SASKATOON SKIES

Volume 26, Issue 11, November 1995

Saskatoon Skies is published monthly by the Saskatoon Centre of The Royal Astronomical Society of Canada

In this Issue

What Happened In History

1 The 2,060th asteroid, Chiron, discovered, 1977 by Charles Kowal.
2 Astronomer Harlow Shapley was born in 1885.
3 In 1973, The interplanetary probe Mariner 10 left the U.S. for Venus and Mercury. It passed Venus February 5, 1974, and arrived at Mercury March 29, 1974, the first time the gravity of one planet, Venus, was used to fling a planet toward another planet, Mercury.
4 In 1981, USSR Venera 14 was launched to Venus, landing there March 5, 1982, X-ray fluorescence soil analysis.
7 In 1966, U.S. Lunar Orbiter 2 left for the Moon, going into orbit there November 10, 1966, sending back hundreds of photos.
7 In 1967, U.S. Surveyor 6 left for the Moon, landing in Sinus Medii November 10, 1967. It jumped eight feet to take pictures of its original landing site, among 11,524 photos it sent back.
8 Astronomer Edmond Halley, after whom the famous comet was named, was born in 1656.
8 In 1968, U.S. Pioneer 9 was sent to orbit the Sun with six solar radiation experiments aboard.
10 In 1970, the USSR sent Luna 17 to a soft landing on the Moon, on the Sea of Rains November 17, 1970. In its first use, the Lunokhod I self-propelled roving Moon car analyzed soil and sent TV pictures of the lunar surface to Earth.
10 In 1968, Zond 6 left the USSR on a flight out and around the Moon and back to Earth.
11 James A. Lovell Jr., Edwin E. Adrian Jr., 1966, Gemini-Titan 12, final Gemini flight including a record 5.5-hour spacewalk.
12 U.S. Voyager I flew past Saturn in 1980.
13 U.S. Mariner 9 orbited Mars in 1971.
14 Charles Conrad Jr., Richard F. Gordon, Alan L. Bean, Apollo 12 to the Moon, 1969. Conrad and Bean make second Moon landing November 19, collecting 74 lbs. rock samples in 31 hours.
15 Astronomer William Herschel was born in 1738 in Germany. Building his own telescopes, he discovered the planet Uranus in 1781; two moons of Uranus, Oberon and Titania, in 1787; and two moons of Saturn, Mimas and Enceladus, in 1789. William and son John compiled General Catalog of 5,000 deep space objects.
15 The USSR successfully launched its first space shuttle, the Buran, to orbit in 1988 on the world's mightiest booster, Energia.
16 In 1965, USSR Venera 3 flew to Venus, arriving in that planet's atmosphere March 1, 1966. No data was sent back.
16 Gerald P. Carr, Edward G. Gibson, William Pogue, 1973, final visit to America's first space station, Skylab. Set the U.S. space endurance record of 84 days which still stands. A record spacewalk of seven hours, part of 22 hours of spacewalks for the flight.
19 U.S. Apollo 12, Man's second landing on the Moon in 1969.
20 Astronomer Edwin Hubble was born in 1889.
23 The first photograph of a meteor was made in 1885.
26 Rodolfo Neri, first Mexican in space, in shuttle Atlantis in 1985.
28 In 1964, the interplanetary probe Mariner 4 left the U.S. for Mars. After a mid-course correction in flight path, it passed behind the Red Planet July 14, 1965. Mariner 4 took 22 photos from 6,000 miles above the Martian surface.

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.

November Astronomy Information

(Reprinted from The 1995 Yearbook of Astronomy by Patrick Moore)

New Moon: November 22
Full Moon: November 7

MERCURY is still visible as a morning object, magnitude -0.9, low above the east-southeast horizon for a short while before dawn, but only for the first few days of month. Thereafter it is unsuitably placed for observation as it passes slowly through superior conjunction on November 23.

VENUS, already available for observation by observers further south, gradually becomes visible as a brilliant evening object, magnitude -3.9, low in the south-western sky after sunset, for observers in northern temperate latitudes.

MARS, magnitude +1.3, is moving towards the **Sun** and even for those in southern latitudes it will be lost to view over the west-southwestern horizon soon after sunset. Observers with telescopes might be able to detect **Mars** on the evening of November 22 as **Venus** passes only 11 arcminutes south of **Mars** at 22h GMT.

JUPITER is coming towards the end of its period of visibility this month and is only visible low in the south-western sky for a short while after sunset. Its magnitude is 1.8. By the end of the month it is only 15 from the **Sun,** which means that for observers in the **British Isles** it is only about 5' above the horizon at sunset. Observers should note that **Venus** is near **Jupiter** for a few days around November 19 when **Mars** is also close by.

SATURN, magnitude +0.9, continues to be visible as an evening object in the southern skies.

BERTIL LINDBLAD. November 26 is the centenary of the birth of **Bertil Lindblad**, one of **Sweden's** greatest astronomers. He was born at **Orebo,** graduated at **Uppsala**, and in 1927 became Director of the **Stockholm Observatory** following a spell at **Mount Wilson.** In 1931 he organized the removal of the main equipment to the far better site of **Saltsjebaden**, and fully modernized it.

Lindblad was a pioneer in the studies of rotations of galaxies, and was the first to show that with spirals the arms are 'trailing'. He also made major contributions to studies of stellar evolution

and galactic structure. He served as President of the **International Astronomical Union** from 1948 to 1952, and was awarded the Gold Medals of the **Royal Astronomical Society** and of the **Astronomical Society of the Pacific**. He died on June 25, 1965.

THE LEONID METEORS. The **Leonids** are the most unpredictable of all annual meteor showers. Generally they are sparse, but throughout the last thousand years or so they have provided occasional 'storms' - as in **1799, 1833, 1866,** and **1966.** The average interval between storms is 33 years, though those of **1899** and **1933** did not occur because of planetary perturbations.

The parent comet is **Tempel-Tuttle,** which has a long history. It was discovered in December **1865** by **W. Tempel**, and independently in the following month by **Horace Tuttle**; it reached magnitude 5.5, and produced a definite tail. The period was given as 33 years, and the comet was identified with those of **1366** - which reached the third magnitude - and **1699.** It was recovered in **1965**, and is due back at perihelion in **1999.**

Leonid 'storms' occur when the comet is near perihelion, and there is a very good chance that one will be seen in **1999;** but it is possible that activity will start to build up well before that, and meteor observers will certainly be very much on the alert from now on. The maxima of the storms are brief - that of **1966** occurred during daylight in **Europe**, and little was seen during the period of darkness. We cannot be sure that the **Leonids** will again produce spectacular displays, but the omens are encouraging even if not much can really be expected before November **1998.**

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.*

A CURIOUS ANOMALY. The southernmost of the first-magnitude stars is **Achernar**, or **Alpha Eridani**-the " Last in the River". With it's declination of -57' it is inaccessible from any part of **Europe** or the **United States**; during November evenings it is near the zenith from **Australia** and **New Zealand**. It is of magnitude 0.46, so that it is the ninth brightest star in the whole of the sky; it is 85 light-years away, and 750 times as luminous as the Sun. The spectral type is B5, so that it is a white or bluish-white star with a high surface temperature.

Yet in **Chambers** list of red stars, published in **1890**, it is given as,red! **Chambers** is usually very reliable, but this is not a misprint in the fourth edition of his book, as it is repeated elsewhere.

The conclusion must be that he had never seen it for himself, and had taken a faulty estimate from some other source. Certainly there is not the slightest chance that **Achernar** has changed colour, and this serves to show that it is not always wise to take colour records at face value. Remember that in some old works **Sirius** too is given as a red star . . .

Achernar is easy to find, partly because it is so bright and partly because there are no other brilliant stars close to it. The south pole of the sky, not marked by any bright star, ties about midway between **Achernar** and the **Southern Cross** - so that when **Achernar** is high up the Cross is low down, and vice versa.

OCTANS. The south polar constellation is very dim; the brightest star, Nu, is only of magnitude 3.8. The south polar star is **Sigma**, magnitude 5.5. It is less than one degree from the pole at the present time; the distance from the pole was only 45' in **1900**, but is now increasing, and will have reached a full degree by the end of the century. It is a star of spectral type FO, about 7 times as luminous as the **Sun** and 120 light-years away. Certainly it is a very poor substitute for the northern Polaris!

RASC access on the GEnic Information

The **GEnic Information System** is one of several computer bulletin board system accessible by modem. Hundreds of discussion Round table's are available to the user. In the **Space and Astronomy Roundtable**, there is one category solely dedicated to the **RASC**. Members and non-members alike can access the category and ask questions (or answer them), discuss of any relevant subject, download or upload files, access the **Internet** (in text mode), use electronic mail capacities, make suggestions or direct potential new members to specific **RASC** Centres across the land.

The connect charges are currently **$10.95** a month, including a 4-hour free time period each month. But from now to December I st, **1995**, the connect charge will be waived for the first month, and a 50$ usage credit good anywhere on **GEnie** will be applied on every new account from a **RASC** member. Here's how to dial up for the first time (preferably during non-prime time hours, which are between 6 p.m. and 8 am. local time from Monday to Friday, and anytime Saturday and Sunday

To get the ball rolling you have to set the modem at 300, 1200, or 2400 bauds, 8 data bits, I stop bit, no panty, and local echo (or half duplex); dial **1-800-638-8369** (U.S. and Canada)-, enter **JOINGENIE** at the prompt; when asked for the special offer enter-. **MDC524.**

This will activate the $50 GEnie usage credit and no-fee first month.

For members who would rather deal with people, they can contact **GEnie** by c@g voice help at **1-800-638-9636** from 9 am. to midnight Eastern Time, Monday to Friday. This number is also where you can ask to know if a **GEnie** local access telephone number can be dialed from your computer.

Daniel Biron, RASC-Montreal Centre

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Oct. 1, 1995

UNIVERSITY OBSERVATORY HOURS FOR PUBLIC VIEWING

The **University of Saskatchewan** observatory will be open to the public on SATURDAY evenings from **7:30 - 9:30** p.m. from October until February.

Visitors will be able to view: the planet **Saturn**, the **Albireo** binary star system, the **Andromeda Galaxy** and other celestial objects. **Saturn** is of particular interest this year, as it rings undergo a disappearing act.

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.**

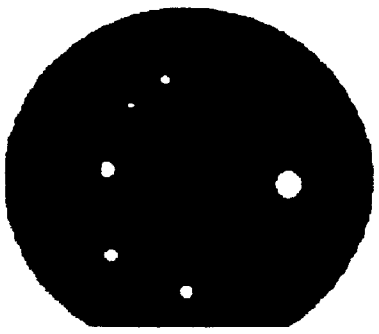
Further information is available on the Astronomy Information line at 966-6429,

Why A Finder?

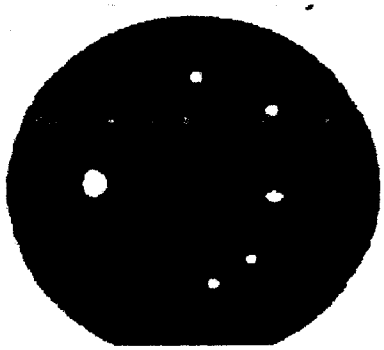
(Reprinted from The Trained Eye by Leon Palmer)

Regardless of your choice of objective and selection of eyepieces for your telescope there is a special accessory you can't do without: a small telescope bolted onto your big one. After all, that's what makes it an astronomical telescope, isn't it? Many manufacturers use this popular perception to their advantage, but what they bolt on may be worse than useless.

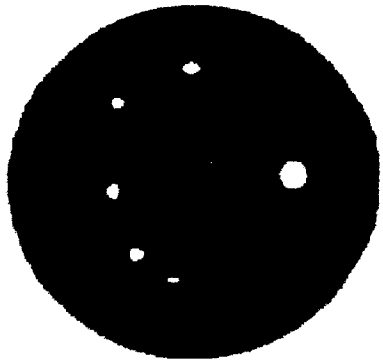
This small telescope serves a useful purpose implied by its name: ***finder telescope or finder for short.*** A finder helps you find stars for your ***main telescope*** (the one the finders bolted onto). A finder works for your main telescope just like a telescopic gun sight does for a rifle; the gun sight helps you aim the gun, the finder helps you aim the main telescope. A finder, just like a telescopic gun sight, has a cross hair that you must pre-align to the main telescope before you can aim it property. During the daytime, point your main telescope at some far distant object and adjust the finder until its cross hairs cross on the same object. After that, whatever you see on the finder's cross hair is what you'll see through the main telescope (unless you bump it). Still, why do you need a finder? After all, isn't your main telescope a telescopic sight?



Stars in the Sky



Inverted by Telescope



Flipped by Diagonal
Figure 1

At best, your main telescope, regardless of its f-ratio, has a field of view 10 or so - pretty small compared to the unaided eye's 1800, and pretty hard to aim at a star. A good finder bridges the field-of-view gap to place what you see with your unaided eye into the main telescope. Some finders (and main telescopes) use a ***star diagonal***, an attachment that lets you look sideways into the finder rather than straight through. The mirror or prism used in the star diagonal introduces a mirror flip into the image. Not only do things look upside down, they also look backwards.(see Figure 1). Upside down you can deal with by just turning the star map upside down but what about backwards? There yo have to learn to flip the map back over in your mind.

A good finder should have intermediate field of view (around 50), mild magnification (6 to 10 times), good light gathering power (limiting visual magnitude about 10th, which implies a minimum acceptable aperture of 2 inches / 50 mm). Ultimately, since ***finder telescopes are*** refractors they require the same good optical design as any refractor (achromatic doublet objective, quality eyepieces, etc.). A fact too often lost in the merchandising of inexpensive (i.e. cheap) telescopes.

Earth Third Planet from the Sun

Earth is the third planet from the **Sun** and the fifth largest: 9 distance from **Sun:** 149,600,000 km (I .00 AU) o diameter: 12,756.3 km * mass: 5.976e24 k **Earth** is the only planet whosc English name does not derive from **Greek/Roman** mythology. The name derives from Old English and Germanic. There are, of course, hundreds of other names for the planet in other languages. It was not until the time of Copernicus (the sixteenth

century) that it was understood that the **Earth** is just another planet.

Earth, of course, can be studied without the aid of spacecraft. Nevertheless it was not until the twentieth century that we had maps (picture 5) of the entire planet. And pictures of the planet taken from space are of considerable importance; for example, they are an enormous help in weather prediction and especially in tracking and predicting hurricanes. And they are extraordinarily beautiful (to this critic at least.)

The **Earth** is divided into several layers which have distinct chemical and seismic properties (depths in km): 0- 40 Crust, 10-400 Upper mantle, 400- 650 Transition region, 650-2700 Lower mantle, 2700-2890 DI' layer (sometimes included in the lower mantle), 2890-51SO Outer core, 5150-6378 Inner core.

The crust is thinner under the oceans, thicker under the continents. The inner core and crust are solid; the outer core and mantle layers are fluid. The core is composed almost entirely of iron (or nickel/iron). Temperatures at the center of the core may be as high as 7500 K, hotter than the surface of the Sun. The lower mantle is probably mostly silicon, magnesium and oxygen with some iron, calcium and aluminum. The upper mantle is mostly olivene and pyroxene (iron,magnesium silicates), calcium and aluminum. We know most of this only from seismic techniques; samples from the upper mantle arrive at the surface as lava from volcanoes but the majority of the **Earth** is inaccessible. The crust is primarily quartz (silicon dioxide) and other silicates like feldspar. Taken as a whole, the Earth's chemical composition (by mass) is: 34.6 Percent Iron, 29.5 Percent Oxygen, 15.2 Percent Silicon, 12.7 Percent magnesium, 2.4 Percent Nickel, 1.9 Percent Sulfur, O.O8 Percent Titanium

The **Earth** is the densest major body in the solar system. The other terrestrial planets probably have similar structures and compositions with some differences: the **Moon** has at most a small core; **Mercury** has an extra large core (relative to its diameter); the mantles of **Mars** and the **Moon** are much thicker; the **Moon** and **Mercury** may not have chemically distinct crusts; **Earth** may be the only one with distinct inner and outer cores. Note, however, that our knowledge of planetary interiors is mostly theoretical even for the **Earth**. Unlike the other terrestrial planets, **Earth's** crust is divided into several separate solid plates which float around independently on top of the hot mantle below. This is known as plate tectonics. It is characterized by two major processes: spreading and subduction. Spreading occurs when two plates move away from each other and new crust is created by upwelling magma from below. Subduction occurs when two plates collide and the edge of one dives beneath the other and ends up being destroyed in the mantle. There is also transverse motion at some plate boundaries (i.e. the **San Andreas Fault in California**) and collisions between continental plates (i.e. **India/Eurasia**). There are (at present) eight major plates: North American Plate - North America, western North Atlantic and Greenland
& South American Plate - South America and western South Atlantic- Antarctic Plate - Antarctica and the "Southern Ocean", Eurasian Plate - Eastern North Atlantic, Europe and Asia except for India, African Plate - Africa, Eastern South Atlantic and western Indian Ocean, Indian-Australian Plate - India, Australia, New Zealand and most of Indian Ocean, Nazca Plate - eastern Pacific Ocean adjacent to South America,
Pacific Plate - most of the Pacific Ocean (and the southern coast of California!) There are also twenty or more small plates such as the Arabian, Cocos, and Philippine Plates.

The **Earth's** surface is very young. In the relatively short (by astronomical standards) period of ***500,000,000*** years or so erosion and tectonic processes destroy and recreate most of the **Earth's** surface and thereby eliminate almost all traces of earlier geologic surface history (such as impact craters). Thus the very early history of the **Earth** has been erased. The **Earth** is 4.5 to 4.6 billion years old, but the oldest known rocks are less than 4 billion years old and rocks older than 3 billion years are rare. **The oldest fossils of living organisms are less than .9 billion years old.** There is no record of the critical period when life was first getting started.

71% of the **Earth's** surface is covered with water. **Earth** is the only planet on which water can exist in liquid form on the surface (though there may be liquid ethane or methane on **Titan's** surface). This is, of course, essential for life as we know it. The heat capacity of the oceans is also very important in keeping the **Earth's** temperature relatively stable. Liquid water is also responsible for most of the erosion and weathering of the **Earth's** continents, a process unique in the solar system today (though it may have occurred on **Mars** in the past).

The **Earth's** atmosphere is 77% nitrogen, 21 % oxygen, with traces of argon, carbon dioxide and water. There was probably a very much larger amount of carbon dioxide in the **Earth's** atmosphere when the **Earth** was first formed, but it has since been almost all incorporated into carbonate rocks and to a lesser extent dissolved into the oceans and consumed by living plants. Plate tectonics and biological processes now maintain a continual flow of carbon dioxide from the atmosphere to these various "sinks" and back again. The tiny amount of carbon dioxide resident in the atmosphere at any time is extremely important to the maintenance of the **Earth's** surface temperature via the greenhouse effect. The greenhouse effect raises the average surface temperature about 35 degrees C above what it would otherwise be (from a frigid -21 C to a comfortable +14 C); without it the oceans would freeze and life as we know it would be impossible.

The presence of free oxygen is quite remarkable from a chemical point of view. Oxygen is a very reactive gas and under normal" circumstances would quickly combine with other elements. The oxygen in Earth's atmosphere is produced and maintained by biological processes. Without life there would be no free oxygen. Earth has a modest magnetic field

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

produced by electric currents in the core. The interaction of the solar wind, the **Earth's** magnetic field and the **Earth's** upper atmosphere causes the auroras (see the Interplanetary Medium).

A Very Busy Month to Come
by Rick Huziak

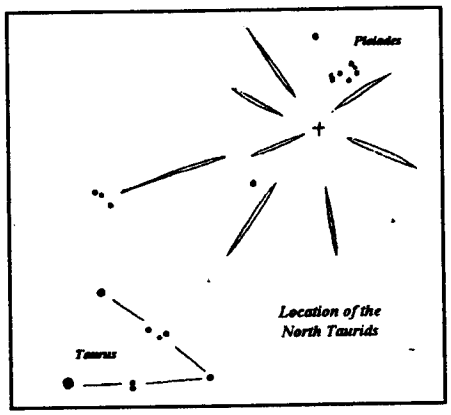
November is a very busy month for astronomical events. Don't let the cooling weather stop you from getting out. We had an exceptionally bad spring and summer for observing, so make up for it by observing some of the following events.

October Meeting Review - I'd like to thank **Sandy Ferguson** and **Eric Keser** for planning and directing the October General Meeting in my absence.

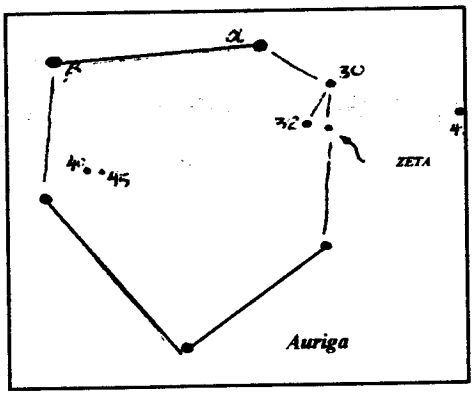
Martensville Starnight Review - We had a starnight planned for October 26 (raindate 27) at **Valley Manor School** in **Martensville.** October 26th was cloudy with rain, and the forecast for the 27th was cloudy with rain as well. Although the 26th was indeed rained out, I was encouraged by the forecast for the 27th which kept on insisting that it was cloudy with rain way beyond the time that the sky had cleared beautifully! (Maybe the weather offices should be legislated to have at least one window). Because of conflicting commitments, only two members were able to host the event.

Brian Friesen and I pulled out our 4-1/4 inchers and dazzled the audience of about 60 school kids and parents with views of the crescent moon, **Saturn,** the **double cluster**, **M31**, the **Pleiades** and other objects. **Eric Keser** tried to make it, but got lost and wandered around to arrive just as we had packed up an left. Better luck next time, **Eric**! Thanks to **Dave Little** of **Valley Manor School** for arranging for the advertising and getting the school opened up for washrooms and the outside lights closed down for a dark sky!

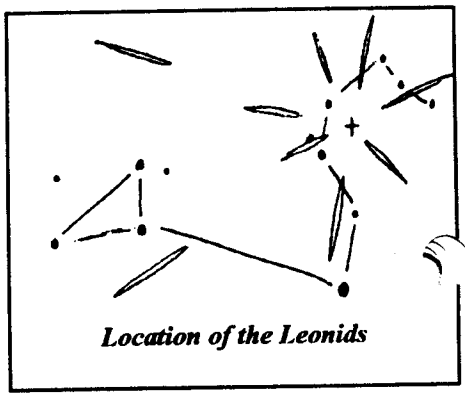
North Taurid Meteor Shower- The **North Taurids** peak on November 12 - 13. This shower is a challenger, as the Zenith Hourly Rate (ZHR) is only 5. However, the shower has been going on since the beginning of October and ends at the end of November. Such an extended shower indicates a very old shower who's particles have had a long time to spread out over the orbit and disperse. The radiant is a large, fuzzy area centered near the Pleiades, as the accompanying map shows.



Zeta Auriga in Eclipse, Too! - OW Gem is not the only center stage eclipsing act this month. **Zeta Auriga**, the right hand member of the "twins" is experiencing a primary eclipse beginning about November 16. **Zeta** is also a giant or supergiant system, very similar to **OW Gem. Zeta** eclipses every 2.66 years (972.176 days). The eclipse lasts until about December 21. The accompanying map shows the area with magnitudes of appropriate 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 4.2 during the eclipse and stay there for a month. More details can be found in **Burnham's Celestial Handbook, Volume 1.**



The Leonid Meteor Shower Watch - The Leonids peak on November 17 at 9:00 p.m. CST. At this time Leo is not above the horizon, so you will have to watch during the early morning of the 17th or the morning of the 18th to catch the peak. **THIS IS A MORNING SHOWER.** You will not see anything before 2:00 a.m. The ZHR is normally 15 - 20, but a storm perhaps 100,000 per hour is predicated for 1998 or 1999, based on similar storms occurring in 1933, 1966 and previous years. **The International Meteor Organization** (IMO) is requesting an intensive watch of the Leonids this year form at least November 15 through the 18th, as the 1994 results indicated an increase to at least a ZHR of 60 and possible a mini-storm (moonlight interfered). This year's shower may be spectacular for those who are willing to get up early. The accompanying map shows that the shower comes from the cycle of Leo.


Location of the Leonids

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.

Fireball Watch - As mentioned in last month's newsletter, I would like everyone to pay attention to fireballs for the next two months, in particular on November 23 - 24 and December 5 - 6 and a few days either way of these. We have had two consecutive years that 2 or 3 fireballs have

been observed on there dates. If more are seen this year, then that is good evidence of fireball showers, similar to meteor showers. There is lots of evidence of fireball streams, but no proof as of yet.

Telescopic Meteor Shower Alert - As mentioned last month, I will be conducting a watch for a possible binocular/telescopic meteor shower between the dates of November 26 - 30. I need observers all over the province to participate in attempting to confirm or dispel the reality of a shower on these dates that produces only very faint meteors. Call me at **665-3392** for details, or attend the November general meeting for search maps.

Notice of the November General Meeting

The General Meeting of the Saskatoon Centre of the Royal Astronomical Society of Canada will be held Monday, November 20, 1995 at 8:00 p.m. in Room A-226, Health Sciences Building, U of S. Campus. The general public is invited to attend the presentation. Also, the annual election of the executive council will be held at this meeting. See the October newsletter for details on the elections.

The Swap Shop

*To have your ad run here call me at **(306) 384-1807** before the end of the month and I will run you ad.*

*Please remember that **Don Friesen** has alot of great stuff for sale. I did not have the latest list so give him a call at **343-1136**.*

*Looking for a couple of light, strong telescope tubes. I have a couple for sale that are made out of space age flexible material. All you have to do is add a couple of support rings and you are away. Suitable for up to a 10" mirror. Asking **$50.00** for both or **$30.00** each. Also have a 386 computer for sale. It has 2 megs of ram, 125 mb hard drive, 3.25 floppy, cd-rom, video card and sound card, speakers and monitor. Asking **00.00**. Call **Garry** at **384-1807***

Notice of the December General Meeting

Please note that the December General Meeting will be held on **Monday, December 11,** on the SECOND Monday of the month, as not to conflict with Christmas plans.

Dues are Due

Please pay your dues for the 1995 - 1996 year as soon as possible. The 1996 Observer's Handbooks are in, so you can pick yours up at the next meeting as you pay the dues.

Regular	**$40.00**
Youth (21 and under)	**$22.50**
Life	**$900.00**

First Time Observer With Twenty Years Experience by Garry Brett

Finally after a year of not looking through a telescope I decided to pull my scope out of moth balls and get serious about observing. Last November I was really struggling with my interest in astronomy and to be quite honest I lost interest in it. So much so that after a night of terrible observing I put my scope away and did not use it until our last OG session.

Even though I have been interested and somewhat active in astronomy for over twenty years I am guilty of not having learned anything about the sky. I would take my **10"** scope out to OG sessions and rely on others to point my scope at the **Messier** objects. As a result the sessions were boring because I was not challenged.

I decided that this time would be different and at the last OG session you would probably heard me say things like: **"Your kidding, I actually found it!!!" "Hey, that wasn't as hard as I thought it would be!"**

I think you get the picture. Because I decided to take the challenge and start working towards my **Messier** certificate and actually found alot of stuff I was looking for I had the most enjoyable night of my observing life.

For my first serious session I was able to locate and view **M-81 & M-82, M-34, M-33, M-31, M-13, M-15** and the Double Cluster in Perseus. I went after serveral more of them but was not able to locate what I was looking for. The biggest reason for this is the fact that I had a finder scope that was way out of alignment so it made it a lot harder to zero in on objects, especially ones that are faint. I also discovered a couple of days later that even though my scope was giving great images with pinpoint star images right to the edge my scopes collumation was off.

As this was my first observing session in a year I forgot just how cold things can get and as I did not dress as warm as I should I got cold quite fast. Around **11:45** I wasn't sure what had more frost on it, my scope or me. Finally with numb fingers I packed up the old scope and went home one happy camper.

When I got home I pulled out some better star charts and found out that the simple star map I was using only had a few of the **Messier** objects on them. When I was looking at the objects I found I could have star hopped to others in the same neighborhood.

Anyhow after a successful night of observing I am looking forward to my next observing session

1996 Calendars are in

The Royal Astronomical Society of Canada's 1996 colour calendars have arrived. The price for the beautiful calendar is **$10.00** with **$1.50** for mail delivery or pick up your copy at the next meeting. They make excellent Christmas presents and stocking stuffers.

Please note

Attention Gordon Light....Please let me know if you recieved the software and what you think of it. Thanks....Ed.

The Eyepiece

Most large telescopes operate as large cameras with a piece of photographic film or other electronic detectors placed at the focus of the objective to capture the image and as such they don't need eyepieces. Remember that the objective determines two properties of a telescope uniquely: light-gathering power and resolution. Seeing through a telescope requires an eyepiece which, in addition to letting you see the image, helps define how big the image looks (magnification) and how much of it you see (field of view) in collaboration with the objective (Project 3-1). Since the eyepiece comes between the image and your eye, you need a good eyepiece to see a good image. So say hello to your old friends chromatic and spherical aberration, and your new friends, ***eye relief, field of view, and field flatness*** (only a partial list). Just like for the objective, you can use combinations of lenses to minimize chromatic and spherical aberration in an eyepiece.

Eye relief, as you recall from Project 3-1, is how close to the eyepiece to hold your eye. If your eyepiece uses only a single convex lens, eye relief equals the focal length of the eyepiece lens. No problem for a 50 mm focal length lens, but how about a 1 0 mm, or a 5 mm focal length? Looking through a 5 mm focal length lens can be as much fun as sticking a finger in your eye. With clever design, however, you can move the eye relief of a 5 mm lens more than 5 mm out from the lens, making it easier (and less painful) to use.

Field of view involves both the objective and the eyepiece. There's not much you can do to change field of view for an objective short of buying another telescope. Remember, you measured field of view in Project 3-1 for simple (single) eyepiece lenses, not combinations of lenses. Different eyepiece designs of identical focal length can have significantly different fields of view.

Field flatness. If you wear glasses, you know the world looks a bit distorted. The thicker your lenses, the worse the distortion. Squares aren't square, they either bow in or bow out - they don't look flat. Eyepieces have this same problem. What's worse, the focus may vary across the field; stars near the edge are out of focus, while stars in the center are in focus. As a rule, the wider you try to make the field of view, the worse the field flatness.

Eyepiece designers trade off all five of these "features" plus trying to keep the number of lenses in the eyepiece to a minimum. Why limit the number of lenses? The more lenses, the more light lost in gening through them. Even perfectly clear lenses absorb or reflect some light (typically 4% at each surface). This may not seem like much light loss until you remember that each lens has two surfaces, so each lens costs you 8% of the light from reflectional one. Multiply this by three or four lenses, and you've lost a lot of light. Of course, the light isnl really lost, it just scatters all over the inside of the eyepiece. You eventually see it as ghost images (bad enough), diffuse glow(just as bad), or worse. Special anti-reflection coatings applied to the lens surfaces reduce reflection losses to below 1% per surface. This ameliorates, but doesn't eliminate, the scaftered light problems. The ultimate limit on the number of lenses in an eyepiece is cost. The more you put in the better (potentially) the image and the greater (definitely) the costs. So how do you tell which eyepiece is right for you? As with objectives, seeing is believing - buy the best seeing eyepieces you can afford.

Objective Versus Eyepiece

The objective is the heart of your telescope, for it establishes the principal capabilities of your telescope. Resolution is defined by the objective. Limiting visual magnitude is defined by the objective. Cost is defined by the objective. Magnification and field of view are limited by the objective. True, you can always change eyepieces to tailor the magnification and field of view of your telescope - of your objective within reason. So what's reasonable? Before getting into this subject, let's redefine the dimensionless version of focal length: f-ratio. ***F-ratio,*** as you remember from Project 3-1, is the dimensionless (no units) number you get when you divide the focal length of an objective by its diameter. For example, an 8-inch objective with a focal length of 64 inches has an fratio of 8 (expressed as f-8); the focal length is eight times as long as the objective is wide. Notice that it does matter whether you use inches or mm calculate f-ratio, you get the same answer.

If you want a wide field (or rich field) telescope, you need a short f-ratio objective (f-4 to f-5). If you want high magnification, you need a long f-ratio objective (f-10 and above). If you want something in between, you need an f-ratio in between (f-6 to f-9). Why does this seem to refute what you just learned in Project 3-1 , - that, regardless of the objective, you can get any magnification field of view you want with the night eyepiece? True in theory, impossible in practice.

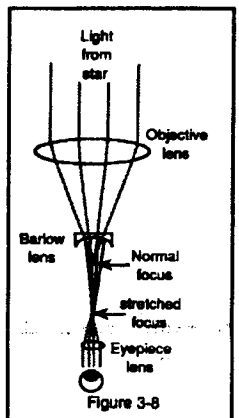


Figure 3-8

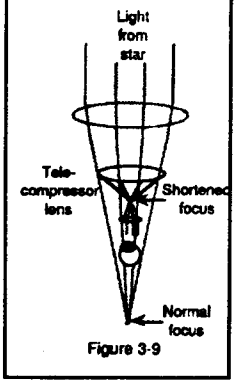


Figure 3-9

To get high magnification out of a wide field objective, you need extremely short focal length eyepieces (<7 mm) These eyepieces are a

Please don't forget that your

DUES ARE DUE!

Please get them in right away!

pain to make, a pain to use , and a pain in the wallet.

Well if you can get high magnification out of a short f-ratio objective, can you get a wide field out of a f-ratio objective? Here again you run into the limitations of eyepiece construction. The longest focal length eyepieces generally available are around 40 mm - still not long enough to convert your long f-ratio objective into a wide-field instrument. You again find problems with eye relief, construction and cost when you push beyond this upper limit on eyepieces.

So the objective's f-ratio defines what type of telescope you have, wide-field, low-magnification or narrow-field high-magnification.

Eyepieces modify field of view and magnification within the useful range set by the objective. You can work around this limitation (or feature) by using one of two optical accessories - but at a cost in image quality and dollars. The first of these optical devices is called a ***Barlow lens.***

A Barlow consists of a concave reducing lens (or combination of lenses) that changes the ***effective focal length*** of the objective, essentially converting a short f-ratio into a long f-ratio (Figure 3-8). Typical Barlows will double or triple the effective f-ratio of your objective, thus doubling or tripling the magnification of your telescope. That's the good news. What is the bad news? The Barlow introduces another optical element (more light loss, more aberrations), and restricts the field of view.

Normal- Going the other way, there are devices called ***tele-compressors*** which shorten ***effective focal length*** (Figure 3-9). They too, just like focus Barlows, introduce more optical elements, light losses and aberrations.

Given their side-effects, the best solution remains to pick the objective for your telescope that fits your desires for light-gathering (power) resolution diameter), field of view (f-ratio) and magnification (F-ratio)

'SLIME' may be clue to life on Mars

Printed from Star Phoenix Paper

WA.SHINGTON (Reuter) - Microbes dubbed **SLIME** that are found deep within the earth may provide clues about the potential for life on **Mars,** U.S. scientists said Thursday.

Scientists at the **Pacific Northwest Laboratory** found that microbes might be able to live on.rocks alone as long as they are rich in basalt and iron.

They said they found the microbes in ground water deep below the surface at the **Department of Energy Hanford** site in **Washington** state. Unlike most other life forms they do not depend on photosynthesis. or the use of lialit to produce essential, complex organic materials.

The scientists called it a subsurface litlioautotrophic microbial ecosystem - **SLIME.**

The microbes appear to be hydrogen-eating bacteria that get their chemical energy from an interaction between ground water and the iron in basalt, a rock on **Earth** and **Mars,** the researchers said.

"We have several lines or circumstantial evidence that lead us to believe this is the source," said **Todd Stevens,** a microbiologist at the lab.

Their report is to appear in today's issue of the journal Science. The researchers said if **SLIME** gets its energy from the i-ninerals in basalt, it could explain how primitive organisms survived on Earth four billion years ago. Photosynthesis did not begin until about 2.8 **billion** years ago.

Planet outside solar system confirmed

Reprinted from the Star Phoenix

SAN FRANCISCO (Reuter) U.S. astronomers have for the first **time** confirmed the existence of a planet orbiting a star beyond the solar system.

Officials at Lick Observatory atop Mount Hamilton announced the confirmation by Geoffrey Marcy, professor of physics and astronomy at San Francisco State University and his researcher Paul Butler, on Thursday.

The discovery of the planet was disclosed two weeks ago by Switzerland's **Geneva** Observatory **which** said it had detected a planet-like object circling a star called **51 Pegasus.** Invisible in its orbit, the planet was detected because its graviity caused the star to "wobble" slightly, said **Jack Schultz,** superintendent of **Lick Observatory** where Marcy and Butler made the observations. Butler calculated that the planet must be at least half as massive as the planet **Jupiter** and concluded that it **must** orbit its **sun** once every 4.2 days. The finding suggests there ire probably other Earth-like planets outside the solar system, **Schultz** said.

. We've confirmed that there is at least one case of a planet outside our planetary system." said **Schultz.** "Since we've found one., there probably are others."

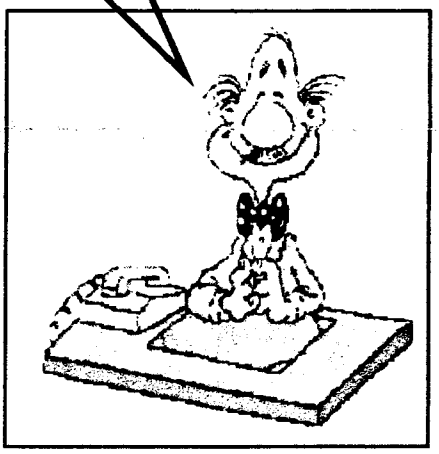
Just thought that I would mention a few important things to you. First of all try to be at the next meeting as we will be holding elections for the executive.

All members are eligible for the executive so nominate your favorite person to the position that you think they would do best at.

Secondly, I encourage everyone to submit articles to the newsletter. The only way it will be interesting is if everyone sends articles in.

THE DEADLINE FOR ARTICLES FOR THE DECEMBER NEWSLETTER IS NOVEMBER 25.

(NO EXCEPTIONS TO THIS DATE)



Your Editor

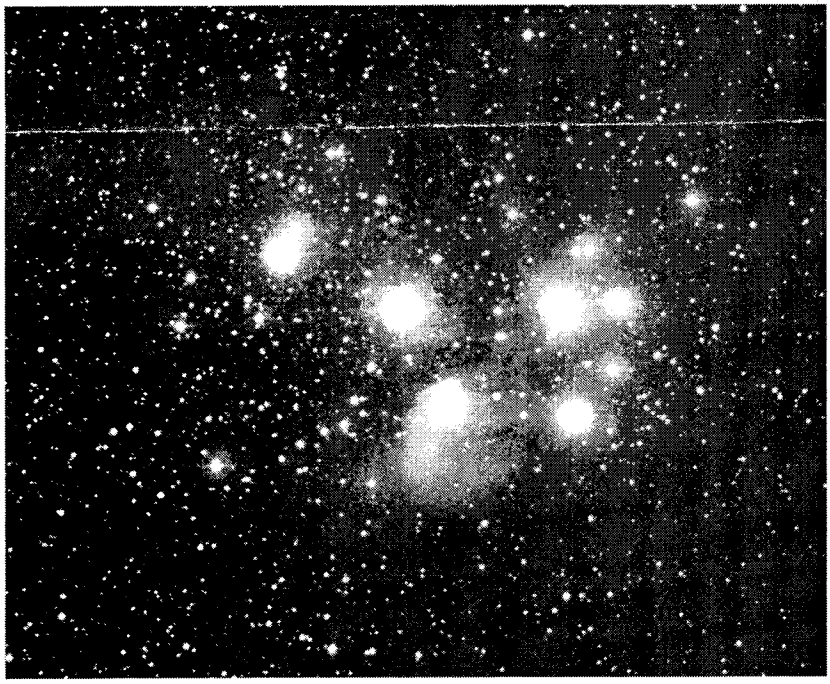
Saskatoon Skies 1995

ASTROPHOTO CORNER

NOV. 1995 RASC SASKATOON CENTRE

PHOTO OF THE MONTH

The PLEIADES M45



This galactic star cluster is one of the nearest open clusters to us at about a distance of 410 light years.The nine brightest stars are contained in a field of about one degree so it is possible to include the whole group in telescopes up to 10 " if a wide-angle ocular is used.
This galactic cluster can be found in the constellation TAURUS.The Pleiades is a a late fall and winter object passing high over head for a Northern Hemisphere observer. Though most individuals can perceive 6 or 7 stars in the Pleiades, some observers claim to have seen as many as 19. Photography has confirmed the existence of at least 300 members of this cluster.

TECHNIQUE: The above photograph was taken with my 8 " Schmidt Camera using a Wratten 2A filter. Exposure time was 8 mins. on hypered Kodak 2415. The negative was developed in D19 for 6 mins. at 70 degrees F.

ASTROPHOTO TIP: Since the Pleiades is quite bright one can use short exposure times to capture the stars in the cluster but more exposure time is needed to capture the reflection nebulosity around the brighter stars.

Suggested exposure times using Kodak 2415 with lenses of different f/ratio.

f2.8	10-15 mins.
f3.5	15-22 mins.
f4.0	20-30 mins.
f4.5	30-45 mins.
f5.6	40-60 mins.

Clear skies and Good Guiding ---------- Al Hartridge