Saskatoon Skies

Volume 22, Number 11 December, 1992

In This Issue:

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Saskatoon Skies Information

Next month's deadline is Saturday, January 2, 1992. Please have any submissions in to me by then in order to be included in the next issue. Submissions may be in typewritten form or on a floppy diskette (3.5 or 5 inch size and formatted for MSDOS) preferably as ASCII files. I prefer electronic submissions as it saves me some typing. Mail or bring your submissions to:

Gordon Sarty
422 Edmund Park,
Saskatoon, Sask.
S7H 0Z4
phone: 374-8803

OR

Saskatoon Centre RASC
Box 317, Sub P.O. # 6
Saskatoon, Sask.
S7N 0W0

E-mail submissions to sarty@math.usask will also be accepted. Saskatoon Skies is a monthly publication of the Saskatoon Centre of the Royal Astronomical Society of Canada.

Minutes of the October Executive Meeting
Room B-111, Health Sciences Building
October 19, 1992 7:00 p.m.

Present: Mr. Mike Williams, Mr. Jim Young, Mr. Rick Huziak, Mr. Ed Kennedy, Mr. Al Hartridge, Mr. Gord Sarty

BUSINESS DISCUSSED:

1. National Council Business. Hube

   Dr. Kennedy has written to Dr. Doug Hueb telling him that Sandra Ferguson would be willing to have her name put forward as the Astronomy Day Coordinator for the Royal Astronomical Society of Canada.

   A balanced budget is to be brought in the National Council for consideration for the February meeting.

   A calendar from the Vancouver Centre is being designed. They suggest that our centre purchase at least 20 copies. We will ask for a sample calendar. The cost is to be $5.00 plus G.S.T.

   The objection posed by Dr. Kennedy at the annual meeting has not been minuted correctly. He will advise the council that he is still not satisfied with the corrected minutes.

   Southern Hemisphere Observatory dedication to Dr. Helen Hogg was attended by Dr. Ed Kennedy.

   Dr. Kennedy is to speak at the British Society for the History of Science in November 1992. This will be held in the National Maritime Museum in Greenwich, England.

   A donation to the Herzberg Fund at the University of Saskatchewan would probably be good P.R. for the Saskatoon Centre.

2. Model Center Bylaws.

   It is suggested that the centre is not bound by the bylaws. These are strictly for reference purposes.

3. Observer's Guide.

   Mr. Rick Huziak states there are 14 remaining copies that have to be sold.

4. Next Observer's Group Meeting.

   This will be held Saturday October 24th around 9:00 p.m.

5. Letter from the National Council regarding liability insurance. The coverage has been upped to $2,000,000.00. This only covers our functions at demonstrations such as would take place in one of the Saskatoon malls. This does not cover us at our darksite observatory. Our own insurance premium is now due.

6. Telescope fund. Four thousand dollars of the fund is tied up in a term deposit and is not available until March 1993. All that is available at this time is about $341.00. Some money however could be withdrawn from the current account after the insurance premium has been paid. The current account could then be brought up to balance once the telescope fund investment matures.

7. Ken Holland from Energy Mines and Resources Canada called Rick Huziak regarding another lecture at the Biology Building in November 1992. Rick has advised him that the club will support this lecture and help advertise the event.

   Howland Howland

8. National Research Council. There are old research bulletins from the 1972 to 1974 era regarding rocket launches from the Churchill Research Site. Rick has salvaged these from SED Systems and will submit these to our library archives.

The meeting was adjourned at 7:40 p.m.

Minutes of the October General Meeting
Room B-111, Health Sciences Building
October 19, 1992 8:00 p.m.

GENERAL ELECTIONS FOR 1992/1993

The floor will be open for nominations to positions.

BUSINESS DISCUSSED

1. Three short programs.
   (a) Dr. Ed Kennedy will show some slides from the General Assembly Meeting.
   (b) Mr. Gordon Sarty will talk about the construction of his 8 inch telescope.
   (c) Mr. Rick Huziak will talk about some asteroid occultations.
2. Rick describes the centre brochure to newcomers.
3. The 1992/1993 dues are now payable to Mike Williams.
4. Rick describes the Beginner Observer's Guide to club members. There are still a few left for sale.
5. Logan Lecture "I Feel the Earth Move Under My Feet". This lecture will be promoted by the Saskatoon Centre of the Royal Astronomical Society.

   The lecture will be on November 5th at 8:00 p.m. in the Biology Building at the University of Sask. campus.
6. 1972-1974 Bulletins from the National Research Council regarding their Rocketry Research Program launches from the Churchill Research Range were recovered by Rick. These will be added to the library archives.
7. Centre Representative. The next annual meeting of the R.A.S.C. will be in Halifax. It was suggested we start a fund to help our centre representative attend the annual meeting. Mr. Jim Young suggests that the maximum amount of monies the centre rep should receive should be one-half of the airfare.

   The executive will look at this problem in the near future.
8. New insurance premium. The premium for the insurance for the observatory is now due. This will be in the amount of $273.00. It was moved by Mr. Jim Young and seconded by Dr. Ed Kennedy that we approve the $273.00 premium. This motion was carried.
9. Elections for the 1992/1993 season.
   (a) Secretary nominated was Bill Hydomako – elected.
   (b) Treasurer nominated was Mike Williams – elected.
   (c) Centre Rep nominated was Jim Young – elected.
   (d) Librarian nominated was Dr. Jim Wood – elected.
   (e) Activities Coordinator nominated was Sandy Ferguson – elected.
   (f) Councillors: Nominated, Al Hartridge – elected; Nominated, Carol Blenkin – elected.
   (g) Newsletter Editor nominated was Gordon Sarty – elected.
   (h) Honorary President nominated was Dr. Ed Kennedy – elected.

   The past president will have an additional function of the media coordinator this year.

Minutes of the November Executive Meeting

Room B-111, Health Sciences Building
November 15, 1992

Attendees: Mike Williams, Sandy Ferguson, Gordon Sarty, Jim Young, Al Hartridge, Jim Wood, Bill Hydomako

ITEM	DETAIL	ACTION
1.	Who has a key to the library? Answer: The President, Secretary, Librarian and Jim Young. The library will be avaliable every third Monday during the meeting or contact the above.	Gordon Sarty
2.	Discussion on putting the library inventory on computer diskette. Jim Wood and Jim Young investigating.	Jim Wood
3.	Discussion on putting member's observations into the library.	Gordon Sarty
4.	Discussion on the display panels. We are looking for photographs for the panels.	Sandy Ferguson
5.	Discussion on other groups that the Saskatoon Centre may want to get involved with.	Sandy Ferguson
6.	Next Observer's Group Meeting: December 19	Gordon Sarty
7.	We have received our video tape on buying your first telescope.	R. Huziak
8.	We have received calendars from the Vancouver Centre to sell to our members.	R. Huziak
9.	Meeting adjourned. 7:50 p.m.	Bill Hydomako

Minutes of the November General Meeting

Room B-111, Health Sciences Building
November 15, 1992

ITEM	DETAIL	ACTION
10.	General Meeting called to order. 8:05 p.m.	R. Huziak
11.	Welcome to M. Peters - new member.	R. Huziak
12.	Next meeting: December 21, as usual.	R. Huziak
13.	Dr. Sofko will be providing next month's lecture.	R. Huziak
14.	Dues are due. The 1993 Handbooks are here.	R. Huziak
15.	Post office box is paid for.	R. Huziak
16.	Mention of "Comet Rapid Announcement Service" - a publication for announcement of comet discoveries.	R. Huziak
17.	Tonight's Program: First some of G. Sarty's slides.	R. Huziak
18.	R. Huziak's slide presentation: "Around the World in 80 Slides."	J. Young
19.	Meeting adjourned, 9:25 p.m.	R. Huziak
	Moved.	J. Young

EDITOR'S NOTES

The end of another year has come and thus the conclusion of volume 22 of the "Saskatoon Skies". I had given some thought to possibly changing the format of your newsletter but in the end I've decided that I have other things to do and didn't have the time to come up with another idea. Besides, the present layout works well enough. So I think I'll leave well enough alone - at least for another year.

This newsletter is only possible with the help of a few people (besides contributors) whom I'd like to thank now. Thanks to Nobby Katrusiak who is no longer a member but photocopies, collates and staples all the newsletters for free! Thanks to Mike Williams who prints the mailing labels every first Monday of the month and then on the following Friday mails the newsletters out. Thanks to Carol Blenkin who makes the fancy envelopes that the newsletters are mailed in. And last, but not least, thanks to Mike Wesolowski, who was the editor of the newsletters before October.

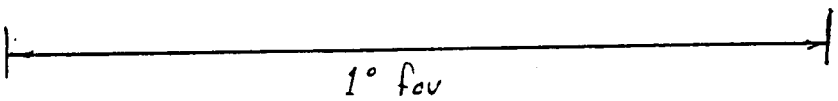
As an incentive to draw out more members, old and new, to our monthly meetings, we will be reviving the Centre's old tradition of opening up the university observatory after the meeting. Beginning this month - weather permitting.

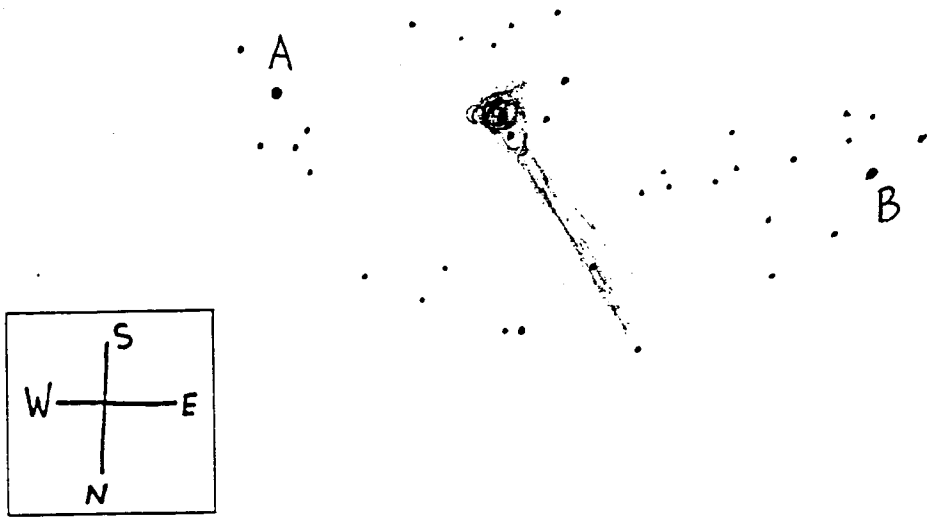
Although missed in the minutes, I donated a copy of a computer program I have written to the Saskatoon Centre's library at the November executive meeting. The program is called "Starship" and is written in Basic for use on IBM compatable computers. It calculates what the constellations look like if you were to view them from a nearby star - which, of course, can be reached via starship. Ask our librarian Jim Wood for the diskette if you would like to play with the program. You may freely copy it for yourself - just mention that you've modified it if you decide to rewrite some of it.

I am writing before the predicted total lunar eclipse of December 9 but you will get the newsletter afterwards. I hope the weather will be/was good. Also for your entertainment, I present a drawing I made of Comet Swift-Tuttle. The observation of the comet was made at our Rystrom dark site on November 24, 1992 at 7:30 p.m. using my 8 inch telescope. (The stars marked A and B are for matching the scene with a star chart I have.) Attendees of the November Observer's Group Meeting may object that no tail could be seen 3 nights before on the 21st. That is because we observed it after 9 p.m. when the comet was quite low. The tail would probably been visible if we looked two hours earlier.

So, until next month - Merry Christmas all!

Gordon Sarty





THE PUBLIC STARNIGHT IN DIEFENBAKER PARK

PART II - Saturday Night

This is a very belated report on the second night of the Annual Public Starnight, held in the Park on July 24, 1992. Many apologies to the Editors, Mike and Gordon, for taking so long to hand this in.

The weather late Saturday afternoon and early Saturday evening looked considerably better than the same time the previous night, so we headed out while it was still relatively bright, in order to have plenty of time to set up telescopes. When I arrived Scott Alexander was chatting to a fellow, who I thought was a Centre member, and who had set up his C8 in the middle of a field. I assumed this was where everyone was going to settle in for the starnight. However, I was surprised to see that Don Friesen had arrived even earlier and had set up the Centre display tables, etc. farther across the same field behind the row of trees between the park and the railway bridge. Then who was this mystery astronomer, if not a member, I thought? I don't think anyone ever found out and Scott's invitation to him to come join us was never taken up. Oh well.

Don had not only set up a very good display table of astronomical publications and material, with a large tent and red-light if you cared to go inside to read the material we had available, but he had also brought along Wayne Gretsky (in the form of a life-sized cardboard cutout) to help flog the newly published "The Beginner's Observing Guide" !

The observing began with everyone turning their scopes to Jupiter, which was very low in the southwest. However, before it got dark enough to have a really good view, cloud gathered in that area of the sky and any viewing of the planet had to be abandoned. Saturn, however, appeared a little later, rising in the east, and as the evening went on everyone had progressively better views of the planet, as it got higher in the sky.

During the course of the evening sky conditions improved dramatically, and the 50-60 members of the public who came to the starnight, had a good look at the summer sky, under reasonably dark skies in the park. The trees behind us hid any lights from the Park and the only stray-light problem we had was temporary, in the form of four trains and their brighter-than-bright headlights trundling through the park, past our observing site!

Those attending the starnight were treated to a good variety of celestial stuff, including a number of the brighter summer Messier objects, M13, M16, M27, M57, and M32 with companion galaxy, together with most of the obvious, brighter Milky Way objects in Sagittarius. For an example of star colours, there was the ever popular Alberio, with its gold and blue components. The night also gave us an opportunity to point out the summer constellations to everyone attending. For some, this was the first chance they ever had to inquire as to what some of those bright "stars" and other sky objects were that they had always wondered about.

In conclusion, the night was a great success. I left at around 12:30 a.m. and, although the crowd had thinned somewhat, there were still over a dozen people lining up to look through the remaining 'scopes. I also discovered later that at least two enthusiastic sky gazers (being one of our newest members and her father) returned after midnight, after having to leave earlier in the evening!

Thanks to everyone who came out and made the evening a success!

Sandy Ferguson

NOTICE OF OBSERVERS GROUP MEETING

The next Observer's Group meeting will be at the Rystrom Observatory at 7 P.M. on Saturday, December 19, 1992, weather permitting. To find the Observatory, drive south on hiway #11 to the Grasswood Esso station and drive-in, turn left past the KOA campground and head down the road approx. 1.5 miles to the last mailbox on the right before the railway tracks. The mailbox is the Rystrom's. Go down the driveway past two homes and around the large equipment building to the right. Be sure to dim your lights.

In addition to the observers group meeting, members are welcome to visit the Rystrom site at any time provided you phone ahead. The number to call is 955-2370, ask for Nelson or Gloria. If you do not have a key, find a member who does and talk them into a trip to the dome. After you have been checked out on the equipment there you are entitled to a key of your own.

GENERAL MEETING PROGRAMS FOR 1992 - 1993

I am pleased to announce a revised schedule for lecturers for the General Meeting presentations. Please note that the list is tentative in that dates may switch around to accommodate the speakers if necessary, and that the programs are subject to change if the speaker cannot attend for some reason. Members are always welcomed to throw in short presentations in conjunction with the main programs and are certainly encouraged to give a main presentation themselves. Bring yourself and your friends so we can have good attendance at these meetings. SUPPORT YOUR CENTRE! If you have any suggestions for the vacant months, please contact me at (306) 665-3392 evenings.

Dec 21, 1992 **Thar She Blows! Solar Eruptions and the Northern Lights**
Presented by: Dr. G. Sokfo
Dr. Sofko is with the Institute of Space and Atmospheric Studies, U of S.

Jan 18, 1993 **Buying your First Telescope**
This is a video by Charles Scovil (of AAVSO fame) which we have just received. It is an excellent presentation for the beginning or advanced amateur.

Feb 15, 1993 **Space Shuttles, Space Stations and Crystal**
Presented by: Dr. Louis Delbaere
A description of biochemistry experiments flown on the Shuttle by this U of S experimenter.

Mar 15, 1993 **Starlab**
Presented by: Ron Waldron
The Dept. of Education's portable planetarium will be set up for us.

Apr 19, 1993 **Planetarium Programs and other Astronomy Software**
Presented by: Jim Young
A description and demonstration of today's great computer programs.

May 17, 1993 **The Dominion Radio Astrophysical Observatory**
Presented by: Dr. Eric Valk
Dr. Valk worked at the DRAO in Penticton, B.C. and did his graduate work with the Radio Astronomy group at the University of Alberta.

June 21, 1993 Vacant
Might be a good time to talk about solstices!

Rick Huziak

NOTICE TO EXECUTIVE MEMBERS

Please note that Executive Meetings will resume at their normal time and place as of the December meeting. Note that the Executive meets in the University of Saskatchewan Observatory at 7:00 PM, one hour prior the the General Meeting.

Next Executive Meeting:
December 21, 1992, 7:00PM

Rick Huziak

SETI: AN OPINION

SETI is the Search for ExtraTerrestrial Intelligence. An article in the November issue of *Sky and Telescope* (vol. 84, p. 507) discusses efforts made by radio astronomers to find radio signals in the sky that originate from beings living on other planets. New projects sponsored by the Planetary Society and NASA are getting under way that will use radio telescopes larger than any used in such searches before along with some very sophisticated signal analysis hardware and software. Here I would like to offer a personal opinion of these projects. Specifically, I suspect that the effort to find radio signals from other worlds will fail.

The reason for my pessimism is not because I believe there are no other intelligent life forms in the galaxy but because the galaxy is very large and because I believe the speed of evolution is very fast. To make this clearer I offer my interpretation of the meaning and values of the factors in Frank Drake's famous equation that counts the number of communicating civilizations in the galaxy. Drake's equation (also mentioned in the *Sky and Telescope* article referred to above) is reasonably famous and reads:

$$N = R^* \times F_p \times N_e \times F_l \times F_i \times F_c \times L$$

where R^* is the number of new stars that form in the Milky Way each year; F_p the fraction of those stars having a planetary system; N_e the average number of planets in the "life zone" around each star; F_l the fraction of those planets on which life evolves; F_i the fraction of life bearing planets on which intelligent life evolves; F_c the fraction of intelligent species that attempt interstellar communication; and L the time a civilization spends communicating. Communication in Drake's equation as applied to the present SETI project means radio communication. The value of L would be different for other modes of communication.

The article in *Sky and Telescope* ventures the following guesses for the factors in Drake's equation:

$$N = 10 \times \frac{1}{2} \times 1 \times \frac{1}{10} \times \frac{1}{2} \times \frac{1}{2} \times 1,000,000 = 125,000.$$

Here are my guesses (taking R^* as essentially known):

$$N = 10 \times 1 \times 1 \times 1 \times \frac{1}{2} \times 1 \times 500 = 2500.$$

I've guessed ones for all fractional quantities, except F_i, because I think that the evolution of life is practically inevitable. However, because of the short lifetime of the more massive stars, I guessed that 1/2 of the life-bearing planets will be destroyed before intelligent life has time to evolve, thus $F_i = 1/2$.

But notice that I've guessed $L = 500$ years. That's not because I think that intelligent life forms have a short lifetime but rather that communication by radio will very quickly become obsolete for any given civilization. I can't imagine humans still using radio 500 years from now - I don't know what will be used but radio will surely be as obsolete as smoke signals are today. Thus, I end up with the guess that there are 2500 civilizations in the galaxy presently attempting interstellar communication by radio, of which we are one. This is a very small number compared to the number of stars in our galaxy.

The range of the SETI searches is reported in *Sky and Telescope* to be at most 100 light years for a 3000 watt beam aimed directly at earth and only 5 light years for non-directional type broadcasts (e.g. from a TV type station on the other planet). With this information and the 2500 number in hand we can roughly calculate the probability of making contact. According to my old university textbook, ***Exploration of the Universe*** by George O. Abell (1975 by Holt, Rinehart and Winston), the mass of the galaxy is roughly 2×10^{11} solar masses and the diameter of the galaxy is roughly 100,000 light years. I will take the number of stars to be 2.5×10^{10}. To be really generous I will assume that the galaxy is a flat disk. Also assume that the stars and intelligent life forms are uniformly distributed about the galaxy and that the beings are continuously broadcasting. Then the probability of making contact with beings 5 light years distant is:

$$\frac{2500}{2.5 \times 10^{10}} \times \left(\frac{10}{100,000}\right)^2 = 1 \times 10^{-15}$$

and for contact within 100 light years:

$$\frac{2500}{2.5 \times 10^{10}} \times \left(\frac{200}{100,000}\right)^2 = 4 \times 10^{-13}.$$

These are very low probabilities, much lower than your chances of winning any lottery you care to gamble in. And I have been generous because the galaxy is not a flat disk but has considerable thickness. (Taking the thickness into account would increase the exponent from 2 to a number between 2 and 3.) To be fair, I should calculate the probability of contact using the 125,000 number quoted by *Sky and Telescope*. The probabilities then increase to 5×10^{-14} for a radius of 5 light years and 2×10^{-11} for a radius of 100 light years. Not much better.

In spite of my prediction of failure, I think that the SETI programs are very important steps toward eventually making meaningful contact with other intelligent life forms. It would be meaningless for us to contact or be contacted by a race that is a million years more evolved than us. It would be like us trying to talk intelligently to a cat. So while the stories of UFO contact that the media has been pushing on us recently may or may not be true, such encounters are not likely to be of any benefit for our race as a whole since only a very evolved race could manage interstellar travel. We must make contact on our own terms with civilizations our own age to maximize knowledge exchange. Eventually, the 2500 civilizations will grow up enough to be able to find each other. When that happens, I suspect we will find that they have as many problems as us and it will not be the salvation that some people seem to think contact will bring. In the mean time, as *homo sapiens* evolves, we are effectively alone in the cosmos.

Gordon Sarty

NOTICE OF DECEMBER'S GENERAL MEETING

The December General Meeting will take place on Monday Evening, December 21, 1992 at 8:00 P.M. in Room B-111 of the Health Sciences Building. A presentation will be given by Dr. Sokfo of the Institute of Space and Atmospheric Studies, U of S. His talk is titled: "Thar She Blows! Solar Eruptions and the Northern Lights."

UNIVERSITY OBSERVATORY HOURS FOR PUBLIC VIEWING

The university observatory will be open to the public on Saturday evenings from 7:30 - 9:30 p.m. during the period of October through February. It will be closed on Dec. 26.

Visitors will be able to view: Saturn and its rings, the Andromeda Galaxy, the Albireo Double Star System and other celestial objects.

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.

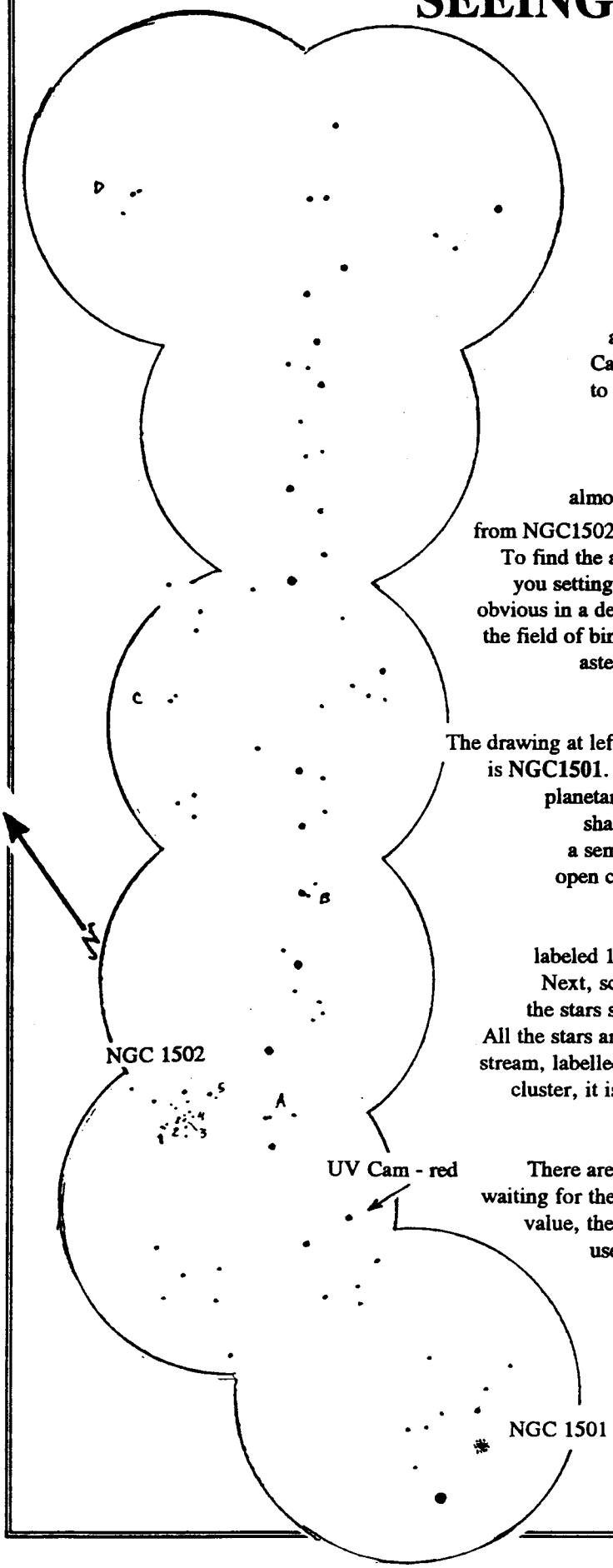
Stan Shadick
Astronomy Instructor
966-6434

NOVA CYGNI 1992

For variable star observers, it is worthwhile to note that Nova Cygni 1992 is finally fading. After it's bright 3rd magnitude peak in February, the nova faded to about magnitude 8.8 in a few months and remained there until November of this year. However, my latest observation in November showed that it was magnitude 9.8. Try and catch this nova before it fades away forever.

Richard Huziak

SEEING THINGS



Cruising Kemble's Cascade

In Camelopardalis, a constellation little explored by amateurs, an interesting asterism resides. This asterism is called "Kemble's Cascade", named after the well-known Lumsden, Saskatchewan amateur, Father Lucien Kemble. Father Kemble is a member of the Calgary Centre of the RASC. On December 28, 1991, I had a chance to explore this interesting field with the 12.5" telescope.

Kemble's Cascade is a chance alignment of about 30 stars into an almost perfectly straight row, which extends 4 degrees north-proceeding from NGC1502. The asterism is centered at approximately 04h00m +63°(2000). To find the area in the first place, you must starhop from α or β Cam, or use you setting circles, as the area has no bright landmarks. The brighter stars are obvious in a deep sky atlas such as Uranometria 2000, and the asterism nicely fills the field of binoculars. There are a number of interesting objects in or nearby the asterism.

The drawing at left shows 7 overlapping 1 degree fields. Near the bottom of the field is **NGC1501**. Although listed at 13th magnitude, I find it closer to 9th; a bluish planetary, easily visible at 1' diameter. It is round, homogeneous, and has sharp edges. One degree north is the very red variable star, **UV Cam**, a semiregular carbon star variable. Another half degree north is the fine open cluster **NGC1502**. This 10' diameter cluster contains about 50 stars of magnitude 8 through 14, and at least 5 interesting double stars. The cluster really comes to life at high power. These doubles are labeled 1 through 5. Note that the fainter stars in the cluster are not shown. Next, scanning along the **Kemble's Cascade**, I was amazed at how straight the stars stay through the entire length of this object, there purely by chance. All the stars are 8th to 10th magnitude. There are four doubles in or near the star stream, labelled on the drawing A through D. Although this asterism is not a real cluster, it is still unique in it's form and is certainly worth the time to explore.

There are many such asterisms or false clusters throughout the sky which are waiting for the lucky amateur to recognize and name. Although of little scientific value, these asterisms are just fun to find and observe. Generally, those who use starhopping as a regular tool will occasionally run into an unusual arrangement of stars which is worth noting for postarity sake. That's all for now. There will be more exciting objects in future Saskatoon Skies. Good observing.

Rick Huziak (phone: 665-3392)

SKY FACTS

News About Amateur Astronomy

No. 1 November 14, 1992

The December 9, 1992 Total Eclipse of the Moon

December 9 brings the only total eclipse of the moon in 1992. Weather permitting, this eclipse will be visible throughout most of the habitable world with the exception of Australia and New Zealand. Unlike total eclipses of the sun, which are only visible in a narrow strip on the earth's surface, total eclipses of the moon are visible to anyone who can see the moon above the horizon at the time.

What is a Lunar Eclipse?

Lunar eclipses occur when the moon plunges into the earth's shadow. (See *Figure 1* below). Because the moon is in an inclined orbit with respect to the ecliptic, lunar eclipses happen only twice a year, with the moon missing the earth's shadow on the other occasions. There are 3 major stages in the eclipse. The first is the **penumbral eclipse**, where the moon enters the earth's faint, outer shadow (see *figure 2* on the next page). This stage is barely noticeable, except that the full moon will look duller than normal. The second stage is the **partial umbral eclipse**, where the moon enters the dark shadow and begins showing "phases". Here it looks as if a bite is being taken out of the lunar disk, though there will still be some detail visible on the darkened area. The most spectacular phase is the **total eclipse**, where the moon entirely enters the earth's umbral shadow. At this stage the moon will shine dull red to dark brown, as no direct sunlight now reaches the moon's surface. All light visible is *refracted* by the earth's atmosphere onto the moon's surface. After the total eclipse ends, the stages reverse order as the moon passes out of the shadow.

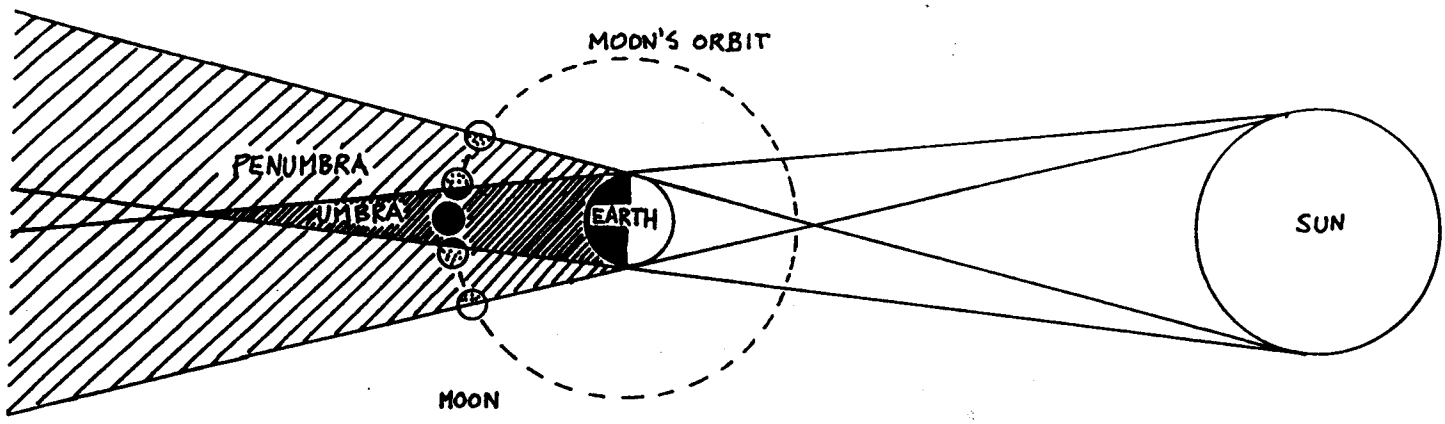


Figure 1. The earth blocks out light from the sun and projects a shadow millions of kilometers into space. When the moon enters this shadow, an eclipse occurs. A total eclipse occurs when the moon fully enters the darkest part of the earth's shadow, the umbra.

How do we view the eclipse?

Lunar eclipses are one of the easiest astronomical events to view. Great views can be obtained using just your eyes. Binoculars or a small telescope will help in seeing clearer details, but they are not necessary. Lunar eclipses, unlike solar eclipses, are not dangerous in the least! You will need a clear north-eastern horizon, unobscured by buildings or trees, and a reasonably dark location to view the eclipse from. Get away from brightly lit yards or street lights. You will *not* have to go out of the city to view this eclipse, though light pollution will be reduced if you do.

What can we see from Saskatoon?

In Saskatoon, the eclipse is already in progress when the moon rises at 4:27 PM. As can be seen from *Table 2* below, the mooh will be about half eclipsed. This effect will be very noticeable, looking as if a bite has been taken out of it. Since the moon will be right at the horizon, refraction effects of the atmosphere may cause the shape of the moon to be quite oval in appearance, or maybe even an irregular shape, adding to the drama of the eclipse. The dark shadow across the lunar surface is usually a regular curve, but volcanic dust in the stratosphere may cause the arc to be ragged. The effect of atmospheric volcanic dust on the shape of the earth's shadow is a very poorly understood phenomenon and this eclipse may help us determine the exact effect, due to the recent eruptions in the Philippines and Alaska. Watch as the eclipsed crescent slowly disappears until it is completely gone at 5:06 PM! Now the total eclipse begins. The exact appearance of the eclipsed moon is hard to predict, but it will be very dull, and probably deep orange or brown in color. This is expected to be a "dark eclipse", again due to volcanic dust in the atmosphere filtering out even the longest red rays of sunlight. There may also be some patches of different colorings on the moon. Dim lunar features and craters may also be glimpsed. The exact view will change as the moon passes deeper into the earth's shadow, then out again towards the far edge. Notice that dim stars will be visible near the moon and all over the sky, not being "washed out" as the moon normally does when it is full. The total eclipse will last 75 minutes, then the partial umbral phase begins again. By 7:29 PM, the dark umbra has moved completely off the moon, and by 8:33 PM, the penumbra has left. A brilliant full moon will again illuminate the sky. The eclipse is over.

What information should I record?

It is fun and informative to take notes and make drawings of the eclipse. The progression of the shadow can be sketched on a prepared set of circles representing the moon (but note that the moon may be oval when it rises). Notes of details and colors seen can be pencilled in, and the drawings can be completed and colored later on after the eclipse is finished. Note the colors and patterns visible during the total eclipse, and the visibility of stars near the moon. Note the illumination of your surroundings (on earth) and any other impressions you get. We would be very interested in seeing your observations. You are welcome to send a copy of them to the RASC's mailbox address shown below.

Can I photograph the eclipse?

Yes, the eclipse can be photographed, but you will need some special accessories. Your camera must be on a tripod and be capable of time exposures of several seconds. You can use a reasonably slow film, such as ASA64 to ASA200 speed. The use of a shutter release and a short telephoto lens such as a 135mm or 250mm lens is encouraged because the moon ends up being only a few millimeters across with a standard 50mm lens. Shoot with the lens aperture wide open (fastest f/ number). Since the moon will rise in bright skies, the camera's light meter will estimate a correct exposure, but as the eclipse progresses, exposures must be lengthened to a few seconds during partial phases, and up to 30 seconds during total eclipse. Note that if the camera is not guided to follow the moon during the longer exposures, the picture will probably smear into a streak. It is difficult to give exact exposures as every eclipse is different, but note that the light meter will not give accurate readings once the background sky darkens. Personal judgement is often the best solution, and take lots of varying exposures to try to get at least a few good pictures.

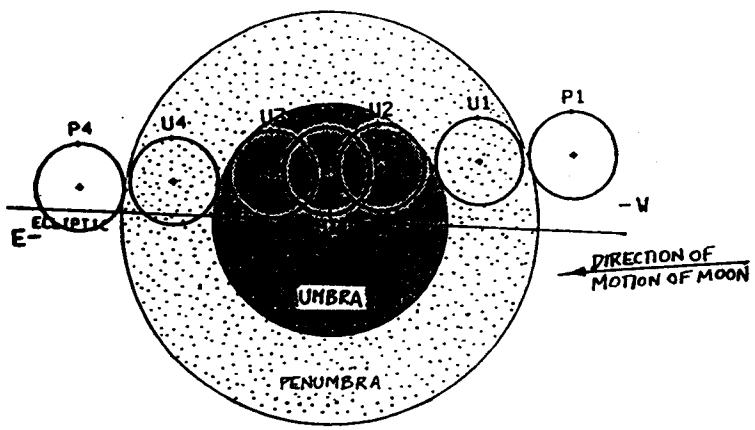


Table 2

	Contacts (CST)
Moon below horizon	P1 = 2:55 PM
	U1 = 3:59 PM
Moon above horizon	U2 = 5:06 PM
	Mid = 5:44 PM
	U3 = 6:21 PM
	U4 = 7:29 PM
	P4 = 8:33 PM

Figure 2. ***The moon moves from right to left through the projection of the earth's shadow. (You will not actually see the earth's shadow until it crosses the moon). Times of the beginnings and ends of the major features of this eclipse are indicated in the accompanying table.***

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