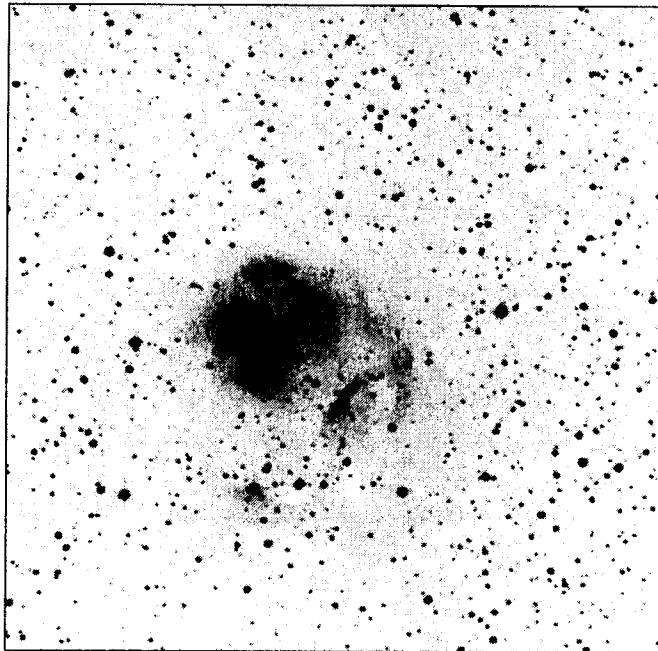


Saskatoon Skies

**The Newsletter of the Saskatoon Centre
of the Royal Astronomical Society of Canada**

**Volume 29, Number 11
November 1998**



NGC 1931 is a fine nebula for small telescopes as described in Scott Alexander's article in Deep Sky Observing found within these pages. Embedded in the thick star clouds of Auriga, this nebula is a fairly easy object for any telescope. This picture is a negative image from the Digital Sky Survey.

Gordon Sarty
1040 Main Street East

RASC Calendar Happenings

Date/Event	Description	Contact	Telephone
Nov 14 - 17	Leonid Meteor Storm Watch	Rick Huziak	665-3392
Nov 16	RASC General Meeting - 7:30 pm	Erich Keser	374-4262
Nov 20 (or 21)	Observer's Group Session at Sieford Observatory	Darren Charlfield	374-9228
Dec 12 - 14	Geminid Meteors - peaks Dec 13/14	Rick Huziak	665-3392
Dec 14	RASC General Meeting - 7:30 pm	Erich Keser	374-4262
	Youth and Junior Astronomers - call	Sandy Ferguson	931-3184

**** Welcome New Members ****

The Saskatoon Centre would like to welcome the following NEW members!!

Barry Allen, 135 Constain Place, Saskatoon, SK, S7N 3K4, tel: (306) 249-0603

Correction: John Leppert's home town is Bismarck, ND (not Bismark) - sorry John... and thanks for the geography lesson!

The 1999 RASC Calendar is Now Available.

This edition features a larger size, 10 by 12.5 inches (was 8.5 x11). Also, all photos are in colour for the first time. The 1998 edition was the "Best Calendar" winner in the Ontario Printing and Imaging Association's annual competition. The same high quality has been retained in the new, larger, 1999 version. Copies will be available for sale at the November meeting. Excellent Christmas gift!

U of S Observatory Hours - the U of S Observatory will be open to the general public on Saturday evenings from 7:30 pm to 9:30 pm from October to February. On clear evenings visitors may view Jupiter and its moons, the colourful Alberio binary star system, the Hercules star cluster and Saturn and its rings through the 6" refractor. Free admission. More info -call 966-6429.

Saskatoon Centre

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Newsletter Editor - Richard Huziak
Copy - Brian Friesen & WBM
Collate - Brian Friesen, Les & Ellen
Dickson



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Saskatoon Skies is published monthly by the Saskatoon Centre of the RASC. Distribution is approximately 140 copies per issue. *Saskatoon Skies* welcomes unsolicited articles, sketches, photographs, cartoons, and other astronomy or space science articles. Articles can be sent by mail in any format to the Centre's mailbox. Submissions may also be sent by e-mail - preferred as **plain unformatted ASCII text files without line breaks**. Images sent by e-mail should be UUEncoded or as attached .GIFs. Send e-mail submissions to the editor at huziak@SEDSystems.ca. Submitted materials can be returned upon request. A separate subscription to *Saskatoon Skies* is available for \$12.50 per year. Articles may be reprinted from *Saskatoon Skies* without expressed permission (except where otherwise stated), but source credit is requested. **DEADLINE for submissions is the 3rd of each month.** *Saskatoon Skies* accepts commercial advertising. Please call the editor for rates. Members can advertise non-commercial items free of charge.

President's Report

by Erich Keser

There were two shocking discoveries for me at our October 29th Council meeting. The first was when our new Co-treasurers, Jim and Barb Young announced that we were up to 91 members; the second was when Jim then told us that, with another four which came in that night, we are now up to 94 members! (The growth of our Centre is almost as astounding as the subtle mathematical magic of the higher realms of accounting!)

We are growing because we are active, and the focus of much of that activity has lately been our new Sleaford observatory site. We got a late start this year for many reasons. Nevertheless, now that the work has really got started, we have made tremendous progress. The first big event was when the (televised!) Rystrom dome move managed to just beat the Thanksgiving weekend blizzard. Within less than a month of that move, the same dome has been properly leveled, anchored and mouse-proofed, and a sturdy deck and the entire base and shell for an extension and toilet enclosure have been built onto our warm-up shelter. All this work has been accomplished through the efforts of over a dozen Centre members, but the main credit for planning, preparing the many details for, and organizing this whole effort belongs to our Site Chairman Bill Hydomako and our Construction Coordinator and Vice-president, Darrell Chatfield. As well Sandy Ferguson (and Brian Friesen) have done a great job of mobilizing the troops, and Sandy, Ellen Dickson and Bill have fed and watered us while we were out there.

If the weather allows it, and our electrical expert Merlyn Melby can finish more of the heavy duty pipes and couplings he so generously provides and fabricates for us, then we may be able to upgrade the whole site's electrical service and run power on to the University's new roll-off observatory. Please let Brian Friesen (384-2963) or Sandy Ferguson (931-3184) know if you can help, and please be sure to dress appropriately, both for the weather and for your own protection. And work carefully! Things have gone well, and most of us have benefited from the fresh air and exercise, but we have had some close calls. (Brian assures me that he sustained no long term damage...and Jim did get the splinter out). Let's have no more such cliffhangers!

CHANGES BEING FOMENTED:

As a member of the RASC Membership and Promotion Committee, I have continued to press for some of the changes which outgoing National Representative Dr. Gord Sarty lobbied for. The most important of these is the institution of some form of couple or family membership to reflect the real interest of the partners and offspring of some members in becoming fully active participants without the cost and wasteful duplication of having multiple sets of national publications come to the same address. The proposal is essentially that the cohabiting partner and children of a member be able to gain full or Youth membership rights for an amount which corresponds to the additional cost of administering such a membership.

I have also made a couple of additional membership suggestions. One is for the institutions of a new category of "Junior Membership" for 7 or 8 to 11 or 12 year old, to receive *Sky News* and the *Journal*, but no *RASC Handbook*, for \$15 or \$20 a year, and to pay another \$10 or so materials fee, in any Centre which has an active Youth Program, possibly for some sort of Junior Handbook. (Sandy is working on this). Another is that the cut-off point for Youth membership be moved from 21 to 18, to reflect the legal voting age. A third one, which reflects the actual practice of several Centres, including our own, is to

substitute the *Beginning Observer's Handbook* for the *RASC Handbook* for (12 or 13 to 17 year old) Youth members.

There are good reasons for such changes. Over a century ago, the RASC started as a club, then a learned society, almost entirely made up of men (although there were always a few notable women). Recently, an increasing number of women, young people, kids, couples and even whole families have become active. And with every passing year, amateur astronomy becomes less of a "boys and their toys" activity and more of a sort of *Naturalism of the Night* which appeals to both genders and virtually all ages.

RASC membership categories should change to reflect this that, as we move into a whole new millennium. Similar changes in our own Centre's composition are also the reason that we need to move ahead with the membership-mandated installation of a sanitary, comfortable washroom at our new site. As one of our most respected and renowned (male!) members put it, *"Now that we finally have a significant proportion of women and young people in the Centre, let's not drop the ball on this one."* Please help at Sleaford, so that we can carry that ball forward!

Sky Buys and Mirror Sells

Still Wanted: Donations of building materials for the Sleaford Observatory site. We'll take miscellaneous 2x4's, 2x6's, 4x4's etc., plywood (even partial sheets), nails, screws, white paint, primer. Every little bit helps. I will pick up. Call Rick Huziak at 665-3392.

For Sale: Tasco Model 11TR 4-1/2" aperture, 900 mm f.l. Newtonian telescope. Comes with 20 & 4 mm eyepieces, 2x barlow, moon filter. Equatorial mount and tripod. Call Gerald at 244-9918

For The Taking: Split Ring Equatorial mount for a 10" Dobsonian. 10" tube assembly NOT included. I built this mount to refurbish my 10" scope before I sold it, so I now have no use for it. The entire mount is lightweight and collapses down to a mere 4 foot height so it will fit in most cars. This mount is designed to be easily motorized. Call Garry Brett at 948-5624.

You are invited to the
General Meeting of the Saskatoon Centre
Monday, November 16, 1998 at 7:30 p.m.
Conference Room, National Hydrology Research Institute building
Innovation Boulevard

November's meeting: Dr. Chary Rangacharyulu, Professor of Physics, U. of S. - *"The Subatomic World of Astronomy and Cosmology"*

December Meeting: Yannis Pahatouraglou, U of S Physics

January Meeting: Mark Kaye

Canadians to Combat the Leonid Menace

by: Andrew Adamson, aadamson@discovery.ca

(suggested for publication by Ed Kennedy)

October 7, 1998. A team of Canadian scientists is promising to give the world's satellites their first-ever protection against meteors - and just in time for the biggest meteor storm to hit the Earth in the modern space age.

The Leonid meteor stream normally gives us a rather tepid meteor shower. Every year on November 17, our planet sweeps through the remains of comet Tempel-Tuttle as it slowly orbits the sun like an enormous, wispy river. But the river runs particularly thick every 33 years after the comet passes through the Earth's orbit. And this is one of those years.

This poses a special risk to satellites. Unlike all of us on the ground, satellites don't have a thick layer of atmosphere to protect them. So there's nothing to stop these tiny, but destructive flecks of dust. Traveling at 72 kilometers a second, they can do a lot of damage - by punching though delicate instruments and especially by generating sparks of electricity in sensitive electronic components.

"We can't shield satellites from the meteoroids," according to Peter Brown, professor of physics and astronomy at the University of Western Ontario. Instead, they'll be doing the next best thing by keeping satellite operators aware of which satellites are at highest risk. He says it will give aerospace companies the same sort of "weather report" that mariners have now come to expect. *"When the winds start blowing hard outside, you may want to change the orientation of your sails and you might start to think about putting people below deck."*

With the help of the non-profit, Toronto-based research institute, CRESTech, Brown will head a team that includes space scientists from across Canada to scan the skies for signs of meteorite activity. They'll be helped by the U.S. military - the world's single-largest operator of satellites.

"This is the first major meteor storm in the modern space era," says Lt. Col. Donald L. Jewell, deputy chief scientist for the U.S. Air Force Space Command. *"In 1966, when the last storm occurred, we had less than 50 satellites in orbit and today (there's a total of) over 650 operating satellites in orbit. So they are of strategic importance to the whole world."*

"The Canadians have studied this longer than we have and are really experts in the field so that's why we have this collaborative effort," he says.

Using 10 Low-Light-Level Television cameras based in Mongolia, the scientists will search for extremely faint visible signs of meteorites. These are the same sorts of cameras used by CNN during the gulf war to peer through the nightly darkness of Baghdad during the Gulf War. And in northern Australia, they'll use sensitive radar to detect the trail of electrons and ions left behind meteorites. All data will be sent to the University of Western Ontario, where it will be collated and analyzed. Warnings will then be released to satellite operators. They expect their observations will give satellite operators a two-hour warning that something is headed their way and a one-hour warning of how big that risk is.

And this isn't just idle star-gazing. In 1993, during the August 11 Perseid meteor shower, the European Space Agency lost control of one of its experimental communications satellites.

"After a lot of investigation, it was determined that the loss of pointing control was caused by the impact of a meteoroid smaller than a grain of sand onto the solar panel," Brown says. *"That generated one of these electrical interference effects and that actually caused the loss of the satellite."*

"This has happened. It's been documented. It's not a theoretical proposition."

Brown hopes, with warning, operators will now be able to turn their satellites sideways to the storm, reducing their profile and lowering the risk of them being struck. Alternatively, certain parts of the satellite might be turned off to reduce the chance of electrostatic discharge doing real damage.

Participating satellite companies will get warnings in real-time, but you can keep up with what's happening above you by going to <<http://www.crestech.ca>>

Information on the Leonids can be found at <<http://www-space.arc.nasa.gov/~leonid>> and <<http://www.spacecom.af.mil>>

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WBM's Risograph Changes Newsletter Printing

by Rick Huziak

Some of you may have noticed a few subtle changes in the newsletter in the last few issues in terms of print quality. In addition, there have been other cost-cutting changes that are quite invisible. In order to reduce cost and production time, we have moved copying from our own photocopier to a machine provided for use by **Western Business Machines**, called a *Risograph*. The Risograph is a very interesting machine which revives the old *Gestetner* technology by 'burning' a master copy, then incredibly spitting out 3 or more copies per second! This process is much cheaper and faster than conventional photocopying. The only problem is that the Risograph is not very good at producing the half-tones required for photo reproduction, so these still have to be done on a conventional copier. This complicates matters a bit, since I will now have to run to a copier *and* **Western Business Machines** in order to get the copies in one location for collating. But that's life.

The staff of *Saskatoon Skies* production is also changing. With the main production being done in a basement meeting room of **Western Business Machines**, the copying sealing and franking staff is now Brian Friesen, and the collating staff is usually Les and Ellen Dickson and me, and less so Sandy Ferguson. We're trying to free up some of Sandy's time so she can concentrate on the Youth and Junior Astronomers program.

I should take this opportunity to recognize Sandy's underrated contribution to the newsletter. For the past year or more, Sandy has been a one-woman production crew, copying the newsletter page by page between copier temperaments and jams; a job that often took much of a day, then she would collate, staple, stuff and seal the envelopes, often consuming another day. I really appreciate her effort, but we are now working hard to reduce the amount of work to get the newsletter out.

Using the **Western Business Machines** Risograph, and a production crew of 4, we managed to get October's newsletter copied, collated, stuffed, sealed and mailed in less than 2 hours! We are looking forward to the generous copying relationship that **Western Business Machines** has provided for us. **WBM** is generously providing the Risograph use and franking at cost.



SSSP

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remember SSSP'98.
upper right: the Wapi
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and Steve Szuta (Re
registration table.

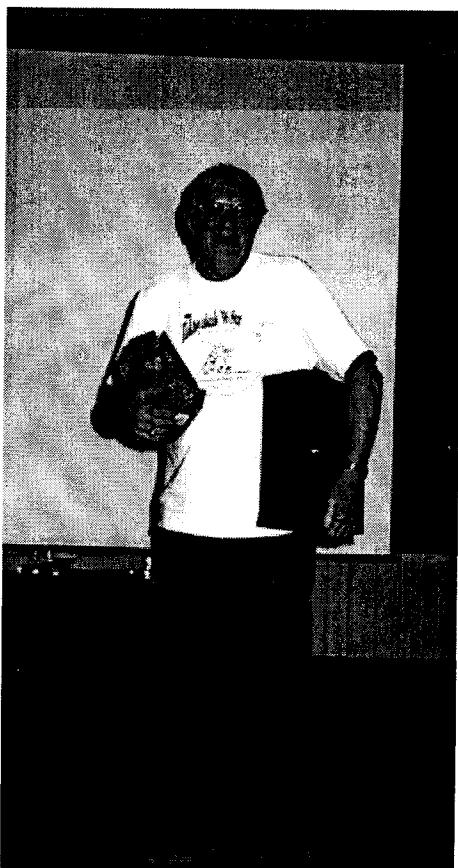
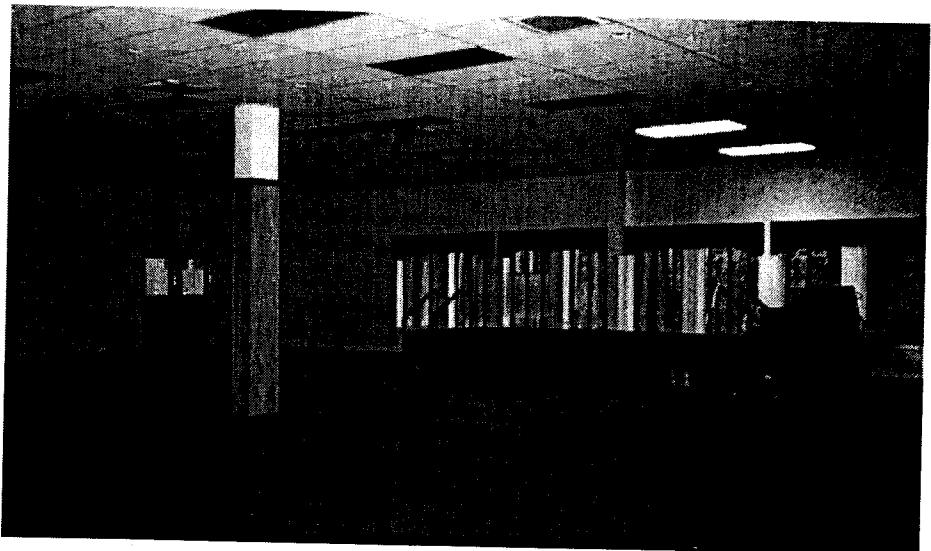
SSSP'98 was a great
work begins soon
Come February, come

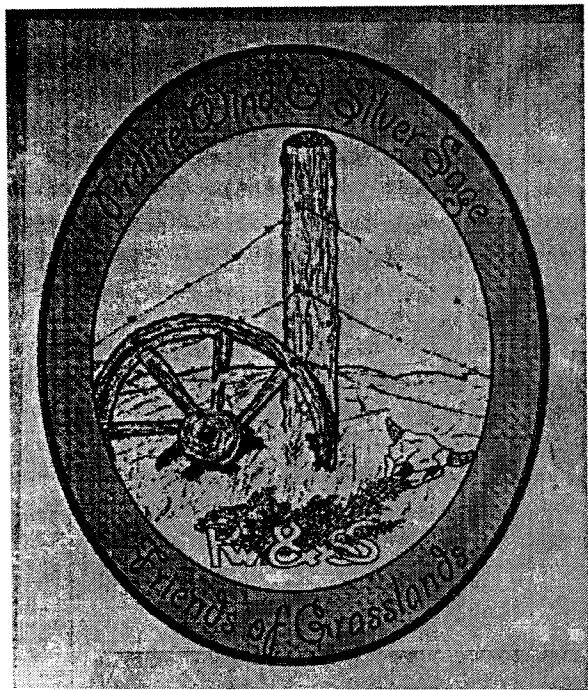


'98

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work!





Clockwise from upper left: Proof that we're close to Climax!, Dale unloads his gear, the Brick Schoolhouse, our hosts "Friends of Grasslands



Good Times Near Climax

by Rick Huziak, with Dale Jeffrey

This summer saw several visits to different towns around Saskatchewan for astronomy events, but one of the most eventful trips was our excursion the Val Marie, which brought Dale and me closer to Climax than we'd ever been before! Indeed, as can be seen from the accompanying photograph, we were not that far from Climax at all after a very long and sweaty ride in the back of Dale's van. But how did this all begin? What brought Dale and I this close?

It all began when I was invited by Karin Smith Fargey of the *Friends of the Grasslands* to give an inspirational speech on astronomy to a writer's workshop being held in Val Marie, not far from the Grasslands National Park in southern Saskatchewan. I agreed to do so and was booked for the gig for August 14th. Since it was going to be a long trip, I suggested that we could do a mini starnight as well, which Karin was delighted to host.

When Dale hear that I'd be going most of the way to Climax, he immediately agreed not just to come, but to do the driving as well! Climax is just down the road from Val Marie. We decided to take Dale's van since it was roomier than my Honda and would easily fit Dale's 8-inch and my 10-inch in the back. We loaded up and began the long, 5-hour trip south. The plan was to arrive a day early, pull an all-nighter observing in the very dark southern skies, to give my talk, then to give the community a public starnight.

The trip began well, but soon after Swift Current, fog appeared, and driving became difficult. Dale was tired, but I kept him by whispering to him "*Oh deer, Oh my... deer, Dale, deer!*", as deer appeared near the side of the narrow road. Somehow, Dale was soothed by my words!

We arrived in Val Marie, not quite yet reaching Climax, and decided to pitch camp before we were too tired. Although the night was beautiful, I decided to turn in early and began to outcry the howling coyotes with wild bouts of snoring. Dale decided that if he had to be up anyway, he might as well observe.

The next day, we did not much, drank some beer in the local pub, and generally had a relaxing day. That evening I gave an inspirational talk and slide show entitled "*A Night Under the Prairie Stars*" to a packed audience of 50 or so in the local "Little Red Schoolhouse", now and arts and crafts shop. The lecture was immediately followed by a public starnight in Grasslands National Park, which was attended by a hundred or so people from Val Marie and may other surrounding communities. Unfortunately, the skies did not cooperate as well as we had hoped, though we did get in some reasonable observing with the masses. Some of the participants said that they had come from Climax or that they would soon be there after viewing what we had to show them. Dale and I were delighted!

The event was a complete success, and we were invited back for next year. To show their appreciation, they gave us some cash for the Sleaford Observatory, but better yet, arranged for the worst thunderstorm that I'd ever seen in my life to bombard our steel-framed tent with bolts so loud and continuous that Dale never once complained about my snoring! I was sure we were going to die - fried by a stray bolt either to the tent poles or to the very tall tree we had pitched the tent under. Somehow, though, we survived, and in the morning, we were awoken by the smell of the sewage treatment plant that had suffered a direct hit! The trip back smelled much better!

The Deep Sky Observer

Planetary and Galaxies in Andromeda and Auriga!

by Scott Alexander

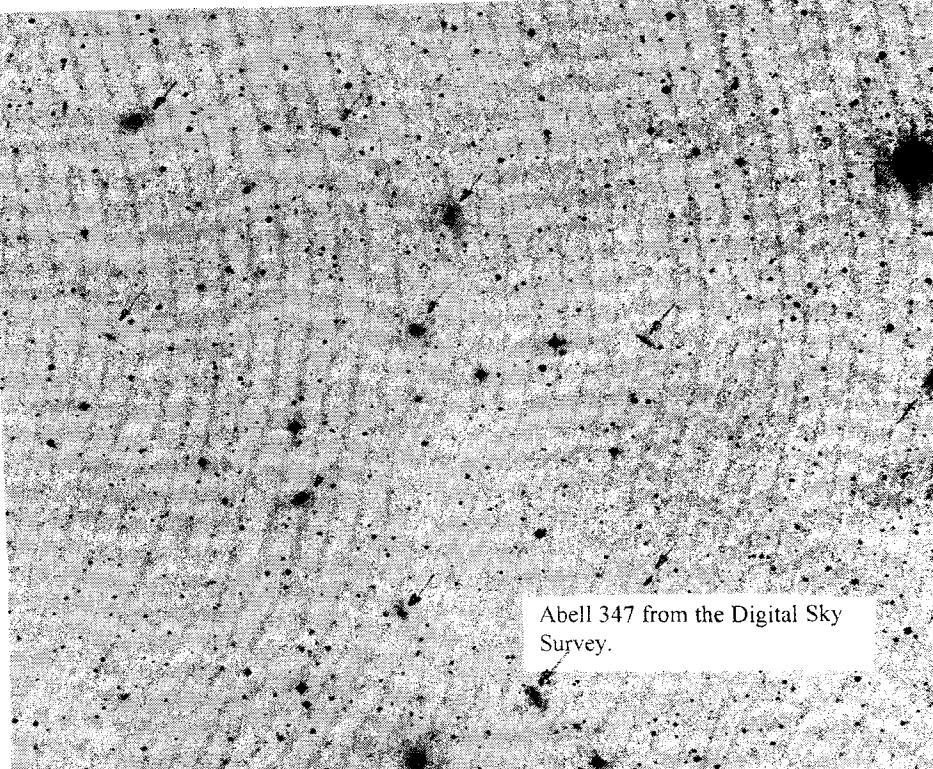
This month I thought that we should go into the very fine lists in the *Observer's Handbook* that the Royal Astronomical Society of Canada puts out.

The first object that I thought we would try is a planetary: NGC 1931 in Auriga. I first found this one on September 26, 1998 from my backyard here on the farm. The planetary is in the *Finest NGC* list (#24) in the winter sky section of the list. This planetary is a haze around 4 close stars. It should be visible in an 8-inch or larger scope. You will have to have a clear night to see this planetary (and no - not that it is too faint to be seen on anything less than a perfect night). You will just have to have a good night and dark skies with no light pollution to see this planetary. It's fairly faint. It is located at RA 05h31.4m and a decl. +34 deg 15m. It is shown on chart #97 of Uranometria 2000. I could not find a magnitude on this object in any of my books. Give it a try anyway!

The next object to look for is called NGC 891. This is a galaxy in Andromeda at RA 02h 22.6m, decl. +42 deg 21m. At a magnitude of 10, this is an object for an 8-inch or larger scope. This galaxy is a classic edge-on galaxy. I first saw this one back in December 1991 with my 14.5-inch scope. It needs a very good night to get a good look at the dust lane, which runs down the length of the galaxy. The galaxy is just near the star Gamma Andromedae. Also look for the galaxy cluster right next to NGC 891, called Abell 347.

Abell 347 is between RA 02h28m and 02h24m and at a decl. of +42 deg. At magnitudes between 12 and 13, they should be visible in an 8-inch or larger telescope from a dark sky sight. The cluster contains 9 or more galaxies. Don't be scared by the fainter magnitudes of this cluster. Dark skies and experience are more important than a "huge scope", (as Lono Mollari would say) - Sorry B5 moment!

So try these objects and see what you can see. 'Til next month! Clear Skies!



Abell 347 from the Digital Sky Survey.

The Sleaford Page

by Rick Huziak

Longitude: 105 deg 55' 13" +/- 13" W Latitude: 52 deg 05' 04" +/- 8" N

Caution to users of Sleaford Site CONSTRUCTION CONTINUES!

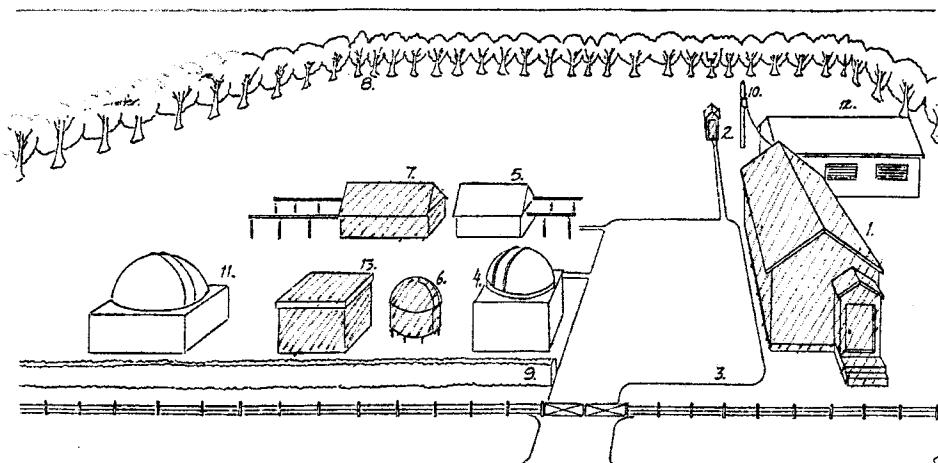
Work on the Sleaford Observatory continues despite the now somewhat unfavourable fall weather. As the President's Message echoed, Darrell Chatfield and Bill Hydomako have to be commended for the great effort they put in to design and blue-print the on-going construction, to itemize and purchase the required materials and to organize the workforce at the site.

Priorities at the site were somewhat rearranged when it was decided that it was in our best interest to add onto the warm-up shelter to install a future bathroom. It became obvious that the extension would also serve to expand the crowded inside space. Planning this structure was not trivial. Bill and Darryl spent dozens of hours designing, redesigning, arranging for subcontractors to drill piles and pour concrete, and to transport lumber. How the extension would be joined to the existing warm-up shelter, how the roof would be fitted, and what electrical requirements were required were difficult problems.

Due to their good organization, the extension was framed in a day by an enthusiastic work crew. Other work recently completed was the installation of a rodent screen around the Rystrom/Patterson dome, a job that required back-filling of dirt in a crowded 12-inch high work space beneath the dome floor. There was also a deck and a step built in front of the warm-up shelter so that getting in and out was no longer an operation in terror or herniation! The power splitter box also took some creative mounting and the pit was dug and redug and redug to allow for proper termination of the underground conduits.

This week, a telephone line was also trenched into the site, courtesy of the University of Saskatchewan, and soon a long-distance telephone will be in service at the site, providing instant site weather forecasts, and a far better margin of safety.

Despite constant cash crunches, the work to date on the site is more or less on schedule and on budget! The buildings shown cross-hatched in the sketch below are now in place and under construction! Thanks to everyone who put in the effort to make this site what it is!



The Messier, FNGC & H-400 Club

MESSIER CLUB

Certified at 110 Objects:

Rick Huziak, Gord Sarty, Scott Alexander, Sandy Ferguson, Dale Jeffrey, Darrell Chatfield

Bob Christie	99
Wade Selvig	64
Erich Keser	51
Tyler Cottenie	33
Stan Noble	28
Terry Nelson	21
Les & Ellen Dickson	still more than Terry!
Brian Friesen	15
Brent Gratias	11

FINEST NGC CLUB

Richard Huziak (applying)	110
Darrell Chatfield	51
Gordon Sarty	50
Dale Jeffrey	40
Scott Alexander	30

HERSCHEL 400 CLUB

Rick Huziak	322
Darrell Chatfield	81
Gord Sarty	77
Scott Alexander	beginning

*Join the Messier, Finest
NGC and H-400 Club!*

Observe all 110 Messier, 100 FNGC or 400 H-400 objects and earn your

CERTIFICATE!

Now that many of us have complete our Messier Certificates, we've added the Finest NGC and Herschel 400 lists to our program. The first 2 lists can be found in the Observer's Handbook. The Herschel 400 list will be available at each general meeting for 50 cents (covers photocopying) or can be mailed out on request to distant members. Each month I'll be posting updates. E-mail or phone in you new numbers! If your name is not on this list and you're observing the Messiers, FNGCs or H-400's, let me know & I'll add you on!

The Messier, FNGC and H400 lists are meant to promote observing! Please send in your observations of these objects, and I'll publish them in the newsletter!

Just Got to Join the RASC? - Well - it's the start of the new membership year. Please renew now!

Membership runs from Oct. 1 to Sep. 30. Please send payment to the Centre mailbox.

Regular - \$40.00 Youth - \$22.50 Life - \$720.00

Minutes of the General Meeting

Monday, October 19, 1998

held at the National Hydrology Conference Room, Saskatoon, 7:30 p.m.

1. Meeting called to order at 7:30pm.
2. Program: Roland Dechesne of the Calgary RASC gave a lengthy talk on small telescopes, their construction, optics, what can be observed and photographed with these instruments.
3. Election of Officers:

Honorary President: Ed Kennedy	Treasurer: Jim and Barb Young ✓
Past President: Rick Huziak ✓	Librarian: Ellen Dickson ✓
President: Erich Keser ✓	Centre Rep: Sandy Ferguson ✓
Vice President: Darrell Chatfield ✓	Membership Coordinator: Les Dickson ✓
Secretary: Al Hartridge ✓	Newsletter Editor: Rick Huziak
Activities Coordinator: Brian Friesen Asst: Brent Gratias ✓	
Observing Coordinator: Darrell Chatfield Asst: Brent Gratias ✓	
Building Coordinator: Bill Hydomako ✓	
4. Meeting adjourned at 9:30pm.

Minutes of the October Executive Meeting

Thursday, October 29, 1998

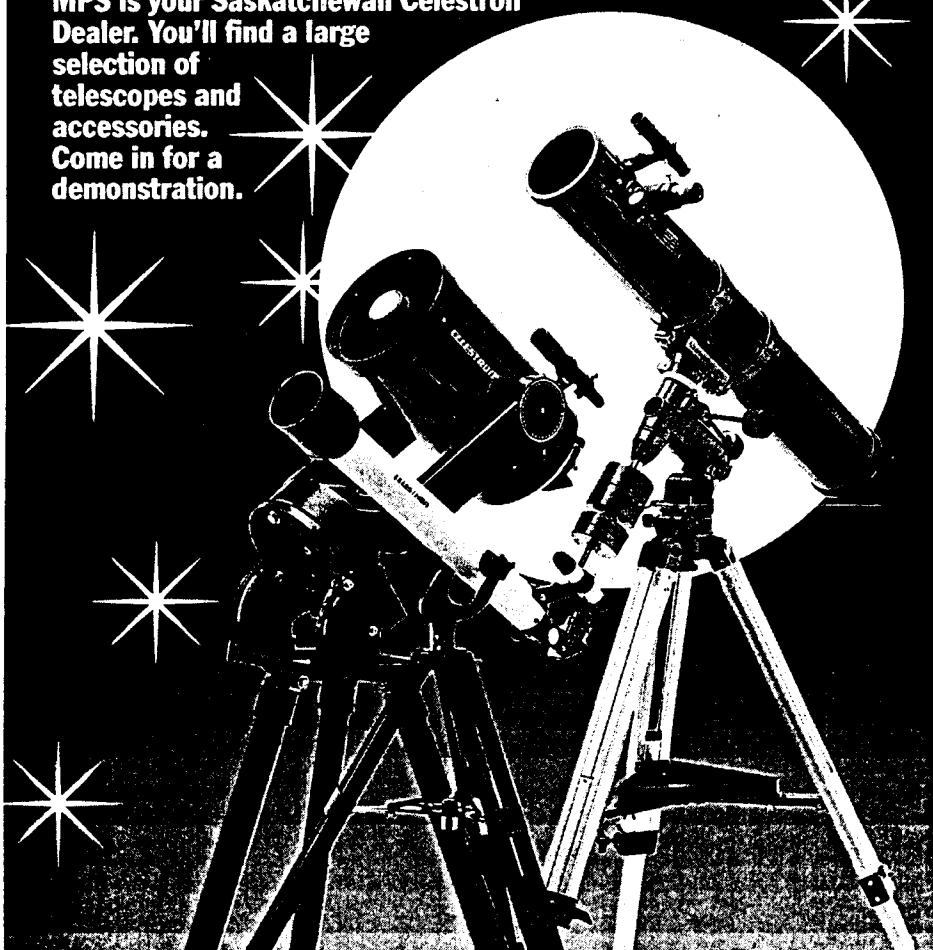
held at Open Door Society, 311 - 4th Ave. N., Saskatoon, 7:30 p.m.

Present: Scott A., Brian F., Al H., Bill H., Ed K., Les Dickson, Erich K., Merlyn M., Barb & Jim Young
Absent with reason: Sandy F., Darrell C., Ellen D., Rick H.

1. Meeting called to order at 7:40 pm.
2. Treasury and Finance: Jim and Barb are still waiting for the year end report. Signing rights have been transferred. Bank remains Royal, Canorama Place branch, branch will be changed to Sutherland in Jan. One-third of the membership have paid up. After Dec. 1, 1998 if not paid up, no news letter will be received. The new insurance premium is now due. The cost will be \$331.00. It was moved by Al Hartridge and seconded by Scott Alexander that we renew the insurance policy. Carried. Barb Young will look into renewing the mailbox at \$40.00.
3. Membership list will be kept by the Treasurer. Les Dickson will also keep a parallel file for his purposes. Les will phone unpaid members to remind them to renew. The potential membership at the moment is 91.
4. Site development: Bill Hydomako - Last weekend a deck and a new step were built for the warm-up shelter. A large electrical box was hung and the dome was anchored down. Garry Brett has some lumber we can use. This will have to be picked up. A further Rystrom cleanup will be required. Meryln also mentioned that there is still a lot of buried cable at Rystrom's that is ours for the pulling.
5. Ed Kennedy: spoke about keeping the interest of the members up and how this might be done and what things have already been done.
6. Youth Coordinator: Sandy Ferguson has agreed to be the Youth Coordinator.
7. Programs for future meetings:
 - Nov. - Dr. C. Rangacharyulu - a talk on the subatomic structure of the universe
 - Dec. - Yannis will also give a presentation
 - Jan. - Mark Kay - has a dynamic presentation
8. Meeting adjourned at 9:30pm.

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