



SASKATOON SKIES

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Other Great Stuff

What Happened in History in December

- 2 U.S. Pioneer 11 flew by Jupiter in 1974.
- 3 U.S. Pioneer 10 flew by Jupiter in 1973.
- 3 California Institute of Technology's Jet Propulsion Laboratory became part of NASA, two months after the U.S. space agency was formed and less than a year after JPL's hastily-built Explorer I became the West's first Earth satellite on January 31, 1958. JPL had been obscure secret lab for WWII Army rocket research.
- 4 In 1965, Frank Borman and James A. Lovell Jr. in Gemini-Titan 7, longest Gemini flight, more than 13 days. Walter M. Schirra Jr. and Thomas P. Stafford, in Gemini-Titan 6-A, made the first space rendezvous with Borman and Lovell in Gemini 7.
- 6 In 1958, the U.S. launched Pioneer 3 which discovered the outer Van Allen radiation layer above Earth's atmosphere.
- 7 Eugene A. Cernan, Ronald E. Evans, Harrison H. Schmitt, Apollo Saturn 17, Moon, 1972. Cernan, Schmitt made sixth and final Moon landing December 11, collected 243 lbs. rocks in 75 hours.
- 11 U.S. Apollo 17, carrying the first scientist to the Moon, in 1972 makes Man's sixth landing there.
- 12 In 1967, U.S. Pioneer 8 was launched from Earth to an orbit around the Sun. It worked until April 28, 1968.
- 14 Tyco Brahe was born in 1546.
- 16 6 U.S. Pioneer 6 left in 1965 for orbit around Sun between Earth and Venus, ranging 75 to 90 million miles from

- Sun, 311-day orbit.
- 21 USSR Luna 13 left in 1966 for Moon, soft landing there 80 hours later. Drove a spike into the lunar surface and sent back photos.
- 21 Frank Borman, James A. Lovell Jr. and William A. Anders in 1968 in Apollo-Saturn 8, made the first manned flight to the vicinity of the Moon in the Apollo command module, sent back television pictures of the lunar surface, and returned to Earth.
- 21 As cosmonauts Vladimir Titov and Musa Manarov left for home in 1988 after a year aboard the USSR's orbiting space station Mir, they set a new 366 days continuously in space endurance record. They had flown to Mir December 21, 1987.
- 23 The Saturn moon Rhea was discovered in 1672.
- 25 Isaac Newton was born in 1642.
- 27 Johannes Kepler was born in 1571.
- 29 In 1987, USSR cosmonaut Yuri Romanenko flew home from Mir space station setting a record of 326 days continuously in space, bringing his total accumulated time in space to 430 days.

Moon was very extensively mapped by the little spacecraft **Clementine**.

The **Moon's** rotation is locked in phase with its orbit so that the same side is always facing toward the **Earth**. Actually, the **Moon** appears to wobble a bit (due to its slightly non-circular orbit) so that a few degrees of the far side can be seen from time to time, but the majority of the far side was completely unknown until the **Soviet** spacecraft **Luna 3** photographed it in 1959.

The **Moon** is receding away from the **Earth** at about 3.5 centimeters per year. The gravitational coupling between the **Moon** and the **Earth** in addition to causing the tides also transfers rotational energy from the **Earth** to the **Moon**. This slows down the **Earth's** rotation (by about 1.48 milliseconds/century) and accelerates the **Moon** into a higher orbit (the opposite effect happens to **Phobos** and **Triton**).

The **Moon** has no atmosphere. Recent evidence from **Clementine** that suggested that there might be water ice in some craters near the **Moon's** poles has turned out to be inconclusive. But the possibility still exists that ice may exist mixed with lunar soil. The **Moon's** crust averages 68 km thick and varies from essentially 0 under **Mare Crisium** to 107 km north of the crater **Korolev** on the lunar farside. Below the crust is a mantle and possibly a small core. Unlike the **Earth's** mantle, however, the **Moon's** is almost certainly not hot enough to be molten. Curiously, the **Moon's** center of mass is offset from its geometric center by about 2 km in the direction toward the **Earth**. Also, the crust is thinner on the near side.

There are two primary types of terrain on the **Moon**: the heavily cratered and very **old highlands** and the relatively smooth and younger **Mar**. The maria (which comprise about 16% of the **Moon's** surface) are huge impact craters that were later flooded by molten lava. Most of the surface is covered with **regolith**, a mixture of fine dust and rocky debris produced by meteor impacts. For some unknown reason, the maria are concentrated on the near side.

In addition to the familiar features on the near side, the **Moon** also has **South Pole-Aitken** on the far side which is 2250 km in diameter and 12 km deep making it the largest impact basin in the solar system and **Oriente** on the western limb which is

The Moon

The **Moon** is the only natural satellite of **Earth**: distance from **Earth**: 384,400 km diameter: 3476 km

* mass: 7.35e22 kg · Called **Luna** by the Romans, **Selene** and **Artemis** by the Greeks. The **Moon**, of course, has been known since prehistoric times. It is the second **brightest** object in the sky after the **Sun**.

Due to its size and composition, the **Moon** is sometimes classified as a terrestrial "planet" along with **Mercury**, **Venus**, **Earth** and **Mars**. The **Moon** was first visited by the Soviet spacecraft **Luna 2** in 1959. It is the only extraterrestrial body to have been visited by humans The first landing was on July 20, 1969 (do you remember where you were?); the last was in December 1972. The **Moon** is also the only body from which samples have been returned to **Earth**. In the summer of 1994, the

University Observatory Hours for Public Viewing

The University of Saskatchewan observatory will be open to the public on Saturday evenings from 7:30 P.M. until 9:30 p.m.

Observatory assistants will be present to answer questions about astronomy and to assist the public in viewing through the telescope. The observatory is located on campus, one block north of the corner of Wiggins Ave & College Drive in Saskatoon.

For more information, call Stan Shaddick, Astronomy Instructor, at 966-6434.

splendid example of a multi-ring crater. A total of 82 kg of rock samples were returned to the Earth by the Apollo and Luna programs. These provide most of our detailed knowledge of the Moon. They are particularly valuable in that they can be dated. Even today, 20 years after the last Moon landing, scientist still study these precious samples.

Most rocks on the surface of the Moon seem to be between 4.6 and 3 billion years old. This is a fortuitous match with the oldest terrestrial rocks which are rarely more than 3 billion years old. Thus the Moon provides evidence about the early history of the Solar System not available on the Earth. Prior to the study of the Apollo samples, there was no consensus about the origin of the Moon. There were three principal theories: *co-accretion* which asserted that the Moon and the Earth formed at the same time from the Solar Nebula *fission* which asserted that the Moon split off of the Earth; and *capture* which held that the Moon formed elsewhere and was subsequently captured by the Earth. None of these work very well. But the new and detailed information from the Moon rocks led to the *impact* theory: that the Earth collided with a very large object and that the Moon formed from the ejected material. There are still details to be worked out, but the impact theory is now widely accepted.

The Moon has no global magnetic field. But some of its surface rocks exhibit remnant magnetism indicating that there may have been a global magnetic field early in the Moon's history. With no atmosphere and no magnetic field, the Moon's surface is exposed directly to the solar wind. Over its 4 billion year lifetime many hydrogen ions from the solar wind have become embedded in the Moon's

regolith. Thus samples of regolith returned by the Apollo missions proved valuable in studies of the solar wind. This lunar hydrogen may also be of use someday as rocket fuel.

Notice of General Meeting

You are invited to attend the General Meeting of the Saskatoon Centre of the Royal Astronomical Society of Canada.

Monday, December 11, 1995, 8:00 p.m.
Room A-226, Health Sciences, U of S
Campus

Please note that this meeting is 1 week earlier than usual to avoid the Xmas rush. The program is TBD.

Plan to come to the Feb./96 meeting -
Speaker - Lumsden, SK astronomer Father
Lucian Kemble -
discoverer of Kemble's Cascade!

Minutes of the Executive Meeting RASC Saskatoon Centre Nov. 20, 1995, Room B-10, Health Sciences Bldg, U of S

Present: Ed Kennedy, Gordon Sarty, Al Hartridge, Garry Brett, Mike Williams, Rick Huziak, Brian Friesen, Bill Hydromako, Merlyn Melby, Eric Keser.

1. Meeting called to order 7:00 PM.
2. Review officers for the executive and discuss positions for the executive.
3. Discussion on the new site survey and location of new property.
4. Report on the 16 in. telescope project by Bill Hydromako.
5. Discussion on the Rystrom Observatory. Merlyn Melby showed the red light assembly he is building. Thanks to Don Friesen for repainting the dome at the observatory site.
6. Thanks to Brian Friesen and Erich

Keser for help on the Martensville Star Night.

7. Western Business Machine is providing the Saskatoon Centre with a van to use when carrying EETOOK around to various star nights. We plan the return the gesture by running an advertisement for them in the newsletter gratis.

8. Erich Keser provided four talks to the Saskatoon School Board space club. Associated with this, a discussion on donations to the RASC Saskatoon Centre ensued.

9. Gordon Sarty is starting a Web Site on the Internet for the Saskatoon Centre and is willing to maintain this site.

10. Rick Huziak has started an information service called "QuickNews" on the Internet. This is to be provided for rapid dissemination of information such as comet and fireball sightings.

11. Discussion on the Edmonton G.A. next year and future G.A.s.

12. This year's membership renewal is at 14.

13. There are also 10 paid new members.

13. Observer's Group meetings will now be held at the Rystrom Observatory.

14. Note on an astronomy course put on by Jim Young and Al Hartridge for the public schools.

15. The next meeting will be held on the second Monday in December rather than the third Monday.

16. Motion for meeting adjourned 7:55 PM by Garry Brett.

Minutes of the General Meeting of the RASC Saskatoon Centre November 20, 1995, Room A-226, Health Sciences Bldg, U of S

1. Meeting called to order at 8:10 PM.
2. Observer's Group meeting set for Dec. 15 (rain 16th). We will hold an observing session this coming weekend as well.
3. Discussion on the Internet "QuickNews" set up by Rick Huziak.
4. Discussion on the Edmonton G.A. We would like to see a large group for Saskatoon attend this G.A.
5. Elections of officers for the RASC Saskatoon Centre Executive.

Important Info

The Rystrom Observatory

Members are welcome to use the observatory at any time but please phone ahead. Call Nelson or Gloria Rystrom at 955-2370 before 9:00 p.m. if you intend on going out. This lets them know that someone will be roaming around their yard. If they do not answer go anyway. Drive through the yard slowly, and dim your lights as a courtesy to others who may be observing.

- Honorary President tba
 - Past President tba
 - President Rick Huziak
 - Vice President Erich Keser
 - Treasurer Mike
- Williams
- Secretary Al Hartridge
 - Centre Rep. tba
 - Membership & Promotion vacant
 - Activities Coordinator ..vacant
 - Newsletter Editor... Garry Brett
 - Librarian Jim Young
 - Councilors

Gordon Sarty

Sandy Ferguson

Merlyn Melby

Brian Friesen

Bill Hydomako

Scott Alexander

Motion for nomination to cease by Chris Martin. Second by Stan Shadick.

Members elected to above positions for the 1995 - 1996 year.

6. Short presentation by Rick Huziak on the RASC Saskatoon Centre summer activities.

7. Presentation by Don MacKinnon on the India Solar Eclipse.

8. Presentation by Dr. Ed Kennedy on the Brazilian 'Tunguska' Event.

9. Meeting adjourned 9:40 PM.

DUES ARE PAST DUE

Dues are past due. Please join us again for the year to come. Mike Williams would like get everyone signed up before Xmas this year! (Novel concept). If you have not rejoined, this will be your LAST newsletter. 1996 Handbooks are in for those who have paid their memberships.

Regular	\$ 40.00
Youth (21 and younger)	\$ 22.50
Life	\$900.00

Send your cheque to this address or join at the next general meeting, but please join us again!

*RASC Saskatoon
PO.Box 317, RPO
University
Saskatoon, SK
S7N 4J8*

1995 RASC Colour Calendars are In

The 1996 calendars are now in beautiful colour and feature excellent photographs from Canadian amateur astronomers. This calendar is well worth it's price of \$10.00. If you want it mailed out, add \$1.50 for postage. Orders within Saskatoon will be personally delivered in time for Xmas! These calendars make excellent stocking stuffers! Act now - our stock is already low! Call Rick Huziak (665-3392) or write to the Centre mailbox.

How ToSee Faint Fuzzy Things and MUCH More Detail
by Richard Huziak

I am often asked how I see the faintest of fuzzy things, such as 16th magnitude galaxies from the Rystrom Observatory, or good detail on planetaries and other objects. Pushing your telescope to and beyond the limit depends on a large number of factors. The more factors your scope and your abilities comply with, the fainter and clearer you will see. Use these tips of ALL observing, not just for the faintest objects, and you will be greatly rewarded.

The Telescope - Keep your optics clean. Dust on the mirror or eyepieces really scatters the light and brightens the background by a magnitude or more. It is OK to wash your mirror often if you do it carefully. The best method is prevention. Keep dust caps on when not using the scope and make sure they are reasonably airtight. Another great failing

is the area of the telescope around the eyepiece. Many scopes have this area painted with bright, glossy paint or even chromed! To see the faintest objects, your eye must accumulate only a few photons per second over a long period. Any glare from a shiny telescope tube will drown out those faint photons, often loosing 2 or 3 magnitudes of depth. Paint all surfaces you can see from your eyepiece (tube, focus knobs, eyepiece draw tube, spotter and anything else) flat black.

Also, if you have a choice of telescopes, a longer focus scope will give you a higher contract field (i.e. and f/10 instead of f/3) with less scattered light and more useable magnifying power. Also, use the telescope at the maximum power possible for that night's observing. This helps to give a higher contrast field with a darker background, plus eliminates all those pesky, glaring 12th magnitude stars that tend to overpower the fuzzy bits. If you have a Newtonian with the eyepiece at the front, you must have an extended dew cap at least 1-1/2 times as long as the diameter of the tube. This eliminates those very annoying flares directly up the eyepiece draw tube that come from the ground or other stars half way across the sky!

You - the Observer: Use a black cloth to cover your head to keep out stray light and reflections from your tube, bright stars and especially the ground. (I use a pair of black gym shorts and look through the leg David Cornish thinks I'm weird, but I do see a lot!) Reflections off of snow in the winter can be as bright as the moon. This

Advertising Info

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Commercial advertising is accepted in the Saskatoon Skies with three sizes of ads available. Artwork must be camera ready and supplied by the advertiser.

One quarter page.....	\$25.00
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For further information please contact me or mail your questions to the address below.

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has to be eliminated. Avoid using any lights (even your red light) when observing for the faintest objects. Even a faint red light will affect your eye enough to miss the fine details. You must also be very patient. To see a faint object may take several or even 10's of minutes for your eye to gather enough photons to form the image. Do not give up too soon. I often spent 15 or 20 minutes at the eyepiece before I spot the faintest galaxy or comet in the field and another 15 checking out the finest details. Keep warm and try to avoid eyestrain, though this is difficult in the winter and after several hours of observing. And don't get dehydrated. Drink juice or water while observing if you can. Furthermore, the more you practice; the more you observe; the fainter and better you see. you have to LEARN what you are capable of seeing.

Field Tricks: You can help to improve the visibility of a faint, extended object such as a galaxy, comet or diffuse nebula by allowing it to float across the field, by jiggling the telescope slightly or by drawing your eye quickly away from the image. All these methods act to 'defocus' the brighter stars, allowing your eyes not to get affixed to the stars instead of the faint fuzzies. Also, use "*averted vision*". Do not stare directly at the object or where the object should be. Your eye uses 'low light cones' which are offset from the daytime cones your eye uses for bright light and you have to displace the image slightly to see the faint parts. (Using "averted imagination" helps sometime, too!). If there is a 'bright' star in the field (3 or 4 magnitudes brighter than the target object), set this star out of the field to reduce the glare. Even a 10th magnitude star is bright compared to a 14th magnitude comet!

The Observing Site; Try to choose a site

away from lights. Light pollution and the aurora are often unavoidable in **Saskatoon**, but do not compound it with nearby house lights, the moon, or other brilliant annoyances. Even a yard light a mile away is brighter than **Sirius**! You don't need that shining in your eye.

Using these methods and my 4-1/4" reflector at f/10.8, I've managed to see the quasar **3C273** at magnitude 13.6 and the faint **Horsehead Nebula**. I've also glimpsed stars as faint as 14th magnitude, though the 'theoretical' limit is only 12.0 (which I see regularly from the city). With the 12.5" Eetook, I've seen galaxies as faint as 16th magnitude from the **Rystrom Observatory**. I can hardly wait for a 'dark sky' at our new site!

There is an excellent article in **Sky and Telescope**, April 1994, page 106 - 108 entitled "How Faint Can You See?", by **Dennis di Cicco**. This is MANDATORY reading for all astronomers. It dispels many myths about 'limiting magnitude'. Have you ever seen a 15th magnitude star with your 2-inch, or a 19th magnitude star with your 16-inch? You can! And one day, you probably will if you practice a lot and observe good faint-object practices.

Electronic Submissions to the Newsletter

Those who submit diskettes to the editor for publication should use MSDOS and save the files as "MSDOS Text with Linebreaks" or "Text with Linebreaks". Do NOT submit "fancy formats" as some are very hard to decode. Save graphic files in either .bmp, .pcx or .gif formats. Since the editor has a scanner, you can still submit typewritten articles and hand drawings, which can be conveniently scanned using OCR (optical character recognition) for text. Those who don't have computers can still hand write articles. This will give the editor some practice on the keyboard. Long distance submissions are welcome to submit to the Centre's email address "Huziak@SEDSsystems.ca". Mailed in submissions should go directly to the editor (**Garry Brett**) to avoid delay. **Deadline is ONE WEEK prior to the**

beginning of each month.

The Saskatoon Centre's QuickNews Service

If you've just subscribed to the **Internet**, the **Saskatoon Centre** provides a "QuickNews" service by email where new discoveries and other interesting stuff is announced as it happens. QuickNews is free and tends toward observing topics. If you'd like to subscribe just send an email message to "Huziak@SEDSsystems.ca" and on the Subj: line write "subscribe uickNews". Issues are sporadic, depending on when interesting discoveries happen. Contributions are welcome.

NEW DISCOVERIES

New Nova Cas 1995 and New Comet Hale-Bopp

About Aug 24, a 9 mag nova was discovered in lower Cas. Full details will appear in the newsletter. However, **Gord Sarty** has the AAVSO charts available in uuencoded (.gif) format. If you are a variable star observer, you might want to beg him for these. ("ge.sarty@usask.ca").

Stan Noble recently emailed me about the new comet **Hale-Bopp**, currently a 10th mag object in **Sagittarius**. Details will appear in the newsletter. There's not much point trying to find it now, as it is very low and sinking into the sun. However, it is the most distance comet yet discovered and appears to be humongous (sp?). Conservative predictions are forecasting it will be a 0 or -1 mag object in early 1997. Please feel free to email anything to me that is interesting and timely. It most likely will end up in the **Saskatoon Skies** newsletter next month AND get on QuickNews.

I will also gladly forward anything sent that is specifically destined only for the newsletter to **Garry Brett**.

Membership Info

Membership in the **Royal Astronomical Society of Canada** and the **Saskatoon Centre** is open to anyone and has many benefits.

Below are the prices for memberships. Should you require additional information please contact **Rick Huziak** at 665-3392.

Regular membership (21 & up).....\$40.00
 Youth Membership (21 & under)....\$22.50
 Club Newsletter (12 issues).....\$10.00
 Observer's Handbook.....\$18.95

Note: Lifetime memberships are available on request for \$900.00

Saskatoon Skies 1995

VARIABLE STAR NEWS

Lots going on about now. This is a heyday for variable star observers:

Zeta Auriga in Eclipse

Zeta Auriga, the right hand member of the "twins" in **Auriga** is experiencing a primary eclipse beginning about November 16. **Zeta** is a giant or supergiant system, very similar to **OW Gem**. **Zeta** eclipses only every 2.66 years (972.176 days). The eclipse lasts until about December 21. The chart in November's Newsletter shows the area with magnitudes of comparison stars indicated. Good luck on detecting this! It is a challenge just as **OW** is, because the visual change is so small, only 1.5 magnitudes.

Experienced variable hunters may be able to notice the difference. **Zeta** is normally at magnitude 3.76, but will fall to about 4.0 during the eclipse and stay there for a month. More details can be found in **Burnham's Celestial Handbook, Volume 1**.

Secondary Eclipse of OW Geminorum

A recently discovered supergiant eclipsing variable will experience a secondary eclipse from about November 17 to December 17. The secondary eclipse is barely visibly detectable, but a challenge for those who want one. This star eclipses only every 3.4457 YEARS, so don't miss this! Although the primary eclipse range is 8.2 to 10.0 magnitude, the secondary eclipse only varies from 8.2 to about 8.5 magnitude, which is visually difficult. The eclipse lasts about one month. Details and a comparison chart are available in **Sky and Telescope**, February 1995.

R Corona Borealis is Faint

The 'reverse nova' **R CrB** has fallen from it's normal 6.0 magnitude, and is currently sitting at about 11.8. This event was not unexpected, but did occur inconveniently when I was in **England** and could not observe the beginning of the fall. Similar decreases have happened in August through October in many of the past years, but a one-year periodicity is not real, just a coincidence. Decreases can happen at

almost any interval from weeks to years. **R CrB** is a red giant carbon star that puffs out a cloud of carbon soot which blocks off the light of the star until the cloud disperses. Details and a comparison chart are available in **Burnham's Celestial Handbook**.

SS Cygni is up:

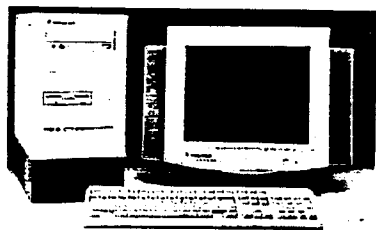
The dwarf nova **SS Cygni** is currently about 9 days into an outburst (about 8.5 magnitude). It should be fading soon. This dwarf nova usually sits at about 12.0 magnitude, but every about 40 days erupts to about magnitude 8.5. Chart available in **Burnham's**.

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Safe.
Don,t
Drink and
Drive!*

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Safe and
Happy Holiday!*



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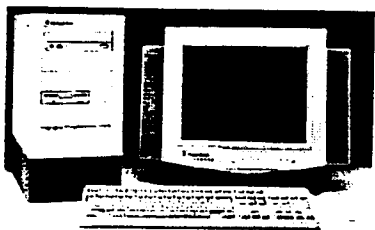
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- Kids** My First Encyclopedia, Spiderman® Cartoon Maker, TuneLand™, The Pirate Who Wouldn't Wash, Milly Fitzwilly's Mouse Catcher, Kidspace



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ASTROPHOTO CORNER

DEC. 1995

RASC SASKATOON CENTER

PHOTO OF THE MONTH

NGC 7479



This beautiful barred spiral galaxy can be found in the constellation **PEGASUS** about three degrees south of Alpha Pegasi the 2.5 mag. star that marks the south west corner of the great square of Pegasus.

TECHNIQUE: This photograph was done with the Celestron 14 with focal reducer to f7.5. The exposure was 90 minutes on hypered Tech. Pan. 2415. The negative was developed in D19 for six minutes at 70 degrees F. The negative was enlarged onto #5 high contrast photographic paper. The image you see here in the newsletter was scanned into Aldus photostyler on the computer and digitally altered slightly to improve the photo somewhat i.e. remove some scratches etc.

ASTROPHOTO TIP: If you are ever at a loss as to what to photograph next try browsing through a reference like **THE OBSERVERS GUIDE**. This a collection of 32 issues covering all the constellations with tips on observing and containing lots of photographs by amateurs. There is usually some info re the technique used on these photos which I have found very useful.

Clear skies and good guiding----- Al Hartridge