  
\*

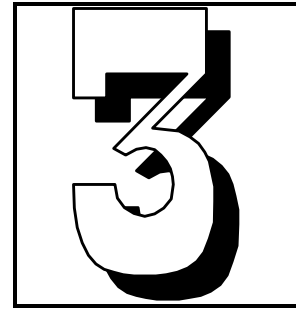
*Observing Director*  
Jon Bowen  
\*

*Promotional Director*  
Orla Aaquist  
\*

*PeGASus Editor*  
Orla Aaquist  
\*

The observatory phone number is  
964-3600. This is a party line, so  
if it rings busy, it does not imply  
that someone is at the

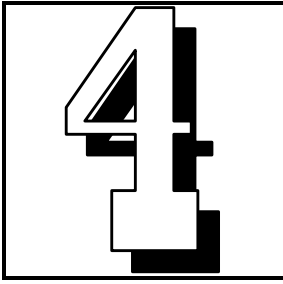
# Editorial



Micheal Ryan from Country 101 FM gave me a call last week to relay a report about a large, red, glowing ball hovering over some lake somewhere south of the border. I think the report originated in Texas or Arizona, probably somewhere hot where people have trouble telling the difference between turnips and radishes. Military experts at the scene reported that it was definitely from outer space, not of this earth. "Do you know what this object is?" Michael asked enthusiastically and with anticipation. A pregnant pause followed while I collected my thoughts. It was showtime. I was on the air. Millions of people all over Prince George were listening to me. Time to show my astronomical expertise, my understanding of human psychology, and my deep insights into the cosmos. I could become another Carl Sagan or Isaac Asimov: a spokesperson for the astronomical community. I said, "I have no idea!" I heard the sound of the *incorrect-buzzer* sounding in my ear. No! It is Mars!

I slapped my forehead. Of course it was Mars. I should have known. Mars is much larger south of the border. For example in Texas, radishes grow to be the size of turnips, and in California movies are larger than life. No wonder that Percival Lowell could see, with great detail, the "*canali*" and other evidence of the advanced civilizations on this planet's surface.

Your contributions ~~to this newsletter are welcome~~. It is very time consuming to put together the PeGASus every month without some input from you. I thank Bob Nelson for faithfully forwarding the electronic SkyNews from Sky & Telescope; this is used to create the *AstroSurfing* article of our newsletter. Thanks to Barb Hansen for sending me a photocopy of a section of Franklyn Branley's book, '*Mysteries of the Planets*'. I used this to generate the article entitled '*The Number of Planets*'. Thanks to Alan Whitman for summarizing upcoming astronomical events in '*The Night Sky*'.



## Monthly Meetings

The next meeting of the PGAS will be held at the **CNC** on Wednesday, February 22th at 7:30 PM.

No indication of the agenda for this meeting has reached the editor at the time of writing. Hey, guys! The question mark is growing bigger.



# The Night Sky

*by Orla Aaquist*



Leo is looking at **Mars** as this red planet moves westward into Cancer in the evening sky. This retrograde motion stops on March 25th, just 6 degrees from Cancer's Beehive (an open star cluster), after which it begins its eastward movement back towards the jaws of Leo.

**Jupiter** is riding Scorpius from midnight till dawn during the month of March. If you are up past midnight, take a look at the rising Jupiter and see if you can see the remains of Shoemaker-Levy 9 impacts. Apparently, the impact sites have spread out and have formed a new belt encircling the planet's far-southern latitudes. This belt is expected to last for years. Late in March, Jupiter rises as early as 11:30 PM. On March 5th, Jupiter is at western quadrature (90 degrees from the Sun), so a slight phase can be observed through a telescope with its sunward limb appearing a little brighter.

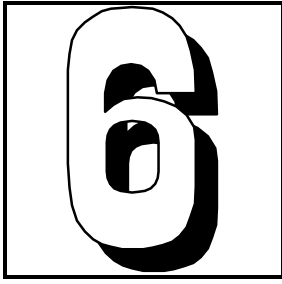
**Mercury** is at its greatest western elongation on March 1st, and you may catch a glimpse of it at dawn. **Saturn** will remain lost in the Sun's glare until March 26 when it appears in the morning sky, passing 3/4 of a degree above the faint -0.4 magnitude Mercury. **Venus**, still a morning star, is low in the sky and continues to move towards the Sun.

On the evening of March 18th, European observers will see a lunar occultation of Spica. The closest approach occurs at 3:30 PM PST, almost 6 hours before moon rise in Prince George; so the Moon will be about 3 degrees east of Spica by the time the waning Moon peaks over the eastern horizon at 9 PM. On the morning of March 22, the waning Moon is about 2 degrees from Jupiter. A week later on March 27, 28 and 29 the crescent Moon is first near Venus and then Saturn.

March has two new moons. The first is on March 1st and the second is on March 30th. After sunset on March 31 look for the 21 to 24 hour old Moon just above the horizon due west.

The spring equinox occurs this year on March 20th at 6:14 PM Pacific Standard Time. On this day, the Sun sets due west. This is a good day on which to set your compass.

For those with a telescope, on March 6-7 the minor planet 103 Hera, magnitude 11.7 will cross the galaxy M95 in Leo. Also, the minor planet 419 Aurelia (magnitude 13) will cross the cluster M67 in Cancer nearly dead centre. The movement of these minor planets is about 30 arc seconds per hour. We'll be looking forward to your pictures on the March 29th PGAS meeting.



# Visiting Astronomer

On Tuesday, March 14, at 7:00 PM, Dr. Lloyd Higgs from the *Dominion Radio Astrophysical Observatory* (DRAO) will give a public lecture in room 7-212 at UNBC entitled

## **EXPLORING OUR CELESTIAL ENVIRONMENT: THE CANADIAN PROJECT TO MAP OUR MILKY-WAY GALAXY**

The talk is an overview of the type of research carried out at the DRAO. Lloyd will introduce the Galactic-Plane Survey Project -- a long-term plan to provide a detailed map in the radio continuum and the HI spectral line of the northern part of the Milky Way. The value of such a project and the probable discovery of many new exotic objects will be discussed.

Also on the same day, Lloyd will give a talk to CNC's Science I students from noon to 1 PM in room 2-243 at CNC entitled

## **SERENDIPITY STRIKES AGAIN: THE DISCOVERY OF A REMARKABLE STAR**

In this talk, Lloyd will discuss the role of serendipity in research with an instrument with a large field of view, such as the DRAO Synthesis Telescope. To illustrate this he will discuss the very luminous star in our Galaxy that was recently discovered using DRAO data.

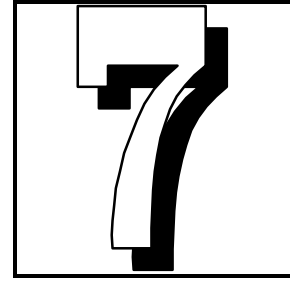
Both talks will have slides, and perhaps also a video presentation for the evening public talk. There is no charge and everyone are welcome.

Lloyd Higgs served as the director of the DRAO for many years. He has participated in the growth of the DRAO and has partaken in the research carried out with this facility. In his two talks, Lloyd will show how this Canadian facility holds a unique place in the milieu of world class astronomical observatories and how it is being used to produce frontier research results.

***Lloyd's visit is being funded by CNC's Science I program through the generous support of the Koerner Foundation.***

# The Scope of Things

by Orla Aaquist



Light travels very fast: about 300,000 kilometers every second, or 18,000,000 kilometers every minute, or 1,080,000,000 kilometers every hour, or 25,920,000,000 kilometers every day, or 9,460,800,000,000 kilometers every year. The distance that light travels every year (9,460,800,000,000 kilometers) is called one light year (1 LY, for short) because scientists would rather say 1 LY than 9,460,800,000,000 kilometers. The distance that light travels every day is called a light day for much the same reason; and as you may have guessed, there are also distances called a light hour, a light minute, and a light second. With this in mind, lets soar through the universe!

The sun's diameter is 5 light seconds. The earth's orbital radius is 8 light minutes. Pluto is about 5 light hours from the sun. The closest star is 4 light years away. Star clusters and nebulae that you can see in a typical small telescope (with diameter less than 0.7 nano-light seconds) are of the order of a few hundred light years away or less. This is pretty much in the solar neighbourhood when it comes to the size of our Milky Way Galaxy which is 100,000 light years in diameter and 1000 light years thick. The Andromeda galaxy is 2 million light years away and the Virgo cluster of galaxies is 70 million light years away. The most distant galaxy seen from the earth is about 10 billion light years away and the 'edge' of the universe is thought to be about 15 billion light years away. In case you have not been keeping track of all the zeros, that last number translates to 141,912,000,000,000,000,000 kilometers.

## **Now we can all start singing, "It's a small world after all."**

Lets do it another way. Let 'O' represent the size of the sun, then Pluto would be orbiting the sun about 12 meters away, and the earth would be about the size of the period at the end of this sentence. Let 'O' represent the orbit of Pluto around the sun, then the nearest star would be 25 meters away. Let '.' represent the distance between the sun and the nearest star, then our galaxy would be 25 meters in diameter and about 3 meters thick. Let '<=o=>' represent the size of our Milky Way Galaxy, then the Andromeda Galaxy would be located about 20 centimeters away (only about one page length away), but the Virgo cluster of galaxies would be 7 meters away (out in the street in front of your house), and the 'edge' of the universe would be two kilometers away.

**You may start singing again.**

# Announcements

## For Sale

New Meade 8" telescope (never assembled), coated optics, German mount, motor drive, tripod, 2 eyepieces, diagonal, telrad for only \$1100. Call Rocky McCann 563-1325 (Prince George).

## Congratulations

*to Matthew Burke (PGAS secretary) and Susan*

*Klaar on their engagement. Their wedding is*

*scheduled for*

*December 31, 1995.*

*To the right is a picture*

*of the happy couple. ...*

*Matthew is the one on*

*the left.*

## Observer's Calendars

from the *Royal Astronomical Society of Canada* (Vancouver Centre) arrived last year. There are still 2 left. Call Orla Aaquist (964-9626) .

## The OK Skies

Newsletter of the Okanagan Astronomical Society (OAS), is back on line with a new editor. Ace Trump has taken over the reins from Ken Hewitt-White who moved back to the west coast. Ace was kind enough to remember the PGAS by sending us a copy of his first edition. Nice cover picture, Ace, but what the heck is it?

## Eclipse 1995

We have received a couple of brochures from *TRAVELBUG International* for tours to Asia for the October 1995 eclipse of the sun. Members wishing to view these, contact Orla (964-9626).

**Picture of Matthew and Susan**



# 10

## Astronomical Lies

*by Tsiuqaa Alro*

If you point a telescope skyward (any telescope, in any direction, day or night), you will see something like the pictures in a typical astronomy magazine: swirling arms of spiral galaxies, undulations in diaphanous clouds of dust and gas, the brilliance of speeding meteors flashing through the sky, the planets looming large and colorful in the eyepiece, and the footprints of astronauts on the moon.

The wonderful pictures in the astronomy magazines are artists' renderings of what astronomers observe through telescopes. Either that or the images are computer enhanced, and the colours are not real. The detailed shapes and structures of many of these images are deduced from advanced astrophysical theories like general relativity and plasma physics, and the images are generated using a supercomputer somewhere in the United States.

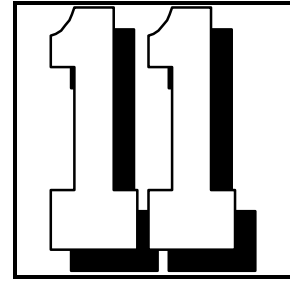
Professional astronomers sleep during the day and observe at night. They spend their nights staring through the eyepiece of very large telescopes. These telescopes are all located on the top of the tallest mountains where the clouds never interfere with their observations. Astronomers must dress warm because the best observing is in the winter. During the summer in the northern hemisphere, they move to the telescopes in the southern hemisphere where it is cold. Astronomers want to build a telescope on the dark side of the moon because it is always dark there and they would be able to observe all the time. They haven't built a telescope on the north or south poles of the earth because the nights last half a year, so they would have to sleep all summer.

Radio astronomers listen to the radio signals from space hoping to find signs of extraterrestrial life. A radio telescope has a speaker in the place normally occupied by the eyepiece, and the astronomer places his/her ear to it rather than his/her eye. Radio astronomers listen for sounds from alien beings on other planets, but they haven't heard anything interesting yet.

Planets can be seen during the daytime, even on cloudy days. All you have to do is look down.

# How Many Planets?

(Taken from *Mysteries of the Planets* by **Franklyn, M. Branley**. Submitted for inclusion in the PeGASus by PGAS member **Barb Hansen**. *Italicized text are comments made by the PeGASus editor.*)



We usually think that there are nine planets. In order of each one's distance from the Sun, they are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Pluto, and Neptune. ... But there may be more planets.

Planets move in elliptical orbits. Their motions are understood so well that astronomers can predict where a planet will be any time in the future, as well as where it was located at any time in the past. *[This is not strictly true since perturbations by other planets will always result in some uncertainty in the location of any particular planet. However, computer models can predict the orbital position of any planet to an accuracy of a few kilometers over a span of a few million years].* But not all planets behave as expected. Neptune was discovered because Uranus was not moving as predicted. It appeared that an object having considerable mass was affecting the motion of Uranus. Astronomers figured out how massive the object had to be and where it should be located. When telescopes were pointed at that location, Neptune was discovered. *(Uranus was discovered by Herchel in 1781. The calculations of Neptune's position were made by John Couch Adams and Jean Josep Le Verrier 60 years after the discovery of Uranus. Apparently, there was quite a competition between these two mathematicians to complete the calculations and to convince an observatory to actually make the observations. On September 23, 1946 Le Verrier finally convinced the Berlin Observatory to help him examine a small portion of the sky near his predicted position in the constellation of Aquarius. A graduate student and a young assistant at the Berlin Observatory, performed a systematic, star-by-star search using a new chart of the Aquarius region. In less than an hour, they found the planet. Although this amazing discovery is often attributed to the power of science, it was demonstrated later that the calculations were flawed. In particular, if the same calculations had been made 40 years earlier or later, the predicted positions would be out be 30 degrees, in which case the planet would not have been discovered.*

A similar sequence of events ... led to the discovery of Pluto by Clyde W. Tombaugh in 1930. *Pluto was found just 6 degrees from the spot predicted by Percival Lowell. However, the*



*planet was much too small to ever have influenced the orbits of Neptune or Uranus. Apparently, the agreement between Lowell's predictions and the planet's observed position was nothing more than a fluke. ... It seems that there should be another massive object beyond Neptune, and beyond*

Pluto.

There are astronomers who still search for that elusive object. If they find it, it will become planet number ten. Is there such a planet out there?

*Before me is the March issue of Sky & Telescope. I am looking at an article by S. Alan Stern entitled The Chiron Perihelion Campaign. Let me type a few snippets from this article:*

*"The late 1980s and early 1990s brought a revolution in our view of the outer solar system... we now know that the planetary system is surrounded by a vast disk of planetesimals ... beyond the orbit of Neptune and extends out toward the much larger ... Oort Cloud from which all comets were once hypothesized to come. This structure (is called) the Kuiper Belt or ... Kuiper Disk ... In 1992 ... David Jewitt and Jane Luu discovered a faint, red, 22nd magnitude body orbiting ... beyond Pluto. This object ... designated 1992 QB1, was joined ... by 1993FW. As of early 1995 almost 20 such objects had been discovered. ... estimates predict that the Kuiper Disk contains at least 10,000 QB1 like bodies."*

*It seems that explaining the perturbation of the outer planets may be much more complex than the existence of a single large body. Could it be that a collection of many small Kuiper Disk objects could give rise to these perturbations?*

About a hundred years ago a topic of concern to many people was Vulcan. An observer had reported seeing a tiny object move across the disk of the Sun. It was not a known object, therefore many people believed it to be a planet in the space between Mercury and the Sun. If there were such a planet, it would be very hot. Thus it was named Vulcan, after the Roman god of fire. ... all attempts to see the planet have been unsuccessful ... (*but*) .. a few people ... continue to scan the region close to the Sun, hoping to glimpse it.

# AstroSurfing



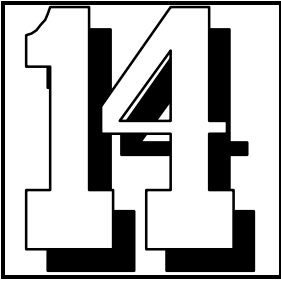
*Astronomy news gathered from surfing through the Internet and other sources. Much of the contents presented here are severely edited for presentation in this Newsletter. For more details, contact the PeGASus editor.*

**SPICA OCCULTATION ON JAN. 23:** I think it was cloudy in Prince George.

**JUPITER-SPOT UPDATE:** As long as you're up before dawn, set your sights on Jupiter. Now separated from the Sun by a healthy 80 degrees, the giant planet is an easy target for scrutiny. Daniel Costanzo says it may be hasty to describe the dark debris from last summer's comet crash as a conspicuous globe-girding belt. Using the historic 30-cm refractor at the U.S. Naval Observatory in Washington, Costanzo and other members of the National Capital Astronomers have observed instead what they call "interesting" and "boring" sides to Jupiter. The interesting half has a central-meridian longitude of roughly 320 degrees, corresponding to the region hit so obviously by fragments G, L, R, and Q. The boring one has a CML of about 140 degrees, near where pieces A and C struck.

**BUILDING A BETTER SUPERNOVA:** Two thousand astronomers met recently in Tucson, and they presented many important new results. One concerned supernovae, the deaths of massive stars. Theorists had figured that the collapse of a star's core and its subsequent "bounce" powered these violent events. But computer models always crashed before producing an explosion. Now teams led by Willy Benz and Adam Burrows have finally built computer models that explode like real stars. They succeeded by doing their calculations in two dimensions, something not possible before the advent of supercomputers. This allowed them to fully account for the energy supplied by tiny, massless particles called neutrinos, as well as departures from spherical symmetry, such as those caused by convection.

**BIG BLACK HOLE IN M106?:** There is impressive evidence now for a massive black hole in the nucleus of M106, a galaxy in Canes Venatici. Japanese radio astronomers led by Makoto Miyoshi detected a thin ring of gas encircling the galaxy's core. The ring is only 1+ light-years across, and it is whirling around so fast -- 1,000 kilometers per second along its inner edge -- that it would fly apart unless held in place by a dense central object with a mass of some 40 million Suns. [This object](#)



is almost certainly a massive black hole\*, because its inferred density is orders of magnitude higher than that of any known star cluster.

*\*Pegasus Editor's Remark: How many times have we heard that claim by astronomers? No one ever mentions magnetic fields when it comes to explaining high speed orbiting materials. The fact is that magnetic forces are just as good as gravitational fields, if not better, at restricting the flow of hot gases.*

**POLARIS DOESN'T MISS A BEAT:** If our pole star could speak, it might echo Mark Twain's famous words, "The reports of my death are greatly exaggerated." Predicted to stop pulsating last year, the star at the end of the Little Dipper's handle instead seems on the rebound. Polaris is a Cepheid variable, a kind of star that brightens and fades as it alternately swells and shrinks. Yet while its period has remained roughly constant at 4 days, its variability decreased in amplitude from 0.1 magnitude at the turn of the century to just 0.01 magnitude by 1992. This trend led a group of Canadian astronomers to predict in 1993 that Polaris would soon stop pulsating altogether. But new observations reveal that this didn't happen. Martin Krockenberger and his colleagues at the Harvard-Smithsonian Center for Astrophysics obtained high-resolution spectra of Polaris throughout much of 1994. From the observed Doppler shifts, they found the star's atmosphere still expanding and contracting every 4 days, reaching peak velocities of 850 meters per second. At the winter meeting of the American Astronomical Society on January 9th, Krockenberger explained that the observed motions correspond to brightness changes of about 0.03 magnitude, well above the level observed two years ago. "There's no sign that Polaris has actually stopped pulsating," Krockenberger emphasized.

**SPOTTING CERES:** Ceres, the 910-kilometer-wide minor planet should be about magnitude 7.0 as it reached opposition on February 3rd. Ceres will also reach the closest point in it's orbit around the Sun -- called perihelion -- in April. These two closely spaced events, when added to the asteroid's high declination make it a prime target. To find Ceres as it makes its way through northern Cancer, consult the chart on page 78 of the February SKY & TELESCOPE.



There is lots  
of room for  
your  
contribution to  
this  
newsletter.

# The Image Gallery



## **DAWN SPECTACULAR!**

Matthew Burke captured this image on Friday morning, January 27. The waning crescent moon is very close to brilliant Venus, with Jupiter to their upper right. Fainter Antares is lower right of Jupiter but is not visible in this photograph.

The image supplied by Matthew was digitized and the sky was artificially darkened to increase the contrast of the early morning sky.