

Event Horizon

December 2002

Volume 10 Issue 2

ROARING LIONS AND OTHER COSMOLOGICAL BEASTIES *by Rita Griffin-Short*

COMET - from Greek *aster kometes* (long-haired star)

“If at your coming princes disappear,
Comets! come every day - and stay a year”,

writes Samuel Johnson to Mrs. Hester Thrale, October 6, 1783, and Shakespeare’s Calpurnia says:

“When beggars die, there are no comets
seen; The heavens themselves blaze forth the
death of princes”.

Julius Caesar (Act 2.2 30-31)

What did comets, meteor showers and other celestial phenomena mean to ancient peoples?

The November Leonids remind us that these phenomena were viewed with awe and fear by earlier cultures. The Leonids are meteor showers that are composed of small particles of hot debris from Comet 55P/Tempel-Tuttle, said to “fan out from the sickle of Leo”, producing “spectacular outbursts” as they shoot through Earth’s upper atmosphere. While we are told they are a “well-established” phenomenon we should nevertheless keep an open mind.

Armed with the latest cosmological knowledge, we can view the Leonids and other celestial phenomena with awe and pleasure, without the fear and trepidation the ancients did. We no longer believe they portend war, famine, pestilence, nor indeed the death of princes. Superstition and ignorance bred fear that people dealt with by creating mythological explanations and that later religious dogmas maintained until they had to give way to rational, physical, causes for celestial phenomena.

From Paleolithic (old stone age) times until the end of the 17th century of the last millennium, human beings have observed and recorded nature’s unpredictability, interpreting either happy events or disasters with

comets, eclipses, or other celestial phenomena. Paleolithic hunters looked to the sky to plan their seasonal rounds, while the Neolithic (new stone age) farmers sought reliable information for planting and harvesting crops. The ability to predict, to measure, resided with the shaman, astrologers, and astronomers, the latter two usually attached to a royal court.

Magical rites were performed at the arrival of certain stars, the rising or setting of the sun, the waxing and waning of the moon, all of which also provided calendrical datum points. Early cultures developed myths to account for night and day, and what they observed in the sky. Eclipses were caused when the sun and moon ‘ate’ each other according to Chinese and Hindu myths. Through time early humans’ view of the sky became more derivative as they borrowed from each other through increased trade. We have inherited the Greek cosmological nomenclature of its pantheon because they took a great leap forward when they sought a physical instead of a mythical explanation for the natural world. Some of their ideas, e.g. heliocentrism did not bear fruit until thousands of years later.

Mesopotamia, Egypt, India, and Greece provide us with the earliest records of celestial phenomena. They established schools of astrology and astronomy some of which were sophisticated considering what they didn’t understand at the time. Those who observed, studied and analysed celestial events held a great power, a power that could and often was, used to awe and intimidate the superstitious and ignorant.

By about 3500 B.C.E. Mesopotamian Babylonia and Sumeria had deified the sun, moon and Venus, dividing their sky into 12 sectors. They recognized that the celestial bodies moved in a given order which they recorded on their cuneiform tablets.

contd on page 7 ...

Chair’s report	page 2
VLF Astronomy	page 3
Mountsberg Report	page 4
Letters to the editor	page 4

Astronomical Youth Camp	page 5
NASA: Enlightened by the Darkness	page 6
Upcoming events	page 8
Calendar	page 10

Chair's Report

Who would have guessed that predicting meteor storms would become a science? As I answered reporters' questions before the "Leonids Last Gasp", I felt strange to be reasonably sure that their actually would be a storm. Astronomy really is a progressive science!

Of course, it was cloudy here in Hamilton - needless to say. Actually, I did see *ONE*! Just after midnight, the sky was every so slightly transparent and I watched for about 15 minutes until I saw one and then went back to bed. So, I like to say that I saw "The Leonid".

I am typing this message from Chile where I am working with my collaborators from the SuperMACHO project - colloquially known as the "Next Generation Microlensing Survey". Each image which comes off the 4m has 8192x8192 pixels - since there is an array of CCD's at the focal plane. That makes for 128 Mb per image. I can't tell you how many CompactFlash cards we've had to go through!!! :)

I have been coming to Chile for 20 years now to observe southern hemisphere objects like the Magellanic Clouds. Chile (as well as Canada) has changed dramatically in that time. There were no observing computers when I first observed here - the closest thing we had was a printing, programmable calculator. Now we can do remote observing and have all of our frames processed within an hour. We have been sharing our pipeline reduction software with a deep supernova project. We are identifying potential candidates within an hour of taking the observations. These are then shared electronically with observers on ESO's VLT, Magellan, and the Gemini North telescope so that they can immediately take spectra! It is true that progress results in other things like light pollution, but it is hard not to feel that, on balance, things just keep getting better!

I hope that the holidays treat you all well as we head into an exciting New Year!

Doug Welch

Doug Welch is the current chair of the HAA and also a founding member. You can find out more about Doug at:
http://www.physics.mcmaster.ca/people/faculty/Welch_DL_h.html



HAMILTON AMATEUR ASTRONOMERS

Event Horizon is a publication of the Hamilton Amateur Astronomers (HAA).

The HAA is an amateur astronomy club dedicated to the promotion and enjoyment of astronomy for people of all ages and experience levels.

The cost of the subscription is included in the \$25 individual or \$30 family membership fee for the year. Event Horizon is published a minimum of 10 times a year.

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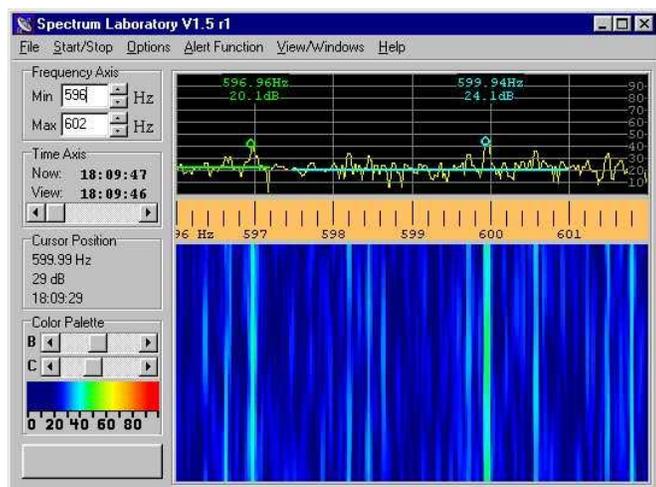
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Very Low Frequency Astronomy with a PC's Sound Card *by Doug Welch*

As many of you may remember, I have taken an interest in the last year in detecting the effect of solar flares on the ionosphere by measuring the strength of distant VLF (very low frequency) signals. I built a basement solar flare detector which was described in an earlier EH article.

Recently, Aaron Price of the AAVSO directed my attention to the possibility of using the very powerful capabilities of a PC's sound card and free software to do monitoring in the VLF part of the spectrum.

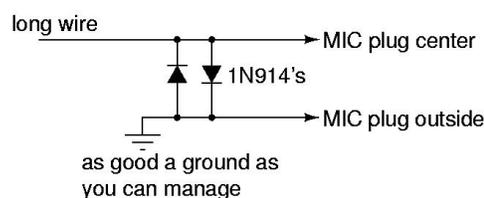
What is the science to be derived from such an activity? For one, it is possible to do the same kind of monitoring as my basement setup with very few external components - some wire, a pair of diodes for protecting the soundcard input and a plug! So, solar flares are covered. However, there are also some interesting issues regarding other ionospheric phenomena which are currently unanswered (to the best of my knowledge). One of these is the strength and nature of VLF radiation emitted by bright meteors. It has been postulated - in a very controversial theory - that low frequency radio waves are somehow responsible for producing the sound sometime associated with meteors. As you know, such meteors are very rare events - perfect for a long-term monitoring station!



One of the really beautiful aspects of working with an antenna being fed into your soundcard is that the hard programming has all been done for you!! There is a free package called "Spectrum Lab" available from: <http://www.qs1.net/dl4yh/spectra1.html> which actually has a VLF monitoring configuration

built in! Among its many strengths is that it can automatically do screen captures of the frequency analysis at user-defined intervals. So, one can look at a day's worth of activity summarized in a few images! And these could be easily put on a shared webpage or in a database for other analysis.

Almost any sort of antenna will provide enough signal for useful monitoring. A wire of 1m (or, better yet, several meters length), oriented vertically will do the trick. It is also possible to connect a loop with many turns for added sensitivity. For a single wire, the following diagram is probably sufficient:



The minimum CPU speed for the computer seems to be about 166 MHz which shouldn't present too much of a barrier. Your sound card needs to be a 16-bit version - but unless you have a truly ancient system, that, too, should be no problem.

Are there any downsides? Yes - amusingly, most soundcards will only analyze up to 22 kHz, since they sample at 44 kHz. The favourite station to listen to in North America is NAA which broadcasts at 24 kHz! It appears that there are NO North American stations broadcasting at frequencies less than 24.0 kHz. With luck, we should be able to pick up the nearest/most powerful European ones! That is not all bad, since many people monitor NAA, having other directions in the ionosphere monitored provides additional spatial coverage. A second downside is lightning. You should definitely not go out of your way to connect a very long antenna to a very valuable soundcard/computer. The diodes provide some protection, but if a lightning strike happens anywhere near your antenna, they won't be enough. A few extra components will provide additional protection against lightning.

Finally, a caveat - I have yet to try this myself! I look forward to doing so when I get home from Chile. If you are interested in doing some VLF monitoring, let me know!

by Doug Welch

Annual Public Night at Mountsberg

On the night of October 05/02 the Mountsberg Conservation area held its annual public night. It has always been ably led by Phil Mozel from the RASC Toronto Centre. Helping him this year were John Gauvreau and Mike Jefferson from the Hamilton Amateur Astronomers and a fellow by the name of Ronald from Guelph.

Phil's usual format is to first present the Solar System and the night sky during the opening indoor introduction. Here he fields questions from the audience before taking it outside for a mythology session in front of a campfire and under the real sky. He has done this for a number of years now, and is very skilled at it.

At this point in the programme, people get to look

through telescopes at whatever happens to be prominent in the sky on that particular night. This year, John, Ron and Mike manned telescopes of 254 to 60mm. As usual, the audience had many intelligent and interesting questions which we thought we answered expertly!!

The attendees left with their very tired, but happy children at about 10:00 p.m. having gained a little better understanding of the universe in which we live. They were pleased, as were the park staff, who graciously gave us two litres of maple syrup last year and free passes to the park until April, 2003 this year. Not bad for a nights work.

Maybe other HAA members would like to help out with this very worthwhile event next year.

by *Mike Jefferson*

Letter to the Editor

Dear Editor:

Glen Muller's 'Galilean Telescope' piece in Volume 10 Issue 1 coincided with some current reading about the ongoing controversy about who made the first perspective glasses.

Recent scholarship suggests, with persuasive evidence, that the concept of convex/concave optical glasses was developed by Leonard Digges and his son, Thomas by the mid 16th c. probably based on Roger Bacon's ideas.

Leonard Digges studied at University College, Oxford. Though he never took his degree he pursued natural philosophy independently making valuable contributions to surveying, ballistics, navigation astronomy, mathematics and optics. Bacon's 'Opus Majus' refers to lenses that "cause the sun, moon and stars in appearance to descend here below", this led Leonard to study optics, determining the principles of both reflecting and refracting telescopes.

Unfortunately, involvement in politics, on the wrong side, after the unsuccessful Wyatt Rebellion of 1554 that protested restoration of Catholicism under Mary Tudor, led to his being condemned to death and his property confiscated. He was reprieved and fined only to die in 1559. He named his great friend, Dr. John Dee, guardian and mentor to his thirteen year old son, Thomas.

Dr. Dee, confidant and astrologer to Elizabeth-

I, was primarily a geographer, mathematician and alchemist, dabbling in mysticism and the occult. He is in disrepute today but deserves better. He wrote the first English edition of Euclid's 'Elements of Geometry' in English. Between 1547-1551 he spent some time in the Low Countries where he purchased a number of astronomical instruments and studied at Louvain University in Brussels. Upon his return to England the instruments would have been amongst the first seen there. Dee pioneered the use of triangulation for land surveying, still used today by archaeologists to establish a datum point! He is said to have had the largest library outside the universities, maintaining a voluminous correspondence with Continental friends with whom he no doubt discussed the new theory of heliocentrism that the Roman Church denied.

Thomas Digges continued his father's work, publishing in English, rather than in Latin, the 'lingua franca' of the period. In 1571, Thomas published 'Pantometria', where perspective glasses or what became known in the 17th c. as telescopes, are mentioned in the title. He discusses both reflector and refractor glasses, and understood both empirically and theoretically, the effect of focal length on magnification. The clear glass we use today was unavailable then; glass contained iron impurities that gave a greenish tint, thus adding to an already inherent distortion problem.

Thomas traveled on the Continent as did most young men of his class. He is said to have met the

father of Jacob Adriaenszoon, one of the three Netherlanders who later vied to claim the first patent for perspective glasses. The other two being Hans Lippershey, who claimed the first patent, and Sacharias Janssen. Janssen claimed that his father had an Italian glass made in 1590. Does it not seem odd that three Dutchman would attempt to patent glasses all in the same month in 1608, some 27 years after Digges published his work in 1571 and 1576?

That these perspective glasses had some practical use comes from Elizabeth's chief councillor, William Cecil, Lord Burghley, who around 1581 commissioned an investigation of this new invention from William Bourne. Bourne mentions both Dr. Dee and Mr. Digges in a way that suggests he had been shown and used the perspective glasses realizing their potential.

The last few decades of the 16th c. saw the beginning of what would become known as the Scientific Revolution. Digges held some revolutionary ideas of his own which he likely discussed with Giordano Bruno who

was in London briefly before going to his death in Rome in 1600 for supporting Copernican heliocentricism and suggesting the possibility of infinite universes. Galileo was luckier, those ideas put his work on the Papal Index and Galileo under house arrest!

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Ronan, Colin A. "Leonard and Thomas Digges" in *Endeavour*, New Series, Volume 16, No. 2, 1992

Woolley, Benjamin. *The Queen's Conjuror*, Owl Books: 2002

Yates, Frances. *Giordano Bruno and the Hermetic Tradition*, Midway reprint: 1991.

The Sleepwalkers, Arthur Koestler, Pelican:1977 edition.

by *Rita Griffin-Short*

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Astronomical Youth Camp in Germany

The "International Astronomical Youth Camp" is an astronomical youth camp for young people from all over the world, which will take place in Klingenthal, Germany from July 19th to August 8th 2003.



For more than 30 years now, every year the IAYC takes place somewhere in Europe. About seventy people from many different countries live together for three weeks. They are between 16 and 24 years old and share the same interest: astronomy. The IAYC is different

from most astronomical camps for two reasons: the international character and the fact that each participant is doing her/his own small research project, not just accepting facts but rather discovering them him/herself. The IAYC is also not like a hotel where one follows a summer school or an astronomy course. Every participant with his or her own cultural background forms an important piece in the complex puzzle of camp life.

Anyone between the ages of 16 and 24 and able to communicate in English may participate in the IAYC 2003. The fee for accommodation, full board and the whole program, including the excursion, will be about 425 Euro. For interested persons who are in the situation of not being able to pay the camp fee themselves, it is possible to apply for our grant program.

You can order - free of charge - an information booklet including an application form from:

Jörg Dietrich

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NASA's Space Place

Enlightened by the Darkness *By Diane K. Fisher*

On the clearest of nights, I may see a dozen stars from my suburban backyard near Los Angeles. Unfortunately, my studies of space and astronomy have been confined to books and the pictures taken by others. Seldom have I experienced for myself a truly dark, clear, moonless sky.

One of those rare times was a summer camping trip in Bryce Canyon, Utah. I lay on my sleeping bag in an open area away from trees. I saw millions of stars (so it seemed) and the cloud of the Milky Way streaking across the sky. Nothing of planet Earth was in my view. It was then I glimpsed my true situation in the universe, a speck of dust clinging to a tiny stone hurtling through the darkness of a cold, infinite universe. I was awestruck by the beauty of the stars and the darkness-and terrified!

In the light of day and a more "down-to-Earth" state of mind, I wondered: With around 100 billion galaxies out there, why is it still so dark out there?

Until the 20th century, astronomers thought the universe was infinite. They were perplexed though, because in an infinite universe, no matter where you look in the night sky, you should see a star. Stars should overlap each other and the sky should be blazing with light and hot as the sun. This problem became known as "Olber's Paradox."

Astronomers now realize that the universe is not infinite. A finite universe-that is, a universe of limited size-even one with trillions of stars, just wouldn't have enough stars to light up all of space.

Although a finite universe is enough to explain the darkness, the expansion of the universe also contributes. As light travels from a distant galaxy to us, the space through which the light is traveling is expanding. Therefore, the amount of energy reaching us dwindles all the time, thus causing the color of the radiation to be "redshifted." (The wavelength is stretched out due to cosmic expansion.) The more distant the galaxy, the more redshifted the light. The largest redshift astronomers have measured comes from radiation that was emitted when the Universe was only 300,000 years old. This radiation has taken over 12 billion years

to reach us and although it began as infrared radiation, it is now seen as the microwave background radiation.



The GALEX (Galaxy Evolution Explorer) mission will do a broad survey of galaxies in various stages of evolution and identify interesting objects for further study by the Hubble Space Telescope.

GALEX (Galaxy Evolution Explorer) is a NASA space telescope that will survey the universe, including galaxies with redshifts that indicate their light has been traveling for up to 10 billion years (or 80% of the history of the universe). Read about GALEX at www.galex.caltech.edu/. For budding astronomers, print out The Space Place New Millennium Program calendar at spaceplace.nasa.gov/calendar.htm to identify great sky watching opportunities.

Diane K. Fisher is the developer and writer for The Space Place web site.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

<http://spaceplace.nasa.gov>

... contd from page 1

In Egypt, the Old Kingdom (2900-2700 B.C.E.) introduced the civil calendar that began with the heliacal rising of Sothis, or Sirius, the Dog Star, revered by their goddess Isis. This event coincided with the flooding of the Nile upon which Egypt depended for its sustenance. Egypt divided the sky into 12 signs that the Greeks adopted and Copernicus used some 3000 years later to formulate his lunar and planetary tables.

The Chinese Shujing (Book of Documents) record observations of celestial events from ca. 3000 B.C.E. using a 12 month lunar year. Each lunar 'mansion' was peopled with the imperial court including its palaces. The Emperor Yao, (ca. 2254 B.C.E.), ordered his astronomers to calculate solstices to help farmers. Agricultural matters were of great concern to all early cultures, they had to make certain they had enough grain and legumes both to feed themselves and to plant the next season's crops.

The Greeks gave each of the 12 solar months the name of the animal they thought they saw in the sky; hence the zodiac which we inherit from the Greek word *zoin*, animal. They assigned the names of their Olympian gods (pantheon) to what they observed, honouring them, e.g. by sighting their temples to face particular constellations.

The Pleiades, e.g. were important to the Greeks because their rising and setting mark the summer and winter solstices. Pythagoras called them "the harp of the muses". They were also called the seven daughters of Atlas and Pleione, born on Arcadia's Mount Cyllene. To account for the fact they only saw six stars they created myths about the missing daughter. Merope was hiding because she was ashamed that she had married a mortal and Ovid added another twist to the myth by naming Electra as the hidden daughter, hidden because she was unable to witness the fall of Troy. In another version the Pleiades were pursued by Orion and Zeus turned them into stars to save them.

Different cultures saw different images in the sky and named them accordingly. The Blackfoot people of North America saw in Orion the Bull of the Hills, while the Navajo saw the Slender One. To the Greeks Orion was the hunter and gave him a varied genealogy. He is memorialized in a magnificent Archaic sculpture that comes from the Temple of Aphaia on the Island of Aegina, a kneeling Herakles about to draw his bow. The Greek scorpion, Scorpio, stung and killed Orion according to Ovid, but the Chinese saw Scorpio as an azure Dragon. It's all in the eye of the beholder!

Comets, meteor showers, eclipses, inspired terror, they appeared irregularly and when they did they were blamed for whatever misfortune had preceded them. The astrologer, John Gadbury, wrote a pamphlet, *de Cometis* in 1665, linking the constellation in which a comet first appeared with the kinds of problems that would ensue! He wrote that scandal, fornication and persecution would be the result of the 1664 and 1665 comets, while omitting to predict the great plague of London in 1665 that Samuel Pepys tells us killed "near 10,000"!

Charlatans played on superstition and ignorance to establish their power, but when Galileo pointed his spy-glass at the sky in 1609, he changed our view of the cosmos forever. Nevertheless, the charming myths the ancients created to explain celestial phenomena remain with us to enjoy. Many artists have found inspiration in the infinite beauty and mystery of the night sky. My own favorite, Van Gogh's *Starry Night*, captures it all.

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New books of interest

Barker, Andrew. *Scientific Method in Ptolemy's 'Harmonics'*. Cambridge:2000. ISBN 0-521-55372-5

Cook, Sir Alan. *Edmond Halley - Charting the Heavens and the Seas*. Clarendon/Oxford:1997. ISBN 0-19-850031-9

Steele, John M. *Observations and Predutions of Eclipse times by Early Astronomers*. Archimedes: New Studies in the History and Philosophy of Science and Technology, No. 4. Dordrecht:2000. ISBN 0-7923-6298-5

* most useful references

by Rita Griffin-Short

email: rgshort@spectranet.ca

Rita has been interested in ancient science for the last 40 years. She is a licensed archaeologist with interests leaning toward pre industrial technologies of 18th/19th c. Currently Rita is the Vice President of the Hamilton Chapter of the Archaeological Institute of America, Executive Director and Founder of The Hamilton-Wentworth Archaeological Foundation (1984) as well as the principal of RGS Archaeological Services.

Upcoming HAA meetings

Date Friday, January 10, 2002

Speaker Geoff Gaherty

Topic An Amateur's Experiences Learning to Observe Variable Stars

Location Spectator Building

Date Friday, February 14, 2003

Speaker TBA

Location Spectator Building

Date Friday, March 14, 2003

Speaker Waldemar Okon (Ph.D. student at McMaster)

Topic Globular Clusters in Galaxies: Improving the Metallicity Distribution Function

Location TBA

AD: The B.E.E.R. chair

Hello fellow Stargazers,

I would like to introduce you to some unique and hard to find astronomy items.

One of my favourites is a ridged acrylic felt sheet. These sheets are great for many astronomical applications. I sell 12 x 18 sheets by themselves and also make a custom light shrouds.

The light shroud is made out of 4 panels of the felt sheets and sewn together, then top stitched and hemmed to add more strength to the shroud. They look sharp and have Velcro sewn on to attach easily to any telescope. They can be rolled up for storage, take very little space and are feather light. They should last years depending on usage. Here are a few uses for the sheets

- Schmidt-Cassegrain dew shields
- Half circle light shrouds
- Telrad dew shields
- Full wrap around shrouds
- Baffle material
- Use inside upper ring to darken field
- Reduce reflection in mirror box
- Eyepiece dew lid in eyepiece case

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Hamilton Amateur Astronomers Membership Renewal

November 1, 2002 - October 31, 2003

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Type of membership:

Individual \$25.00/year

Family \$30.00/year

Royal \$50.00/year*

Friend \$100.00/year*

Patron \$250.00/year*

Voluntary Donation: \$.....

*These levels of membership confer the same rights and privileges as a Family membership. We greatly appreciate the additional financial support our members provide by signing up as a Royal, Friend or Patron member. *All membership dues are eligible for tax receipts.*

Total: \$.....

Please make your cheque payable to:

Hamilton Amateur Astronomers
P.O. Box 65578
Dundas, Ontario
L9H 6Y6

Membership renewals are due November 1, 2002

January 2003

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1 New Year's Day	2	3 Observing Night	4 Observing Night
5	6	7	8	9	10 HAA General Meeting	11
12	13	14	15	16	17	18
19	20	21	22	23	24 Observing Night	25 Observing Night
26	27	28	29	30	31 Observing Night	
			For observing info, call Stewart Attlessey 827-9105, Rob Roy 692-3245, Ann Tekatch 575-5433			
				December 2002		
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