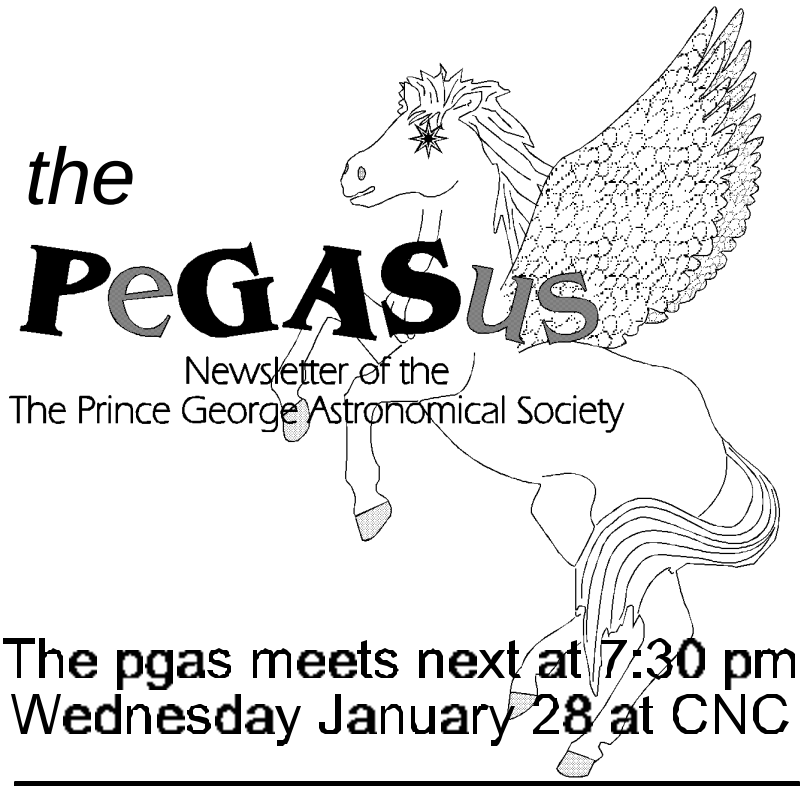
1998 JANUARY ISSUE #81

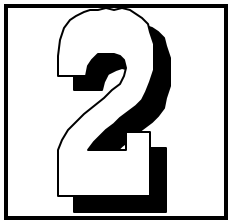


the PeGASus

Newsletter of the
The Prince George Astronomical Society

The pgas meets next at 7:30 pm Wednesday January 28 at CNC

INSIDE :

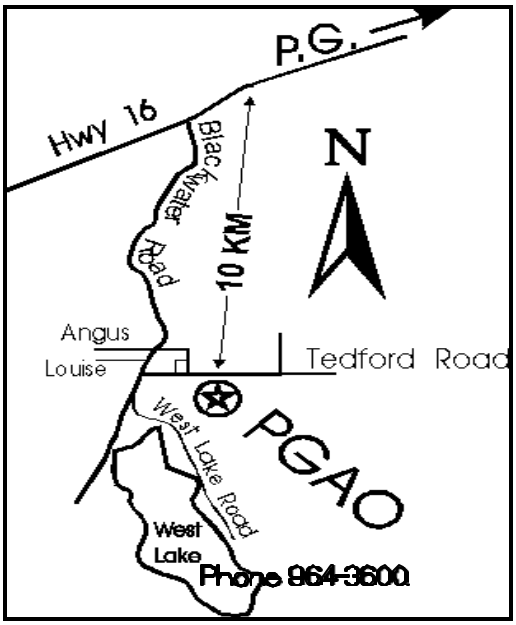


the PeGASus is published monthly by the *Prince George Astronomical Society*.

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
February 14

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



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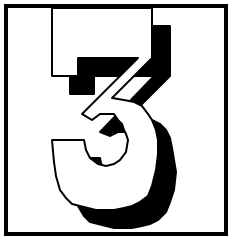


EDITORIAL

by Gil Self

I should take a few moments to explain what might seem confusing to some of you. Normally we don't produce a December newsletter, but I did print one last December (#70) and planned one for this December. We had a printing problem but I was not especially concerned since there was no meeting in December and issue #80 promoted January's meeting anyway and #80 is late maybe we should skip January—— but gee I already have some great stuff for January, but I'm running a bit behind on my deadline.....Are we confused yet ? Does being this close to fifty mean your thinking process is this scattered? Net result, you will receive two newsletters within a week of each other, (gosh another newsletter has a month gone by already? It seems just a few days since I got my last newsletter) relax you're ok it was me.

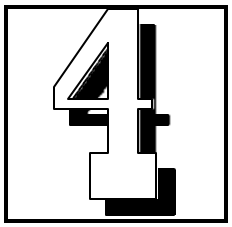
Last year we completed many projects. We finally have the roof protected, this has been worrying us for a long time since the original temporary roof was not adequate to protect the structure of the building. The new roof is all complete and paid for and should last for many years.

Another item that would have eventually caused a lot of damage was the condition of the lower basement which was starting to smell like an old root cellar. The basement floor was sealed and the cement was poured, what an improvement. The basement is almost dried out and with a bit more work will be a very usable space. Bonus, we put in a four foot wide sidewalk down the side of the building and mounted the pedestal for the outdoor C-8.

Still another outstanding accomplishment for last year is our web page. If you have not got a computer get a friend to take you there. But you really should see it .
E-mail the address to all your friends and relatives.

There have also been many tech improvements and upgrades. The guide scope was added to the 24 inch , we completed alpha tests on the ST-4 (it worked). The drives needed to be modified and the drive corrector repaired to allow automatic operation, this has been completed and will be installed and checked out this weekend.The Celestron will soon be mounted on the main telescope and all these improvements will allow us to move into our prime focus (no pun intended) for 1998 . We want to assemble a collection of "home grown" photographs. We now have everything we need to put together a collection of images we can be proud of.

Our computer is net ready and as soon as we install a browser and a phone line we can go on-line from the observatory. This will give use access to other observatories images, research and reference collections.
In 1998 we will complete our automated slide system to allow consistent professional slide presentations. Now if we could just get some clear skies!



Coming Events

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

February 25 -General meeting at CNC

The Night Sky for February '98 by Bob Nelson, PhD

Hi folks! As I write this, our winter is progressing nicely and, with the snow gradually building up to normal levels, those of us who like skiing are enjoying the outdoors. The same progression of winter storms is also depriving us of clear weather for observing. Oh well, what else is new? Anyway, here is what is going on in the sky:

MERCURY is a morning object for most of February but is lost in the glare of the Sun as it races ahead of the Earth to disappear behind the Sun. Superior conjunction [the point at which Mercury lines up with the Sun but is on the other side] is on Feb 22 (at 0800 UT).

VENUS makes its reappearance as a morning 'star' in February (it has moved past inferior conjunction as it zooms past the Earth). On the 15th, it rises about two hours before sunrise. On the 15th, it's a 43" crescent of magnitude -4.6 and should be very noticeable in the morning twilight.

MARS, in Aquarius (until the 24th when it passes into Pisces), is an insignificant 4" disk of magnitude 1.2 low in the south southwest at sunset and sets around an hour later. An increasingly difficult object, it still hangs around since it too is moving quickly around its racetrack only a little slower than the Earth.

JUPITER, in Aquarius, is lost in the glare of the Sun. It reaches conjunction with the Sun on the 23rd. Because it is much further from the Sun than Mars, it moves much more slowly, hence Earth speeds away from it and it disappears more rapidly.

SATURN, in Pisces, is in the southwest at sunset and sets around 10 P.M. It's a 16.6" disk of magnitude 0.3 and is still a decent object

reasonably high in the sky. Look for it! [Last month I discussed the seven moons that we can easily see from Earth.]

URANUS, in Capricornus, is lost in the glare of the Sun.

NEPTUNE, in Capricornus, is a 2.3" disk at magnitude 8.0 (as it was last month). It rises about an hour before the Sun (at about 6:30 A.M. -- good for all you very strange people that like to get up early).

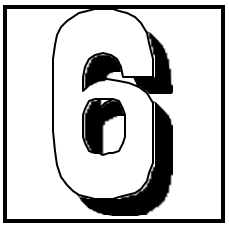
PLUTO, in Ophiuchus, is (as usual) a star-like object of magnitude 14. It rises at about 2 A.M. and should be visible in our 24" telescope for those staying up late.

There is a total solar eclipse on the 26th. It is centred in the Pacific south of Panama and is not visible from Prince George. (You can see the partial phases from Mazatlan if you are lucky enough to be going there.) Many details are in Sky and Telescope for February and will also be given at our February meeting.

CONSTELLATIONS to look for in February are Cancer with the ‘Beehive' or Praesepe Cluster (M44). According to Burnham's ‘Celestial Handbook', this cluster is over a degree in apparent size and contains about 350 stars down to magnitude 17. It is one of the few clusters to be mentioned in antiquity; the great astronomer Hipparchus, in 130 B.C., referred to it as a "Little Cloud". Galileo was the first, in 1610 with the newly invented telescope, to resolve it into stars. Modern studies have revealed, through indirect methods, the distance to be around 525 light years. Cancer also contains the very old open cluster M67.

Other constellations to look for are the northern half of Hydra (which contains M48, an open cluster; M68, a fine globular; M83, a large spiral galaxy; and numerous interesting variable stars and NGC objects), and the small constellations of Pyxis and Sextans, neither of which contains any Messier objects.

Good observing (if the skies ever clear)!



The Most Frequently Sought Information in Astronomy.

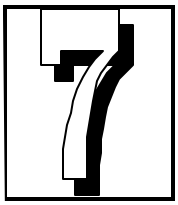
The beginning of our universe, often referred to as the Big Bang, began with an infinitely compact ball enclosing a space even smaller than an atomic particle. The universe was created when a compact ball grew through rapid expansion. Several events occurred after the Big Bang. The first three events separated the basic physical forces of the universe. At 10^{-41} seconds gravity separated from the three other forces (electromagnetic, strong and weak forces). At 10^{-33} seconds the strong and electromagnetic force became distinguishable, while the weak force was still tied up with the electromagnetic force. At 10^{-10} seconds the weak and electromagnetic forces separated, hence the four basic forces now acted independently. At 10 microseconds, quarks combined to form particles and after 3 minutes the protons and neutrons were formed. It took another half million years for true atoms of hydrogen and helium to form. After one billion years, gaseous clouds of hydrogen and helium began to condense into protogalaxies and the first generation of stars were created. Ten billion years after that, our sun and its solar system came into being, and a mere five billion years later, the PGAO was constructed on Tedford Road, South-West of Prince George.

There are plenty of unproved astronomical theories in the universe. Some of the most popular follow:

(1) Astronomers believe there is more mass than has been observed based on unexplained gravitational tugging on visible matter. Dark Matter is that missing mass which may constitute 90 percent of all mass in the universe. It could be made up of dead stars, black holes or exotic particles.

(2) One of the most intriguing theories concerns the possibility of an antiuniverse, a universe made up of antimatter. Scientists know that antiprotons and antielectrons exist, because such particles have been produced in particle accelerators. Supposedly, every time a particle was produced in the Big Band, an antiparticle should have been produced. Astronomers have yet to locate these antiparticles. Perhaps they exist in an antiuniverse.

(3) White holes and wormholes have been topics of numerous science fiction stories. The theory states that a black hole would lead to a matching white hole in another universe. A spaceship crossing over the event horizon--the boundary between the edge of the black hole and normal space--would pop out from the white hole. In reality, the excessive gravitational pull of the black hole would rip the spacecraft



apart long before it passed through either a wormhole or a white hole.
(4) Closer to home is the following problem. The Sun contains 99.86% of the mass of the solar system, and the planets comprise almost the remaining 0.14%. A measure of rotation (angular momentum) within the solar system gives a much different distribution. Angular momentum due to the orbital motion of a planet is a product of the mass, square of the radius and angular speed. For the angular momentum of the Sun (which is a spinning sphere) the product must be divided by 5 because the mass of the sun is strongly concentrated near its core. The angular momentum of the planets due to their spin can be ignored because it is a very small quantity compared with that of the Sun. When the products are calculated we discover that the Sun has only 1.5% of the angular momentum and the planets have the other 98.5%. Why do the planets, which contribute such a low percentage of the solar system's mass, contain nearly all of the solar system's rotation? If the solar system did evolve from a collapsing, rotating cloud of gas and dust, then most of the angular momentum (since it is conserved) should distribute itself in proportion to the mass. Apparently it didn't. Why not?

O.A.

SUNRISE ON THE CLIFFS OF SINUS IRIDUM

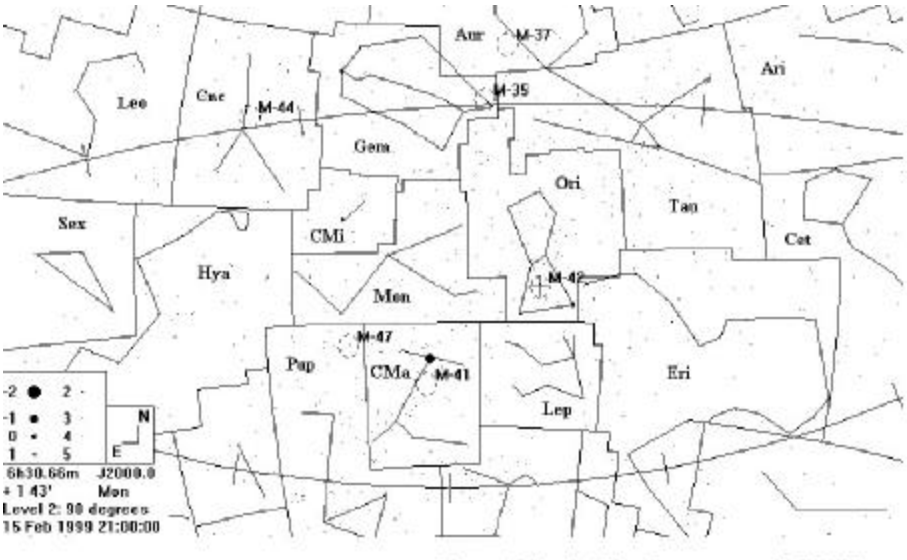
by Alan Whitman

The prettiest sight on the moon is visible when the terminator cuts through Sinus Iridum but the sun is rising on its bordering cliffs, the Jura Mountains. Then the cliffs form a great ring of light jutting out into the darkness beyond the terminator. This great ring is prominent even in 7x50 binoculars.

The ring of sunlit cliffs appears on the ten-day old moon. (It was a 9.7 day old moon this November 9th, but this changes from month to month as it is dependant on libration and when perigee and apogee occur.) The greatest effect only lasts for about two hours so it isn't visible every month from a particular longitude. I've only caught it seven times since 1961. Not that I've ever thought to look for it--it has just been luck each time that I've had the thrill of seeing it. On November 9th at 5:30 PM PST the ring was still incomplete. It was at its best about 7:30 PM and by 10 PM the show was already way past its peak because, as the sun crept across the slightly wrinkled floor of Sinus Iridum, the semi-circle of cliffs became less and less 'suspended in space'.

The long needle-shadow cast by Laplace Promontory where the great impact crater of Sinus Iridum joins the greatest impact site of all, Mare Imbrium, is also visible then.

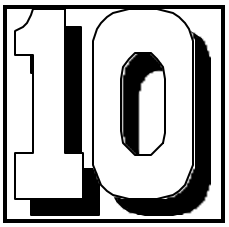
Have you seen the great ring bridging the void?



Map courtesy of Dr. Bob
February 15, 8:00pm

PGAS

PRINCE GEORGE ASTRONOMICAL SOCIETY



AT THE EYEPIECE by Alan Whitman

Scintillating Wintertime Half-hours

Winter cold need not keep you from enjoying the sky. While my larger telescopes are seldom used at temperatures below -15C, there are few clear cold nights when the snow isn't squeaking under my moonboots while the Milky Way is swept with 7x50 binoculars or a richest field telescope (RFT). Either binoculars or an RFT can be carried outside and back in with one hand, avoiding that great mental roadblock to winter observing, packing up afterwards. Dark adapt your eyes in your heated house or car; enjoy the brilliant winter skies until cold; and then back into the house at the highly civilized hour that the early darkness of winter allows.

This month, three short rambles are offered: one for ordinary binoculars, one for an RFT, and one for your unaided eyes. Lastly, some extreme examples of winter scintillation are described.

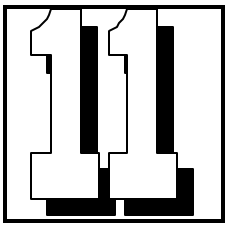
Here are the highlights of three adjacent 7x50 binocular fields near the border of Camelopardalis and Cassiopea:

Begin with the Camelopardalis open cluster NGC 1502. Two attendant star chains look rather like the tidal filaments of interacting galaxies. There is a short arc of four stars southwards and the delightful 2.5 degree long "cascade of faint stars tumbling down from the northwest to the open cluster", highlighted by a fifth magnitude star in the middle of the chain. Walter Scott Houston named Kemble's Cascade for the first observer to describe it, Saskatchewan's Father Lucien Kemble, who is quoted above.

The next field to the west holds an almost isosceles triangle of three prominent clusters: Stock 23 (resolved into stars) which is on the Cam/Cas border, H1 in Cassiopea, and Melotte 15 at the vertex. All three are plotted on Tirion's SKY ATLAS 2000.0. IC 1805, the nebulosity surrouding Melotte 15, was not visible to me in 7x50s. (Somewhat confusingly, NIGHT SKY labels the cluster IC 1805 while NGC 2000.0 says that IC 1805 refers to both the cluster and the faint nebula.) An adjacent open cluster, NGC 1027, was barely noticeable, just a little fuzziness around a star.

Sweep westwards one more field to NGC 663, the most prominent cluster viewed yet and the only one that the binoculars revealed of the five that Tirion plotted between Epsilon and Delta Cassiopeiae. It is interesting that this NGC cluster is so obvious, while the adjacent cluster Messier 103 was not visible in 7x50s.

Between NGC 663 and the glorius Double Cluster there are two attractive clumps of stars, each nearly two degrees in length. Neither is marked as an



open cluster in standard atlases, but they look either like clusters or stellar associations. The elongated northwestern group's stars are bright enough to be plotted on SKY ATLAS 2000.0 at RA 02 hours, Dec +60 degrees. The second group, Stock 2, is midway between those coordinates and the Double Cluster. An arc of bright stars extends from the latter to magnitude 4.4 Stock 2.
Experienced binocular hunters know that some of the largest and brightest open clusters that their binoculars sweep up appear only in the catalogues of Stock, Trumpler, Melotte, and Collinder, or somewhat surprisingly, in the Index Catalogue. These large clusters went unnoticed by the 18th and 19th century pioneers whose discoveries make up the NGC because their telescope's fields of view were too small to make such large coarse clusters evident.
We end our binocular ramble with another beautiful Kemble asterism. Extending the line from Eta through Gamma Cassiopeiae one length will bring you to two adjoining arcs of faint stars. The perfectly shaped southeastern arc is about three degrees in length; the adjacent northwestern one is smaller and not quite as perfectly formed. The curving pair are reminiscent of the mammatus which frequently hangs below thunderstorm anvils.

Also prominent in binoculars are the three famous Messier clusters in Auriga, M36, M37 and M38. But, like the Double Cluster, they are more rewarding when viewed with an RFT. M37 is the best of the three--unusually dense for a galactic cluster with an orange star in the centre. Very attractive M38 is usually described as resembling the Greek letter 'pi', but to me it has always seemed like a minature of the constellation Perseus. The rich compressed open cluster NGC 1907 is quite prominent in M38's field of view, a moon's diameter to the south.

If you live on a quiet road, driving home on a winter evening allows your eyes to become quite dark-adapted. Before going inside to the bright lights I almost always spend five minutes checking the sky with my unaided eyes; this was standard even at -35C in Arctic airmasses when we lived in the B.C. Central Interior. Every so often Algol will be caught unusually faint, and, sure enough, it will be at minimum when THE OBSERVER'S HANDBOOK is checked later. Twice the four-sided Keystone of Hercules has surprised me by turning into a pentagon. No, they unfortunately were not novae; the variable 68 Herculis had just surprised me at maximum. Last February we enjoyed Mira at one of its brightest maxima this century, so bright at magnitude 2.3 that its orange hue was prominent without optical aid. How bright will it become this year at its mid-January maximum?

There are more naked-eye galactic clusters visible along the Milky Way in winter than in any other season. Challenge your dark-adapted unaided eyes with these open clusters: M39 in Cygnus, the Double Cluster and M34 in Perseus, NGC 752 in Andromeda, M35 in Gemini, NGC 2244 in Monoceros, M48 in Hydra,

cont on page 12

cont from page 11

M47 in Puppis, and M41 in Canis Major. Five other naked-eye wintertime open clusters could hardly be called challenging: the Hyades, the Pleiades, the Beehive, Coma Berenices, and the Big Dipper cluster. (The Dipper's five middle stars plus Alcor and Alphekka are prominent members). Add the Orion Nebula, the Andromeda Galaxy and the toughest one, galaxy M33, and you have 17 naked-eye objects gracing winter skies to look for. In comparison, summer adds only seven more objects to the list of naked-eye clusters and emission nebulae that are visible from Canada using average eyes like mine. Walter Scott Houston suspected that the reflection nebulosity around the Pleiades could be glimpsed with the naked eye; my logbooks record the same tentative observation on several nights.

A.W.

note: Al has been kind enough to arrange to make his RASC articles available for our newsletter, more to follow next month.
Not for redistribution at the author's request

Local global position

The following longitude and latitude numbers are approximate, they have been extrapolated from aeronautical charts of the area and should be more than adequate for reporting fireball information.

the observatory	53d 48m N—-122d 53m W
Summit lake	54d 17m N —122d 43m W
Tabor lake	53d 55m N —122d 33m W
Town centre	53d 54m N —122d 47m W
Quesnel	53d 00m N —122d 30m W
Vanderhoof	54d 01m N —124d 01m W
McBride	53d 16m N —120d 09m W

(Thanks Ken)

Other useful stuff for fireball reports

The moons diameter is one half a degree or 30 arc seconds
A fist held at arms length covers about 5 deg of sky
A spread out hand at arms length covers about 10 deg of sky

To calculate UT add 8hrs to current PST or add 7hrs for daylight time.

I wouldn't try and memorize a pile of star magnitudes, instead note stars of simillar brightness and look up the right values.

Clear Skies
Gil

AstroSurfing

In November 1997 Steve Senger posted to the pgas e-mail net, reports of fireballs over the southern interior and south coast all the way to Vancouver island. A short while later Orla posted this e-mail and the suggestion that club members might find this helpful in the newsletter

From: Richard Huziak <huziak@SEDSystems.ca>

Subject: Re: RASC List: Fireball! - Great report!

For those of you who see fireballs, Stan's excellent report below gives us almost precisely what is most valuable! This is the form of report we'd love to see on a regular basis. The only thin missing was Stan's exact location from which he observed the event. Giving RA's and dec's instead of alt-azimuth readings is just fine - they're more accurate if the observer is experienced. Again, there are 5 important parameters we'd mostly love to have - the rest are gravy:

- observer's exact location (long and lat)
- beginning point (alt-az or RA, dec'l)
- end point (ditto)
- duration of flight (seconds)
- exact date/time (state zone used)

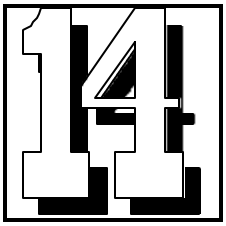
Other info is useful as well, so don't exclude it, but the positional data is what makes the data useful and makes us investigators hot! Thanks a lot, Stan! I hope others are encouraged! Rick

****

On Thu, 13 Nov 1997 18:49:29 -0500 Stanley Hanna <sjhanna@cyberus.ca> wrote:

> Last evening while travelling east from Perth to Ottawa my wife and I witnessed a brilliant fireball. Here are the pertinent details:
> Date: 1997 November 12
> Time: 02h 35m 20s UT
> Start: RA= 6h 10m DEC= +36Deg
> End: RA= 7h 45m DEC= +25Deg
> Travel: It appeared to traverse 55Degrees.
> Apparent magnitude was -4.5 to -5.
> Duration was 2.8 seconds.
> Colour was white with a definite smoke trail.
> There was some fragmentation in that it appeared that pieces fell from the object.
> However, the train was steady and there was no breakage.
> The velocity was medium to fast. I was unable to hear if there was any sound.
> I am not sure why I have been so fortunate to witness two within a few
> weeks. I do not know much about Fireballs - but I know what I like - and I
> liked seeing that!
> Stanley Hanna

Please see page 12 for local longitude and latitude



SOLAR ECLIPSE-CHASING NOSTALGIA

from Al Whitman

With the Caribbean eclipse fast approaching, on the 19th anniversary of the last total eclipse in Canada or the continental U.S.A. (February 26, 1979), you know where my thoughts and efforts are concentrated.

Some remembrances of moon-shadows past:

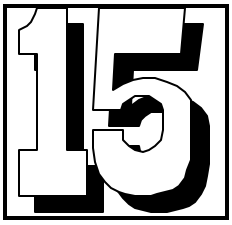
July 20, 1963 at Plessiville, Quebec with the Montreal RASC Centre: We saw the eclipse through altocumulus cloud which hid the outer corona but that really wasn't a problem since totality lasted only 63 seconds (63 sec in '63). Amazing what you can see in 63 seconds--one long prominence made my eclipse. Jay Passachoff was in our group of 60. It was his first eclipse too but he has gone on to see 23 more totalities; I've seen 2 more and am envious.

On the way to the eclipse by train a freight train up ahead lost two flat cars which rolled back down into our passenger train, derailing the engines just after they had crossed the Miramachi River trestle. The rest of the train stayed on the tracks--rather fortunate that since the passenger cars were still on the high trestle! We were at the wreck-site for 14 hours--I had to leave the train part way to Montreal and grab a bus to make it to Plessiville in time. Dumb 16-year-old that I was, on the way home I missed the train in the middle of nowhere when I got off for breakfast in a small Quebec town. Couldn't speak French well enough to pay my bill and catch the train. Touched the last car but there were not any steps at that end of the car! Called my father and had him get my luggage and precious 60mm refractor off the train when it reached home.

February 26, 1979:
We planned to observe at Pasco in the eastern Washington desert but it was raining heavily at 4:30 AM. A network of ham radio operators reported breaks in the clouds farther west, behind the front. At 5 AM on a Tuesday morning in February we joined bumper-to-bumper traffic in the emptiness of eastern Washington--a line of 'eclipse refugees' fleeing west to clearing skies. Set up at Goldendale, Washington near the Oregon border and skies continued to clear. Two minutes before totality a tiny scud cloud formed above the sun, heading right for it. I yelled out "We have to move!" and was greeted by stares from the unaware or fatalistic around us. Jumped into the car leaving the unaware at ground zero behind and tore north a mile to avoid the cloud. Schreeched into a parking spot one minute before totality. My wife even ran around the car laying out the white sheets on the hood--thus we saw the only shadow bands that I've seen at any eclipse!
There were no clouds within a few degrees of the sun--my first outer corona, a solar-maximum "daffodil". Just used naked eye and 7x50's this time.

(more eclipse stories from Al next month) Ed

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	744
A.V. Jay Roofing	600
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.

The Prince George Astronomical Society's
New home page , is located at
http://www.pgweb.com/astronomical/
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