

SASKATOON SKIES

Volume 23, Number 12

December, 1993

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Saskatoon Skies Information

Commercial vendors wishing to advertise in the "Saskatoon Skies" may do so at the following rates: \$50.00 per page, \$25.00 per half page and \$12.50 for business card ads. Individual RASC members and other parties (at our discretion) may advertise items and events for free.

Next months deadline is Friday, December 31, 1993. 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. Electronic submissions are preferred 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, RPO, University
Saskatoon, Sask.
S7N 4J8



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 November Executive Meeting

November 15, 1993

Room B-10 Health Sciences Bldg U of S 7:00 p.m.

Present: Richard Huziak, Gord Sarty, Mike Wesolowski, Ed Kennedy, Al Hartridge, Jim Young, Sandy Ferguson, Mike Williams

1. Meeting called to order 7:01 p.m. New executive welcomed. (R. Huziak)
2. Room bookings have been confirmed for Monday, Dec. 13 and Tuesday March 15. Editor should emphasis both dates in the newsletter. (R. Huziak)
3. There is no news yet from the Regina Centre regarding Peter Broughton's visit. (J. Young)
4. The Rystrom dome fixes have been paid for in full and Al Hartridge has been reimbursed. A total of \$271.87 was used from the telescope fund. (M. Williams)
5. The hand truck fund has a total of \$40 so far, enough to make a purchase. (M. Williams)
6. The Light Pollution Committee has received a letter from Works and Utilities. They are working on a report and will give us a call when it is complete. (G. Sarty)
7. (a) Old material in the RASC display for U of S Observatory has been removed and new pictures have been procured. The new display is expected to be complete by Christmas. (S. Ferguson)
(b) A blackboard (from the U of S observatory) is available for the Rystrom Observatory. (G. Sarty)
8. We will promote the upcoming lunar eclipse to the media. (M. Wesolowski)
9. The next Observer's Group Meetings are set for Dec. 11 and Jan. 15.
10. Pursuit of 2 unattached members in GA report has produced a new Centre member. (R. Huziak)
11. Ed Kennedy has donated about 500 astronomy related slides to the U of S archives. (E. Kennedy)
12. The 1994 Handbooks are not yet available. (R. Huziak)
13. We do not have to pay for the 1994 RASC Calendars received from the Vancouver Centre until Dec. 15 as they are being sold on a consignment basis. (M. Williams)
14. Size of Membership is 32 members and rising. About 20 members have not yet renewed this year. (M. Williams)
15. Richard Huziak could use help in Programming with both format and actual contacts for presentations. Some possibilities are Dr. Coleman, who is curator of the U of S meteorite collection and Alan Dyer, who is now back in Calgary. (R. Huziak)
16. The Centre's mailbox has been paid up for the year (\$20.00). (R. Huziak)
17. The *Sky and Telescope* subscription is up for renewal. The question of whether or not it should be renewed will be raised with the general membership. (R. Huziak)
18. Carol Blenkin has printed 2-3 months worth of envelopes with the corrected address. (R. Huziak)
19. RASC "Family" memberships have been requested by a few people. It was decided that no special provisions should be made and that a family could share in the benefits provided to a single adult member. (R. Huziak)
20. A centre member has expressed interest in purchasing our old astronomy magazines. It was decided that the Centre wants to keep these magazines. (R. Huziak)
21. Gordon Sarty has a catalog which advertises a spider which converts between Newtonian and Cassegrain configurations. This may be useful for the Centre's 16". He will get more information on this. (G. Sarty)
22. It was noted that R. Huziak has expended several days collecting meteor reports, typing them and sending them off to the Winnipeg Centre. He is to be commended. (G. Sarty)
23. Al Hartridge plans to donate a set of Time-Life books on astronomy to the Centre Library. (A. Hartridge)
24. Ed Kennedy suggested that the executive hold a special meeting in the new year to review the Centre's long term plans and objectives. He noted that we might want to look at expanding the Centre's current activities. (E. Kennedy)
25. Meeting adjourned at 7:51 p.m.

Christmas Gift Suggestions

The Saskatoon Centre of the RASC has a couple of items for sale that would make good Christmas presents. One is the 1994 RASC CALENDAR. They are available for \$6.50 each (G.S.T. included). Also the 1994 versions of the BEGINNER'S OBSERVING GUIDE are available. We must order these as the demand arises, so order early.

Contact Rick Huziak at 665-3392 or at the monthly General Meeting if you would like to purchase either of these items.

Minutes of the November General Meeting
November 15, 1993
Room A-226, Health Sciences Bldg, U of S
8:00 p.m.

1. Meeting called to order 8:05 p.m. (R. Huziak)
2. Everyone was welcomed and the RASC was described. (R. Huziak)
3. There was a motion for adoption of Sept. minutes as published. Moved: J. Young, Seconded: M. Williams, Carried.
4. There was a motion for adoption of Oct. minutes as published. Moved: A. Hartridge, Seconded: M. Wesolowski, Carried.
5. Room bookings have been confirmed for Monday, Dec. 13 (to avoid the Christmas rush) and Tuesday, March 15 (to accommodate National President Peter Broughton). (R. Huziak)
6. Donations are still being accepted for the Rystrom dome fixes fund and the Hand Truck fund. (R. Huziak)
7. The RASC will promote the Lunar Eclipse of Nov. 28-29. We will observe it from the Rystrom Observatory and will NOT hold a public star night. (R. Huziak)
8. Observer's Group Meetings set for Dec. 11 and Jan. 15. (R. Huziak)
9. Dues are past due. Please pay up. 1994 Handbooks will be available from M. Williams for paid members. (R. Huziak)
10. 1994 calendars are available for purchase for \$6.50 each. See Richard Huziak. (R. Huziak)
11. The issue of the *Sky and Telescope* subscription renewal was raised. An informal vote was held but no decision was made.
12. The U of S observatory will be repainted next week. Items will be temporarily stored in the RASC room, resulting in extremely restricted access. (S. Shadick)
13. Mike Wesolowski made some presentations to the Saskatoon Space Club on behalf of the Saskatoon Centre. (M. Wesolowski)
14. Tonight's Presentations:
Observing Variable Stars - M. Wesolowski
Preliminary Results from the October 30 Bolide - R. Huziak
15. Meeting adjourned 9:42 p.m.

Observers' Group Meeting

An Observers' Group observing session will be held on December 11 and January 15 at Rystrom Observatory, weather permitting. Time: After 8:00 p.m. 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 approximately 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.

University Observatory Hours

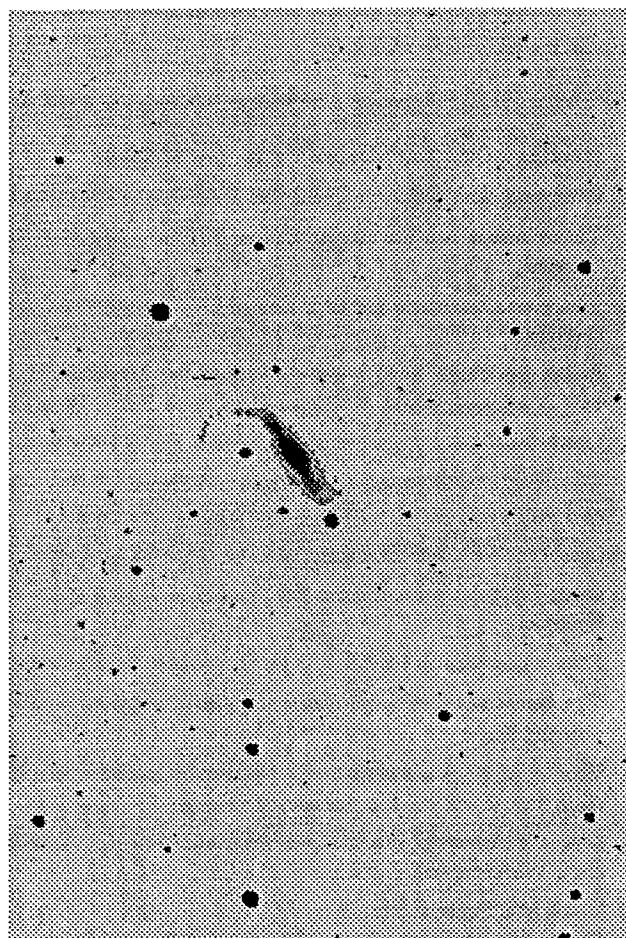
The U of S Observatory will be open to the public on Saturday evenings from 7:30 to 9:30 p.m. in December and January (except Christmas). Visitors will be able to view Saturn, the Andromeda galaxy, the Double Cluster and other celestial objects. Observatory assistants will be present to answer questions 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. and College Drive. For more information, call Stan Shadick at 966-6434.

Editor's Notes

My life is temporarily (!) out of control! Astronomy has been running my life the last couple of weeks since I decided that I knew enough to calculate the orbit of that bright fireball that was seen last October 30th (see Rick's article on page 9). Although the calculations are conceptually straightforward, it takes several hundred lines of computer code to apply the calculations to the data Rick collected from the observers. Then there's getting this newsletter out. And working on my thesis. And going to Regina where my wife Kerry is working for December. And observing?

But I did manage to see the eclipse from Regina and even get some pictures (I hope!). Mike Wesolowski gives a first report on page 5. Well now that the newsletter is done, I can maybe do some observing (or work on my thesis... nah!). We probably all need to do some observing so until next month, Merry Christmas to all and to all a good nights viewing!

NGC 7479 in Pegasus as photographed by Centre member Al Hartridge and processed by computer to produce a negative image.



The President's Message

Let the bells ring out and the banners fly. It's too good to be true, but I'm here! (All barf now!). Anyhow, I've been a member of the Saskatoon Centre for 18 years, and this is my first stint as the President. How I've been able to avoid this job until now I'll never know, but it's here now and I'll do my best. (I just hope I don't go down in history as "remember that guy did that!"). But in the last two decades, I think I've learned enough about the Centre to give it a good try.

In our November executive meeting, Ed Kennedy suggested that we formulate a stronger Centre direction. I tend to agree with this comment. I've been thinking about this for a long time now, and in the next two years I would like to see us work towards this.

Setting a course for the future is important, so that we can attract, entertain and retain our members for years to come. It is important that we have activities of interest for ALL members and provide them with the means for achieving the maximum that they can within our Centre. With the recent influx of new members, (through the hard recruiting work of several older members - thanks!) we now face the challenge of providing rewarding experiences for these people. We can no longer use the old excuse that "the same guys always end up doing it". Our new members are very enthusiastic and just need some simple guidance to find their own way in the Centre. If we can get them started and make them feel welcome, then they will become Centre activity leaders too. I'm really looking forward to a year of membership growth and additional new blood (not that there was anything particularly wrong with the old blood. We're a great group of amateurs!)

Thanks to everyone who has aided in helping me get a grasp of this new position. Thanks to outgoing President, Don Friesen who I worked closely with over the last two years. I'm looking forward to working with Scott Alexander; a bit timid maybe as VP, but certainly one of the darn best observers I know! You'll do great Scott. (Great Scott!!) We also have a strong executive this year that will be able to tackle and complete a lot of longstanding projects. I'm sure we will be able to formulate an exciting Centre direction in the months to come. Don't worry. It will be a whole lot more fun than work!

Richard Huziak, President

P.S. And for those of you who like electronic chit-chat, I am now on E-mail. If you would like to contact me directly, my Internet address is "Huziak@SEDSsystems.ca". I read my E-mail every weekday.

The November Lunar Eclipse: A Personal View From the Morning After

by
Mike Wesolowski

Having the opportunity to view two total lunar eclipses within the space of one year is an unusual experience for me, and I was determined to take full advantage of it, even if I did have to stay up late on a Sunday night (as was required by the most recent eclipse of November 28/29). Even the weather cooperated - there was absolutely no uncertainty as to whether or not I should stay up, since the sky was generally clear, although there appeared to be some high level haze (which would eventually disappear).

The observing circumstances for this eclipse were quite different from last December 9. At that time, I was in Ottawa on business, and was forced to observe from the top of my hotel with a pair of binoculars and a camera. The light pollution situation was, shall we say, not optimal. This time, I was observing from my back yard in Saskatoon, I had a small telescope at my disposal, and the light pollution situation was a definite improvement over Ottawa.

I started observing about 10 p.m. in the hopes of identifying the penumbral phase. I found it very difficult to be certain when the penumbral shading first became evident, possibly around 10:15 p.m. This conflicts with my memory of the earlier eclipse where the penumbral shading was fairly obvious. This may be because, in the last eclipse, the penumbral shadow first entered the moon in the southwest (bottom left) corner, whereas in this eclipse, the penumbral eclipse started at the northwest corner (top left), the difference being the presence of the darker lunar maria in the northwest which might have minimized the effect of the shadow.

About 11 p.m., I woke my 9 year old daughter, Danielle, to see the eclipse (by prior arrangement). She had to think about it for quite a while before she decided to get out of bed and join me (I'm sympathetic - I have quite often decided I'm too tired to get up and observe when the alarm goes off!).

The partial phases of the eclipse were fun to watch through the telescope, an improvement over binoculars. There were times, though, that I wished I had a bit more power at my disposal. Statements on television notwithstanding, I wanted a closeup of the Earth's shadow as it moved across the moon.

As totality approached, Danielle and I watched the stars come out, and did some constellation identification. Unlike the earlier eclipse, it was possible to see the eclipsed portions of the moon during the later partial phases, even with the naked eye. The appearance of the sky also changed significantly, compared to the earlier eclipse, due entirely to the relatively darker skies over Saskatoon, I'm sure.

During totality, the moon had a ring-like appearance to the naked eye, and was not as colourful as I had hoped. Through the telescope, Danielle and I agreed that it had a dark brownish-yellow colour, with most of the yellow at the south end of the moon, which was closest to the edge of the shadow. It was interesting to be able to see some of the lunar features even during totality.

We packed it in at about 12:30, just after mid-eclipse. Much as I would have liked to see the entire eclipse, work interfered with life in the form of an 8:30 meeting. Maybe I'll watch the whole eclipse next time.

December General Meeting

The monthly Centre meeting will be held on Monday evening, December 13 in room A-226, Health Sciences Building on campus, 8:00 p.m. Note that this is a change from the usual room B-111 and is a week early to avoid Christmas panic. The presentation will be by Les Coleman of the U of S Dept. of Geology. His talk will be on: *The Geological Importance of Meteorites*.

The impact of meteorites on the Earth's surface has been responsible for the formation of a number of earth structures and, possibly, has profoundly affected geological history and also has been ultimately responsible for the formation of important economic deposits. However, of even greater significance is the fact that several lines of evidence indicate that meteorites represent samples of inner planetary materials and thus of parts of the Earth that we are unable to see. For geologists to understand a number of processes operating at and near the Earth's surface and the materials that are produced by them, we need to know what materials there are in the Earth's interior and meteorites provide us with the necessary clues.

Also Sandy Ferguson will present: *Beginning Astronomy - Learning the Winter Constellations*.

The Geminid meteor shower peaks on Tuesday the 14th, so there may be an informal observing session at the Rystrom site afterwards. See page 3 for directions to the site. Be sure to pick up your 1994 *Handbooks* at the General Meeting as well.

Novices' Corner

by
Sandy Ferguson

The long winter nights are upon us once again and although it's tempting to sit indoors and practise armchair astronomy I'd like to encourage some of the diehard novices to bundle up and spend some time getting to know the winter's brightest stars and constellations. The group of six constellations known as the "Winter Six" have all cleared the southeastern horizon by 9:00 p.m. in mid-December, and remain visible well into the spring. The members of the group are the constellations (in order of rising) Auriga, Taurus, Orion and Gemini, Canis Minor and Canis Major. Their brightest stars form a stunning oval, which offers a lot of observing possibilities for naked eye, binocular and telescopic viewing.

Although Orion is probably the best known and easiest to spot of the group, if you are not familiar with any of them you can once again use the Big Dipper to get into the area. Figure 1 shows how you can use the stars Alpha and Delta of the Dipper to locate the brightest star in Auriga (Capella) or the stars Beta and Delta to locate Castor and Pollux, the two brightest stars in Gemini. Alternatively, if you know Orion, you can use Figure 2, with Orion as a guide, to locate the other constellations in the group.

Well, now you've braved the sub-zero weather and have succeeded in locating this magnificent bunch of stars! Following are suggestions for naked eye, binocular and telescopic observing, with Figures 3 and 4 giving details of some of the brighter features and objects available in each constellation.

NAKED EYE

The most obvious observation you can make is to familiarize yourself with the shape of each constellation. This is the basis of all observing. In order to locate any object of any kind within a constellation, you need to know your way around it. Once you have become comfortable with shapes and bright stars, spend some time observing how the constellation orients itself in relation to the horizon as it moves across the sky, from rising in the eastern half to setting in the western half. Gemini, for instance, rises on its side and sets upright. If you are not aware of this change, you may find it difficult to identify a constellation. Take time to observe the different star colours. For instance, Betelgeuse, the upper left "shoulder" star in Orion is reddish/orange; Rigel, the lower right star in the same constellation is bluish/white. Look for the following features in the group's constellations:

Orion - the distinctive belt and sword area

Auriga - Capella, its brightest, white star

- the "Kids", a triangle of stars containing the eclipsing variable Epsilon

Taurus - the Pleiades cluster (called the Seven Sisters, although you can see only six naked eye.)

- the orange colour of Aldebaran

- the "V" shape of the Hyades

Gemini - Castor and Pollux, both yellow/white colour

Canis Major - Sirius, the brightest star in the sky

Canis Minor - Sorry, other than identifying Procyon, this is a dead naked eye area of the sky

BINOCULARS

Orion - M42, a greenish/white fuzzy patch that is the centre star of the sword

Auriga - M36, M37 and M38 - large open clusters that can also be visible to the naked eye under dark skies

Taurus - M45, the Pleiades, the six naked eye stars become many more

Gemini - M35 another large, open cluster

Canis Major - M41, yet another open cluster

Canis Minor - still unexciting

SMALL TELESCOPE

Orion - M42 and M43 (emission nebula adjacent to M42)

- the "Trapezium": eclipsing binaries components A and B. Component A eclipses every 65 days in a 20 hour eclipse, which varies from magnitude 6.7 to 7.7, with a 2.5 hour minimum; Component B eclipses every 6.5 days

- lots of double stars

- Challenge object: try for the companion of Rigel. At magnitude 6.7 it can be seen in a 6" scope

Auriga - M36, M37 and M38 again

Taurus - M1 the Crab Nebula, the remains of a supernova

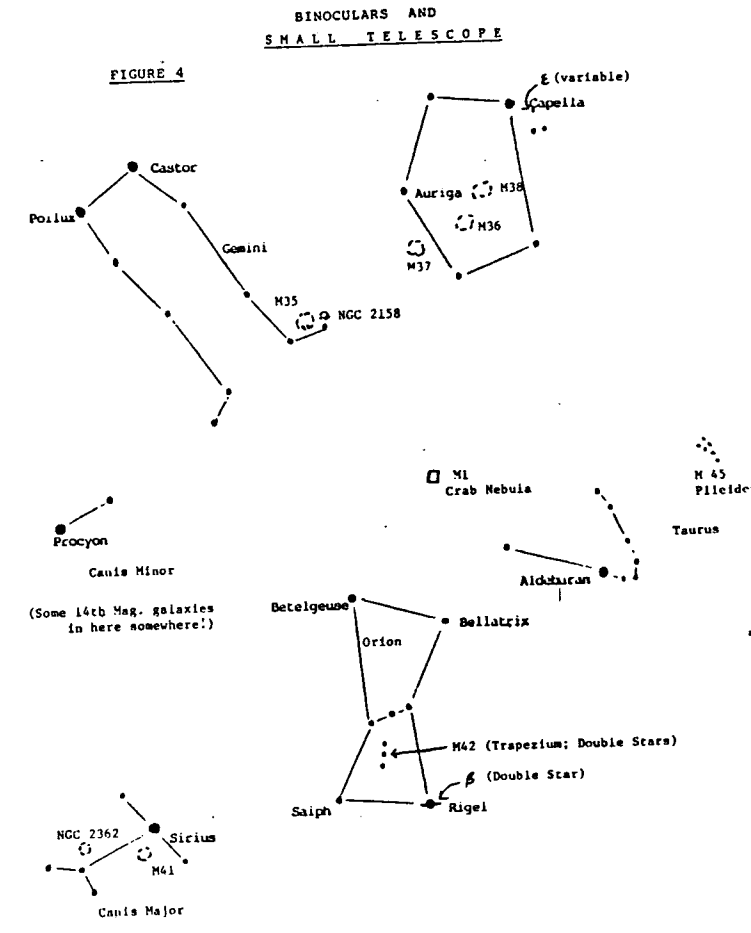
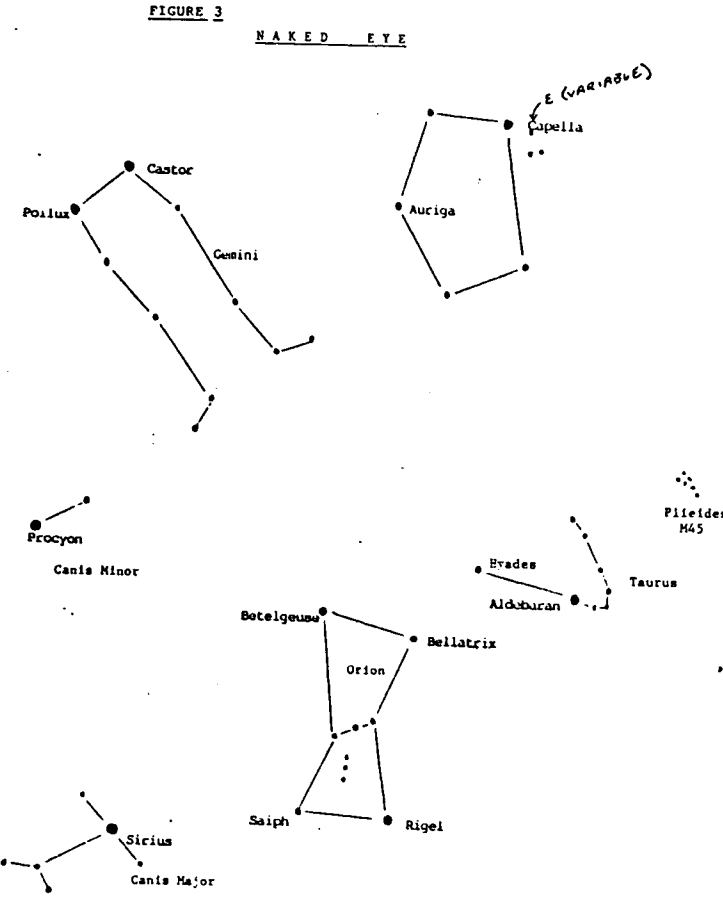
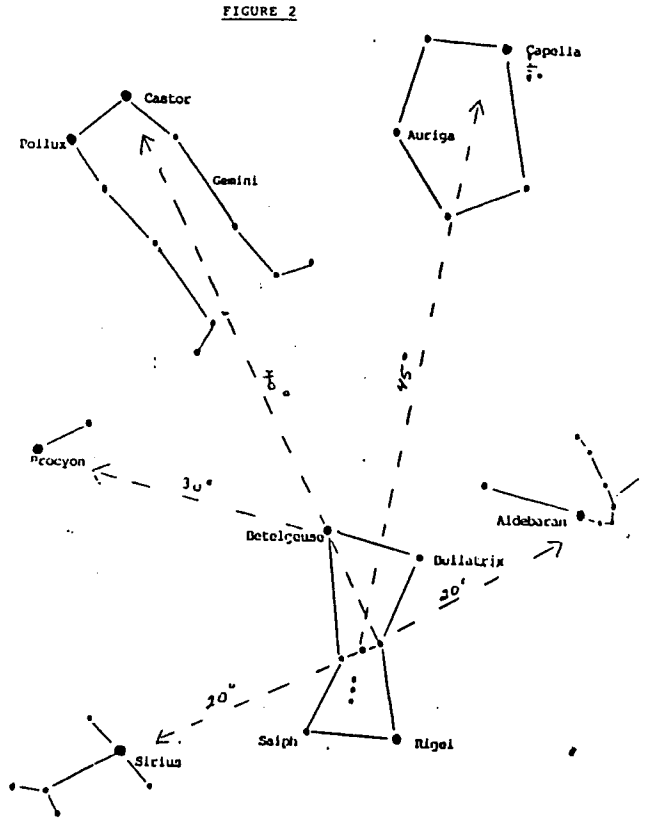
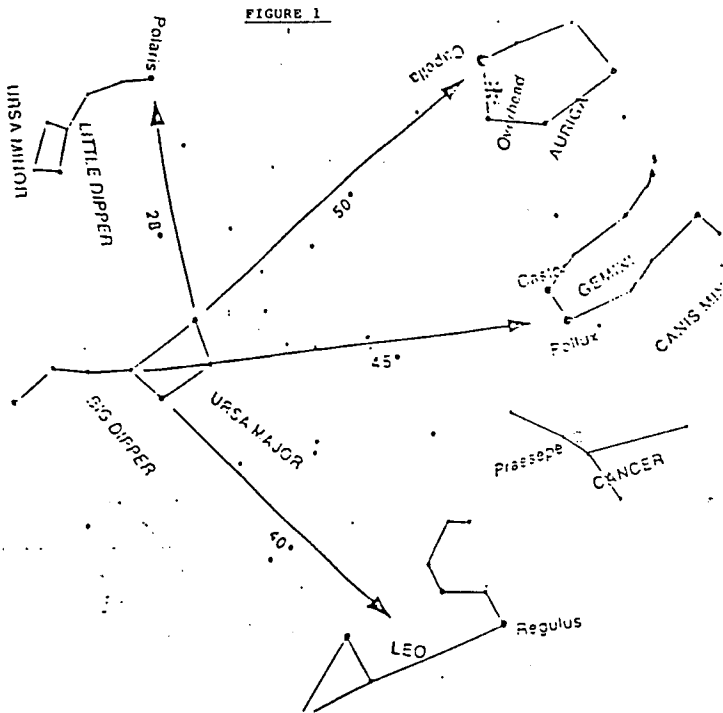
- The Pleiades lose their character in a telescope

Gemini - M35 and it's companion cluster NGC 2158 .5 degree southwest make a nice pair in the same field

Canis Major - M41 and NGC 2362, another open cluster

Canis Minor - try for some faint 14th magnitude galaxies there isn't much else!

Happy observing!



"Demon's Star" Presents Scientific Paradox

by
Stan Shadick

Arab astronomers in medieval times named it Al Ra's al Ghul, the demon's star. Modern astronomers have contracted the name to Algol.

The origin of this demonic appellation may be due to its mysterious habit of almost "winking out" at regular intervals. Normally as bright as the North Star, Algol dims to 1/3 brightness for a few hours every third day.

By examining the spectrum of its starlight, astronomers have learned that it really consists of two stars, one much brighter than the other. By chance, our view of the pair from Earth is such that once each orbit, the fainter star passes in front of the brighter star. The light from the brighter star is then blocked by the fainter star, resulting in a stellar eclipse and the apparent dimming of Algol.

Having solved one mystery, astronomers then discovered another one. Using the Dominion Astrophysical Observatory in Victoria, B.C., astronomers concluded that the brighter star is a massive normal "main sequence" star and its fainter companion is a much larger but less massive red giant star.

According to the accepted theory for the evolution of stars, a star spends most of its life as a normal "main sequence" star, like the Sun, while it consumes its hydrogen fuel. When the fuel runs dry, the star will swell up into a much larger giant star.

The theory predicts that the more massive star of a pair should turn into a giant BEFORE its less massive companion. The Victoria observations proved that the opposite was true for Algol.

An intriguing resolution of this paradox has been proposed by the British astronomer and science fiction writer, Fred Hoyle. He proposes that the giant star was originally the more massive and brighter star of the pair. As it expanded to become a giant, its surface layers were siphoned onto the companion star, converting the companion into the more massive and luminous star of the pair.

Upcoming eclipses of Algol may be observed on the dates listed in the sky-by-month section of the RASC *Observer's Handbook*. A telescope is not needed but you should consult a star map to be sure you are looking at the right star (such as the one in the variable star section of the *Handbook*). You may find that Algol is designated by the Greek letter Beta in the Perseus constellation on most star maps.

Look for Algol to be well up in the eastern sky. Watch for a gradual change in brightness over a few hours by comparing it with neighboring stars.

(Adapted from an article published in the November 21, 1993 issue of the *Saskatoon Sun*.)

The Mailbox - A Letter From Iran

by Richard Huziak

The Centre's mailbox gets a variety in interesting letters, brochures, and newsletters. Last month, we received a letter from an amateur in Iran, requesting just about anything we can send him. (The letter was written in excellent English, so corresponding with him should be not problem). One of the readers out there may want to take him up on this matter. You could send him a recent Handbook, Beginner's Observing Guide, an old stargazing chart, or a spare book. I'm sure he'd be delighted with just about anything he received. However, it might not hurt to check with Customs on what items may be prohibited from entry into Iran prior to sending anything too valuable. Here's his letter:

Golamreza Safarzadeh
Sheykh/Rafian Square
Istgah Ave. 54168
Marand, Iran

Dear Sir:

I am too willing to have information about Astronomy. Would you please send me some information and brochures. I am very interested in contacting you. Thank you in advance and wishing you success.

I am really looking forward to hearing from you in your earliest convenience.

Yours sincerely,
G. S.

The Great Bolide of October 30, 1993

In the early evening on October 30, 1993, the sky over much of North America became ablaze. On this Saturday night, everyone it seemed was looking to the east. A great flaming meteor entered the earth's atmosphere over Nipawin, SK and crashed into the earth (or nearly did) somewhere southwest of Brandon, MB. Or so it seems. This will go down as one of the most enigmatic "meteor" falls in Canadian history. Although this fall was observed from Alberta to Ontario, from Beauval, SK to Kentucky (!), at the time of this writing, it is still uncertain as to what the object was that fell; and even uncertain that it was only one object.

As I presented in my talk at the November General Meeting, the fall was first thought to be a meteor, then maybe a Chinese satellite, then it was confirmed to be a Russian rocket reentry. Then it was unconfirmed as the rocket because the rocket was observed to fall into the Atlantic 4-minutes later. The US military also confirmed that an event happened over Manitoba at 9:39 p.m. Oct. 30 CST. This is our apparent meteor. However, the location that the US military measured near Dauphin, MB does not match the visual sightings very well. Indeed, observations from Saskatchewan (collected by myself) and Manitoba seem to indicate a fall area much far to the south, somewhere southeast of Brandon.

When the meteor was first reported in the media, I became the "expert" by placing my telephone number in the newspaper and on the radio. This was the only way to ensure that the reports would eventually get to the "right" places to collect good astronomical data. My phone rang off the hook, and during the times I could be home, I recorded 70 interviews of the sighting, and talked to perhaps 50 more people about the event. The data turned out to be very good, though observers from the "general public" are not all that reliable when it comes to "accurate" measurement. Luckily, the fall was also seen by no fewer than 4 amateur astronomers and an experienced camper. From these I was able to get three very accurate compass readings of the sky track and some excellent descriptions. We were even able to very accurately simulate the sky track on a PC computer-planetarium program of the sky at the exact instant of the fall [the program used was *Earth Centered Universe* - a program written by Halifax Centre RASC member David Lane -Ed.]. This information will go a long way in the final determination of the fall area and the original orbit of the object, thus determining what it really was.

This "meteor" was phenomenal! It was visible for more than 700 kilometers in all directions. From Saskatoon it was -15 magnitude (6 times as bright as the near-full moon). Within 50 kilometers of the ground track, it seem to have been brighter than the sun, causing the streetlights to go off in Humboldt! The head was said to be 4 times as large as the moon. For a dozen seconds, it lit the sky with a brilliant emerald green and welder's blue brilliance, and then came to an abrupt end by exploding in a great flash. Fragments are thought to have emerged from the explosion. Sonic booms and the explosion shook houses in Dauphin and surrounding area.

Currently, our observations reside at the Meteorite Impact and Advisory Committee (MIAC), who coordinate observations of this type, sent there immediately via e-mail. We are in nearly constant communication with MIAC through e-mail, keeping abreast of new developments. Astronomers and geologists at MIAC are madly reducing the data, attempting to come up with more accurate elements for the fall area and the original orbit. In the mean time, Gordon Sarty and I are writing an article which we will submit to the *RASC Journal* describing our analysis of the public observations of the event. We hope to get it published in an upcoming issue. Even if this turns out to be just the Russian rocket, it was certainly excellent practice for the "real thing".

If anyone does observe a fireball of greater than -4 magnitude or hears of a fall through the media, please report it immediately to Gordon or myself. Meteors of this brightness are potential meteorite producers and are of great interest to MIAC. And although this fall consumed two weeks of my life, the experience was worth it, and I won't hesitate to become the "expert" again.

Richard Huziak

FOR SALE

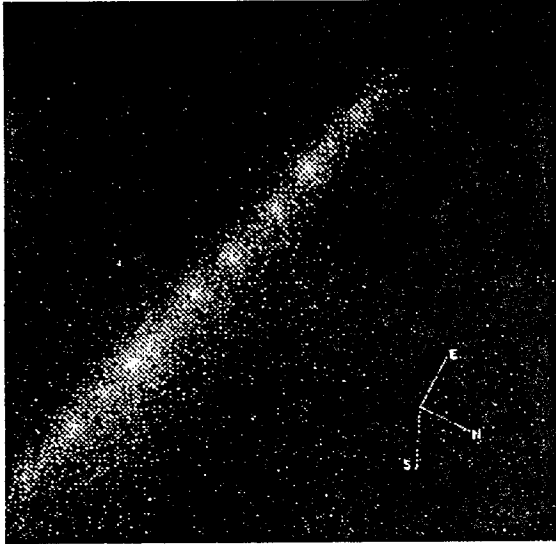
(1) Meade 6" f/8 Newtonian c/w equatorial drive, pedestal base, rotating tube, small finder and additional 3" finder. Eyepieces: K40mm, K25mm, Ortho 6mm, diagonal. Wooden case for spare parts.

(2) Sears 2.4" refractor c/w alt/azimuth mount, wooden tripod, diagonal, image erecting prism and barlow lens. Eyepieces: K20mm, K6mm, K4mm. Sun and moon filters, extra parts.

Both are in excellent shape. Call Darrell Chatfield, 330 Guelph Cres, Saskatoon, SK, S7H 4S9, ph. (306) 374-9278

[Our Centre president notes that "sun" filters supplied with small telescopes are UNSAFE. They can (and often do) break from the heat of the sun. Eye damage can result! These should be discarded and never used. - Ed.]

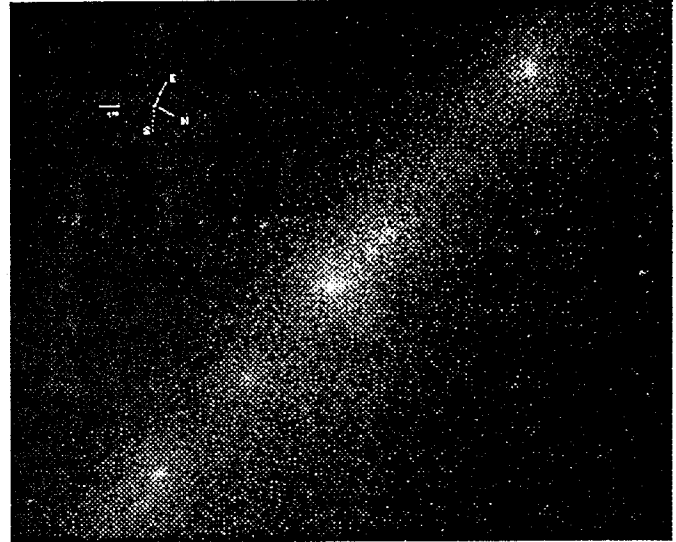
A Gallery of Comet P/Shoemaker-Levy 9 Pictures



Hubble Telescope Image of the "String of Pearls Comet"

Hubble's high resolution shows that the comet's nuclei are much smaller than originally estimated from observations with ground-based telescopes. The Hubble observations show that the nuclei are probably less than three miles (5 km) across, as opposed to earlier estimates of nine miles (14 km).

This image was taken with the Wide Field and Planetary Camera (WFPC), in PC mode, on July 1, 1993.
credit: Dr. H. A. Weaver and Mr. T. E. Smith, STScI, NASA

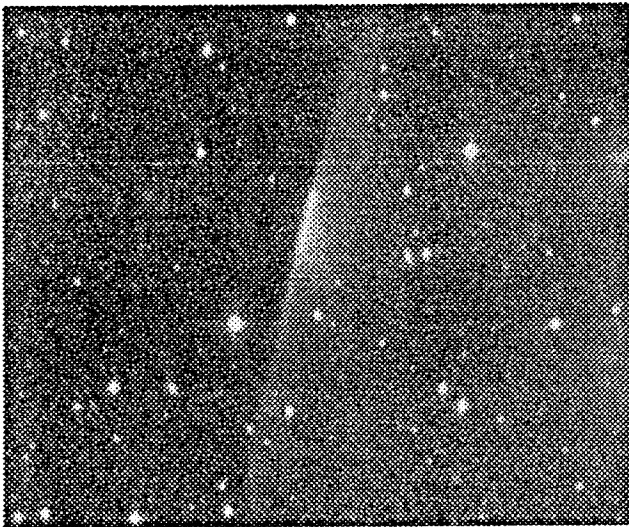


Hubble Close-up of Bright Nucleus

This is an enlargement of a NASA Hubble Space Telescope image of the "brightest nucleus" in a string of approximately 20 objects that comprise comet P/Shoemaker-Levy 9.

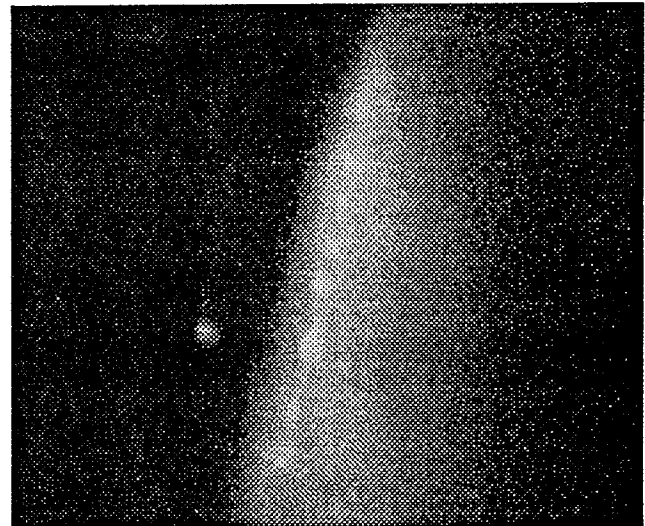
Hubble's high resolution shows that this bright region is actually a group of at least four separate pieces. The HST images allow for the best separation of the individual nuclei and their surrounding halo of dust (comae), which results in a better estimate of the nuclear sizes.

credit: Dr. H. A. Weaver and Mr. T. E. Smith, STScI, NASA



An image of comet P/Shoemaker-Levy 9 taken on 30 March 1993 with the Spacewatch Camera of the University of Arizona. Although not clearly visible in this image, the bright "streak" near the center contains many individual nuclei and their associated comae and tails. In addition, light scattered from fine dust particles can be seen extending for large distances beyond the region of the streak.

credit: Dr. J.V. Scotti, University of Arizona



This is an image obtained with the 2.3-meter telescope of the University of Arizona Observatories on Kitt Peak in Arizona by Wieslaw Wisniewski on 1993 March 28 at a mid-time of 06:45:32 UT. The total integration time was 300 seconds. North is to the right and East is at the top. The field of view is 1.3 arcminutes square. This is a close-up of the nuclear train showing at least 12 individual nuclei embedded within. Notice that the southern boundary of the nuclear train is very sharp compared to the northern boundary.