NOVA NOTES

Halifax Centre

Sept-Oct 1987
Volume 18
Number 5

1987 Halifax Centre Executive

Honorary President	-	Dr. Murray Cunningham	
President	-	Kathy Oakley 3140 Hemlock Avenue Halifax, N.S. B3L 4B6	455-2681
Vice-President	-	Darrin Parker P.O. Box 249 Bridgewater, N.S. B4V 2W9	429-2110
Secretary	-	Douglas Pitcairn 13 Ferguson Road Dartmouth, N.S. B3A 4J8	463-7196
Treasurer	-	Joe Yurchesyn 5264 Morris Street Halifax, N.S. B3J 1B5	422-8030
NOVA NOTES Editor	-	Patrick Kelly 2 Arvida Avenue Halifax, N.S. B3R 1K6	477-8720
National Rep	-	Norman Scrimger 12 Lynwood Drive Halifax, N.S. B3M 1Y9	443-7455
Librarian	-	Mary Lou Whitehorne 53 Zinck Avenue Lr. Sackville, N.S. B4C 1V9	865-0235
Associate Librarian	-	Hugh Thompson 6 Marine Drive Halifax, N.S. B3P 1A3	477-2377
Observing Chairman	-	Mary Lou Whitehorne 53 Zinck Avenue Lr. Sackville, N.S. B4C 1V9	865-0235
Centre's Address	-	Halifax Centre, R.A.S.C. c/o 1747 Summer St. Halifax, N.S. B3H 3A6	

Notice of Meetings

Date: Friday, November 20th, 1987 .

Place: Nova Scotia Museum. Access from the parking lot and side entrance. Meeting to be held in the lower theatre.

Topic: Our **7:00** video presentation will be **"Death of a Star"** the first episode of this year's new season of the PBS series **NOVA** . The results of this year's executive elections will be announced. Our **8:00** speaker has not been finalized yet.

Date: Friday, December 20th, 1987 . **NOTE: This is the second Friday in December!**

Place: Nova Scotia Museum. Access from the parking lot and side entrance. Meeting to be held in the lower theatre.

Topic: Both the **7:00** video presentation and the **8:00** speaker have not yet been finalized.

Note: The above list is tentative and subject to change.

About the cover: The cover this issue shows a drawing of the western side of Altar Q of the ancient Mayan city of Copan. The altar has similar figures on the three other sides and are thought to represent the "astronomers" who participated in an astronomical congress held in Copan in 763 A.D. to reconcile the growing difference between the Mayan religious calendar and the actual timing of the seasons.

Editor's Report

Patrick Kelly

Members may be aware of the controversy raging at Mount Palomar over as a result of proposed plans to build a convention centre near the 200 inch Hale telescope. The resulting light pollution from such a facility would pose a very serious obstacle for the continuation of astronomical research at that observatory. We feel that the astronomers at Mount Palomar should receive all of the support that we can give them and as a result we have enclosed a sample letter of support which we would hope that all members would take the time to sign and mail (see page 115).

Please mail copies to:

Mr. Thomas King
4160 1/4 32nd Street
San Diego, California 92104
U.S.A.

Palomar Dark Sky Defence
358 Manzanita Drive
P.O. Box 1530
Julian, California 92036
U.S.A.

Remember, every voice counts. If astronomers are ever going to win the long fight against light pollution it has to start with those of us who have an appreciation of what will be lost if they lose.

I mentioned last issue that the centre hosted an astronomy camp for kids over the summer. The following is a poem that was written by Karen Francis (age 10), the sister of one of the participants.

Stars

The stars are too many to count.
The stars make sixes and sevens.
The stars tell nothing and everything.
Stars are far away.
They never speak when spoken to.

It is so rewarding to see the appreciation that children have for the night sky and its contents. There is a lot that some of them could teach us adults about enjoying some of the simpler things in life.

Speaking of appreciation, one of our members who has been a great help to us is leaving Halifax for the time being. **Laurie Reed** has gone off to the University of Waterloo to pursue her Ph.D. in Astronomy. Laurie assumed Randall's responsibilities while he was in England working on his Ph.D. and now that Randall is back its her turn! During her tenure at Saint Mary's she has given the centre invaluable aid "behind the scenes". She was involved in helping us to find material for our Astronomy Camp for Kids program as well as obtaning the films that we showed at Nova East 87. In addition, she was involved in helping with the summer tour made by the astronomy club in Summerside group and has been an all around supporter of the centre's activities. She plans to remain a member of our centre while she is away and the executive would like to publically thank her on all of our behalf for her help and we look forward to seeing her again in the future.

Dues are Due!!

Once again it is that time of the year to renew your membership! The dues are as follows: Regular: $25 ; Youth (under 18): $15 ; Life: $500. In addition there is an associate membership ($5) which is for family members of someone who is already a regular or life member. Associate membership includes only Nova Notes.

Be sure to renew as soon as possible to ensure that there is no interruption of your newsletters and journals. In addition, early renewal will make help ensure that you get your 1988 Observer's Handbook in 1987! You can bring your renewal to the November meeting or you can send a cheque or money order made payable to "Halifax Centre - R.A.S.C." to us directly. Our mailing address can be found at the bottom of the inside front cover.

At a recent executive meeting it was decided that our centre has been so actively involved in several public education

events (such as Nova East, the Astronomy Camp for Kids, our planned newspaper column etc.) that it would require a full time person to coordinate these efforts. Thus, starting next year, there will be **two** vice-presidents on the executive. The first vice-president will be mainly in charge of handbook sales while the second vice-president will be mainly in charge of publicity. We hope that this will allow us to get our message across to the general public with more efficiency.

Another idea which the executive has been going ahead with is the formation of a committee to study the ways and means of obtaining an **observatory** for the Halifax Centre. Doug Pitcairn has volunteered to chair this committee and is currently in the process of producing a questionaire on the subject. Look for it in the next issue of NOVA NOTES. It will help us determine such things as how to pay for it, where it should be located, what type of instruments it should house, etc. We are also looking for members who would like to help in this project, either by volunteering time or services or being on the committee. Think about it and be sure to fill out the questionaire in the next issue.

Another item which members may find interesting is that Doug recently made a proposal to the Halifax Herald (the publishers of the Chronical-Herald and the Mail Star) to have a local astronomy column on a weekly basis included in their papers. We have just heard back and they have agreed to the idea. We will be having a meeting in the near future so watch for details!

NOVA EAST was such a success that it was decided that we would hold it at Fundy Park again next year! If you weren't able to make it this year, you can read all about it in this issue as well as practice deciphering pictograms from outer space as you try to recognize other members (or yourself) in our NOVA EAST '87 centrefold. Unfortunately the "thunderscanner" didn't do quite as nice a job as I had hoped but the final product does seem to have a certain quality of its own. We hope that next year's event will be even better attended. We also sent of a summary of events to both **Astronomy** and **Sky & Telescope** magazines. We hope to be able to

make more long-range plans for the one this summer and with a bit of publicity we might get some people showing up from outside the "local" area.

Fans of "Gazer" may have noticed his absence from this issue. I have been getting all sorts of cartoon related to astronomy from various people (thanks folks!) but have never had a chance to include them . Despite the fact that this issue of NOVA NOTES is nine sheets there still was not enough room so something had to give. I hope you find these cartoons as humorous as I do and Gazer will return next issue!

The National Council meeting that was held here in September was a lot of fun for all concerned. A lot of our local people got to meet some of the people that they had only know as names up until then. The National Council meeting was held at the Nova Scotia Museum and was followed by a lobster dinner at the Lord Nelson Hotel. Most of the people "wimped out" and drove from the museum to the hotel but I had the pleasure of walking down throught the Public Gardens with Rosemary Freeman.

Following the meal it was down to T.U.N.S. for the lectures. Both of the two "planned" presentations were very well received. Dr. Lloyd Higgs gave an excellent account of not only how aperture synthesis radio astronomy works but also of the kind of work that is done at the Dominion Radio Astrophysical Observatory in Penticton B.C. Michael Watson's presentation of "South of Capricorn" was also well received. I was pleased to see that he has added some additional slides to the "original" version which I saw at the Winnipeg G.A. Members were also treated to a "surprise" coast guard - style lecture by Raymond Auclair of the Coast Guard College in Sydney who gave an excellent and hilarious presentation on what he has up his sleeve for the 1989 G.A. If the G.A. is anywhere close to Raymond's presentation we are in for a real treat!

I just received word yesterday that the ten inch Odyssey that Doug and I ordered is on its way from California. With a bit of luck we might have it in for the next meeting for those interested.

That's all for now so clear skies and hope to see (or hear) from you soon. Ω

Dear sir / madame:

We in the Royal Astronomical Society of Canada are concerned about the threat of light pollution to the 200 inch telescope on Mount Palomar. This telescope has been at the forefront of astronomical research since the date of its completion. This rich historical background combined with its potential to continue in a leading role make this telescope a truly international resource.

We cannot allow this superb facility to be rendered useless by something as easily resolvable as light pollution from nearby development. This would be a tragedy of global proportion. Convention centers and similar facilites can be located almost anywhere, but the location of a productive astronomical research observatory is extremely restricted by environmental and meteorological factors. Good sites are rare and infringement upon these few sites should not be tolerated.

Civic officials must be aware of the global aspect of the astronomical community and the enormous scientific merit that the Hale telescope has achieved. This instrument must be permitted to continue making valuable contributions to the world's knowledge of the universe, of which we are all a part.

Yours truly,

Halifax Centre
Royal Astronomical Society of Canada

The First Modern Planetarium

Doug Pitcairn

Although the idea of the sky being a sphere has been around since at least 2000 B.C. (in China), the first known construction of a celestial globe was one made by Eudoxus of Cnidos (about 400-355 B.C.). For the next 2000 years, people seemed content to modify and expand upon this general concept as hundreds of versions of celestial globes were produced. Some, such as the Gottorp Armillary Sphere, were awesome mechanical accomplishments of craftmanship and art. This device modelled all the then known movements of the heavens, including the 25 000 year precessional movement of the earth's axis!

The next generation of sky simulators were developed about 1664 in Germany by the same Andreas Busch who built the previously mentioned armillary sphere. Called the Gottarp Globe, it was a water powered, 3.5 ton, three metre diameter sphere that rotated every twenty-four hours. Inside was a platform on which twelve persons could stand and view the gilded stars on the inside surface. This was the first time the skies were modelled on the inside of a sphere, a big improvement over the earlier globes. For the next 250 years, these instruments, called 'Orrerys' (after one built for the fourth Earl of Orrery) were constructed in many different varieties and one fifteen foot diameter dome built in Chicago in 1911 is still in use today! The largest problem with these devices was the difficulty in building one large enough to hold more than a dozen people and still show astronomical motions.

In 1913, the Carl Zeiss optical works in Germany took on the task of building a large planetarium. After much work, little progress was made until 1919, when a Dr. Walter Bauersfield made a virtual breakthrough. Instead of rotating the dome, he thought, why not project the images onto the dome from a projector in the centre, and accommodate all the movements with the optical projector! The modern planetarium was born! For the next five years, a large staff of scientists, engineers and technicians worked with Bauersfield at the large Zeiss plant in Jena (now in East Germany) to design the projector and dome. Not only was the projector a marvel of achievement, but the dome incorporated many new techniques and principles and was the world's first lightweight thin-shell concrete dome, as well as the world's first geodesic dome.

Finally, in August, 1923, the heavens were for the first time accurately reproduced in all their beauty on the Jena rooftop dome. The effect blew everybody away, including Dr. Bauersfield! As the planetarium became widely publicized, orders for more of these wonders began to pour in and soon a new universal model, able to show the stars from anyplace on Earth, was being sold worldwide! The first one set up in North America was the Alder Planetarium, in Chicago.

We here in the Maritimes have the benefit of a public planetarium. Operated by the Nova Scotia Museum with help from the R.A.S.C., it is located in the Dunn Building at Dalhousie University in Halifax. (The projector is a Spitz Model A and is pictured in the September issue of Sky & Telescope, page 279). Public shows are given twice a month, there is no admittance fee and all are welcome! In addition, private shows for groups or clubs are available. Contact the Nova Scotia Museum on Summer Street for more infomation. Ω

Some General Characteristics of the Various Levels of Astronomers

reprinted from **Astronomy London** - London Centre

Astronomers, who have always been busy classifying things, have never had a classification system for themselves. Now, with job difficulties likely to present many problems in the near future, such a scheme has been devised. For convenience's sake the familiar spectral classes have been employed. This should not be implied to assume that the best astronomers are hot and heavy or that the worst are the cool reds. Classifications have been achieved for each of the following catagories:

INTELLECTUAL ACHIEVEMENT

TYPE O: Has figured out the unified field theory, but isn't telling.
TYPE B: Understands thoroughly the methods of stellar energy transfer and has applied them successfully to increase their gas mileage.
TYPE A: Remembers the difference between inertial and gravitational mass.
TYPE F: Lucidly explains why eclipses occur.
TYPE G: Can quote the latest value of the cosmological constant.
TYPE K: Has a copy of "Astrophysical Quantities".
TYPE M: Has trouble spelling "parallax".

ASTRONOMICAL EXPERIENCE

TYPE O: Spots cepheids in M33 with the naked eye.
TYPE B: Can make out the spiral arms of M51 with opera glasses.
TYPE A: Aims a 48-inch telescope without looking at the dials.
TYPE F: Needs setting circles to find Saturn.
TYPE G: Can point out Venus to his mother.
TYPE K: Identifies aircraft beacons with a blink comparitor.
TYPE M: Can't even find the full moon when his dog is barking at it.

TECHNICAL SKILLS

TYPE O: Has built polarimeters out of spare parts from his broken television set.
TYPE B: Rebuilds broken photomultipliers without reading the manual.
TYPE A: Aligns polar axes by sighting along his thumb.
TYPE F: Fixs clock drives with only a nail file.
TYPE G: Able to set up a C8 in less than thirty minutes.
TYPE K: Doesn't know which end of the binoculars to look through.
TYPE M: Cannot change a light bulb.

RESPECT IN THE FIELD

TYPE O: Chairs IAU Symposia when they feel like it.
TYPE B: Gets invited to IAU GEneral Assemblies.
TYPE A: Goes to IAU General Assemblies and sits in the back.
TYPE F: Is a member of CAS.
TYPE G: Has a friend who is a member of CAS.
TYPE K: Went to a UWO Applied Math Colloquium once.
TYPE M: Gets ejected from R.A.S.C. meetings.

PUBLISHING HISTORY

TYPE O: Publishes in the Astrophysical Journal when they ask politely.
TYPE B: Wrote a definitive book on his specialty.
TYPE A: Had an article in an obscure Russian journal once.
TYPE F: Co-authored the introduction to a friend's book.
TYPE G: Buys classified ads in Sky & Telescope
TYPE K: Gives talks at R.A.S.C. meetings.
TYPE M: Reads comic books but looks up the hard words in a dictionary.

CURRICULUM VITAE

TYPE O: Ph.D. and honorary doctorate from Harvard.
TYPE B: Fellow of the Royal Society.
TYPE A: Went to U.C.L.A. on a scholarship.
TYPE F: Got all three degrees at the same place in eight years.
TYPE G: Filled out an application to the University of Arizona once.
TYPE K: Physics drop out from Queens.
TYPE M: Ontario Senior Matriculation. Ω

Newton's Lincolnshire Home

Dianne Brooks

On June 10th of this year, Randall and I accompanied his thesis advisor, Dr. Allan Mills, to Woolsthorpe Manor, the birthplace of Sir Isaac Newton, which is about forty kilometres from Leicester. The day was partly sunny, following a long rainy spell and the dark clouds scattered here and there made me wonder if we would be treated to the same rainbow display that was captured so effectively by a well-known member of our centre. Parking the car, we were greeted by the National Trust custodian who led us up the lawn past a knarled apple tree. "Was that the tree?", I wondered. It's popularly thought to be, although the orchard of Sir Isaac's time was further north of the house. Even if this existing tree wasn't the one under which the falling apple prompted thoughts of gravitation, the tree is still believed to be descended from a 400 year old specimen which blew down and rerooted. The British Geological Survey has recently measured the force of gravity under this tree and by the door.

Led to the house, the window from which Newton observed sunlight was pointed out to us and then we were conducted directly to the study in which his optic experiments were carried out. In a closet-like corner of the large room, a display had been set up demonstrating how Newton studied the spectrum, now recreated by a lamp which projects the colours onto a white surface. While Dr. Mills made some needed repairs to the exhibit equipment, Randall and I were given a personal grand tour of the house.

The 17th century yeoman farmer's manor house was purchased by Newton's grandfather and passed on to his father. There are a lounge and a combined kitchen/dining room downstairs, and the master bedroom, study and an extra bedroom upstairs. The extra bedroom's size was greatly decreased when a new staircase was built facing the main door in the early 19th century. The old staircase was at the back of the house, approached through the

kitchen, and nothing can now be seen of it in the section of the house normally open to the public. We were shown a sketch of the very grand staircase and then taken to the attic through the living quarters of the custodian and his wife, to see the existing railing and banister with its elaborate carving. While upstairs we were also shown the surviving "rat-catchers" under the roof, left over from the house's thatched roof period.

Returning to the usual tour area, we stood in the room in which Sir Isaac is believed to have been born--a premature baby small enough to fit in a pint container and not expected to live. The 400 year old floor now slopes down from the outer wall toward the bed and is made of ashlar concrete, a very lightweight construction of ash and lime reinforced by reeds. A large chunk of it on display weighed no more than a kilogram. The spare bedroom is used as an exhibit area for photographs, sketches and printed panels on which information about the series of stamps issued by the British Post Office commemorating the tercentenary of the Principia is prominently displayed. Also on the wall is a documented geneological chart of one side of Newton's family, from before his time to 1981.

Some of the most fascinating features of the house were sketches on the walls, some of which could be attributed to the young Newton, and some of which are speculated to have been deliberately added to the walls by later owners in an attempt to embellish the legend and attract sightseers. Newton was apparently a fan of graffiti and a large sketch in the kitchen, of a chapel's spires, as well as a smaller drawing of a windmill in the hall could be plausibly credited to him. Sketches of advanced geometrical figures are less likely to have originated with him because he wouldn't have known about their content until he went to Cambridge.

In the lounge, a model of a Newtonian telescope stands on a window sill. From a cupboard the custodian showed us one of two existing snuff boxes made from the wood of the apple tree. On sale are first day stamp covers with Dr. Bishop's photo of the rainbow over Woolsthorpe. The only ones remaining have the single, apple stamp because the stock containing all four stamps with the photo sold out in the first 24 hours! While I was signing my name

in the visitors' book, we were told that previous visitors' books are still held by a former owner of the manor and one is particularly sought after by the National Trust. It contains the June 1930 signature of Albert Einstein who commented after his name that, in his opinion, Newton is still the greatest scientist the world has ever known. The custodian, Mr. Stan Cullen, was a well of information on the house and Newton's life, both professional and private, and we felt honoured to have been given such a priviledged glimpse into one of Britain's and the world's most distinguished figures. Reluctant to take up any more of our guide's time, we left Woolsthorpe Manor just before the site was due to officially open for the day.

Next stop was lunch at a pub in Colsterworth across the road from the Church of St. John the Baptist. Thinking over what we had seen, I wondered how many of the local residents appreciate how much history is concentrated in that one small area of England. After lunch, we borrowed the church key to see another Newton artifact. When he was nine, the aspiring scientist had carved two sundials with his penknife on the outer south wall of the house. For safe keeping one of these sundials had been mounted on an inner wall of the church. Curiously, it was inverted on the wall, apparently by accident. One must either know where the sundial is situated or look carefully because of its unassuming location. If the church is entered by the back door, which is the only one the very large, old key would fit, one finds theirself in a small room behind the altar. There is a narrow walkway between the back of the organ and the outer wall. On this wall, behind the organ is the sundial, difficult to see clearly because of the dim light from the shaded window above. Some of the Newton family are buried under the organ, commemorated by a plaque high up on the wall, unlit, and partly hidden by the organ. In the nave, beside the left altar, a small display for the Principia's tercentenary had been set up on a table. It included a bust of Newton, books of his life and about astronomy, a reaction pendulum, an apple, and a blown-up photocopy of a page from the church records containing the entry for Newton's baptism. Also on the table were several tourist leaflets announcing various Newton theme events planned throughout the district, including a half marathon known as

"Newton's Fraction" on June 21, which would pass many relevant landmarks. The leaflets invited readers to "Gravitate to Grantham" where we drove next.

Grantham is where Newton attended King's School while boarding with an apothecary on High Street. The school can be visited only by appointment, so his signature carved on a window sill and other momentoes will have to wait till another time. However, the local museum had an interesting exhibit which included commemorative medals, books, a model of the bronze statue of Newton that stands in the town square, plaster casts of his death mask, one of the sundials and that window sill signature, and a wax figure of Newton conducting his optics experiments. We discovered at the museum information desk that there was a clock in the new mall across the street. Since Dr. Mills' special interest is horology, we went over to investigate the Isaac Newton Shopping Centre. Walking down Newton Lane, one enters the central courtyard under a huge papier maché apple. To the left is a large model of a Newtonian telescope in a glass case. At the far end high on the wall is the very large timepiece consisting of a lion automaton sitting under an apple tree holding the clock face. A plaque hung at eye level explains that the lion is asleep but wakens when the clock chimes on the quarter and half hours and opens its eyes to see if the apple has fallen. On the hour the apple does fall and the lion strikes the chime. I wondered what Sir Isaac would think of the techniques used to popularize astronomy, or to exploit a famous name. Astronomy has been taken to the people in grand style in Grantham.

Woolsthorpe, Colsterworth and Grantham lie within a few kilometres of each other in Lincolnshire. They make a fascinating day out for anyone interested in seeing for themselves the landmarks in Sir Isaac Newton's earlier years. A bit further away but also of relevance is Trinity College Library at Cambridge University, which holds the scientist's private library including his personal copy of Principia.Ω

Nova East '87

Doug Pitcairn

This year's camping observing weekend took place from July 31 to August 3 at Fundy National Park in south-east New Brunswick. People began arriving Friday night, and after a bit of initial confusion, (our maps were inaccurate and nobody had ever been there before!) soon found their accomodations. Approximately thirty members and their families were present! Skies were clear with intermittent cloud for the first night, but observing went ahead "in the clear spots". Notable mention to Hugh Thompson who persevered to observe Mercury rise in a clear pre-dawn sky.

On Saturday, people explored the sights until 4:30, when we gathered at the group campsite for a talk by Dave Driscoll of the Saint John Astronomical Society entitled "Beefing up Your Optics". After supper, we got together at the lecture hall for some films (supplied by the Saint Mary's University astronomy department. (much thanks!!) and talks by Pat Kelly on the planets currently visible and yours truly on observing with binoculars. That evening, seeing was good but "spotty". However, the members with large aperture binoculars would scout the sky and cry out the names of objects in the clear, and the telescopes would all swing from object to object as the clear spots permitted ! Good fun was had by all. While I was looking south, (of course), a -8 magnitude fireball streaked through the Big Dipper! This is the one that Mary Lou showed a photo of at the September meeting. Although I missed the meteor, I observed the green shadows of members and equipment swing across the ground in time to the OOHs and AAHS of those fortunate enough to be looking in the right direction!

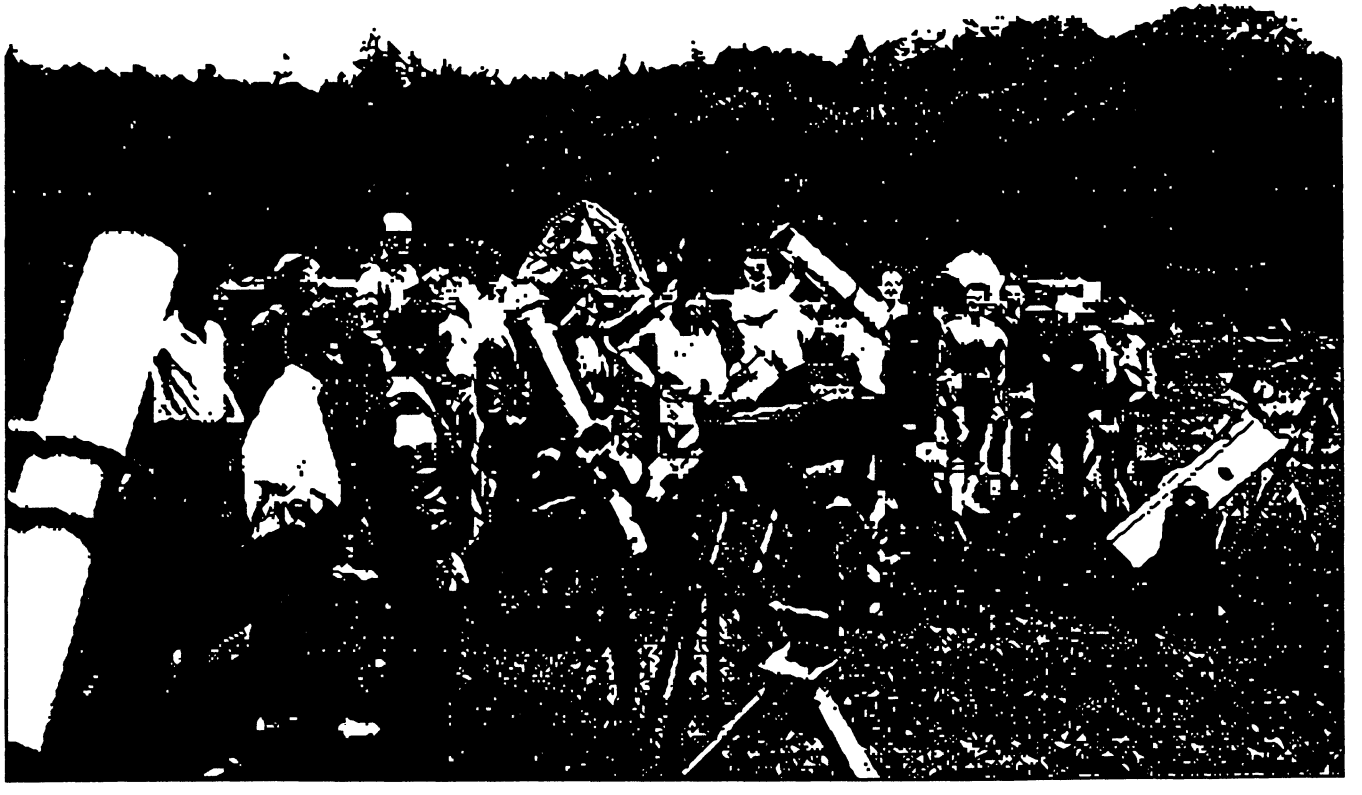
Sunday came with clear skies, and members again spent the day exploring all the wonders of this beautiful park. At 4:30 P.M., Len Larkin (also of the Saint John Astronomical Society) gave a talk on "Dynamics of Double Stars". (A favorite subject of his, as he owns a six inch refractor!) This was followed by a group photo session with

telescopes on display. After supper, it was back to the assembly hall for more films and talks by Mary Lou Whitehorne on still camera photography and Len Larkin on observing double stars. We emerged from the talks to find an excellent twilight promising a night of rare seeing, and it was!

Telescopes included six C8s, a six inch refractor, a ten inch f/6, a twelve inch f/9, and a score of smaller telescopes of various types! Observing continued until the wee hours. On Monday morning people went their own ways taking their memories and pictures with them. I would ask any members who have taken pictures to send us a copy of their best shot(s) and I will make these available to any who would like a copy. Also we are going to send a notice to some of the astronomy magazines, and try to get an article included!

Although it was not the first Camping Observing Weekend sponsored by the Halifax Center, Nova East '87 will definitely stand out in the minds of all who attended as one of the best. The site chosen, Fundy National Park, is truly an ideal location for a star party, and is currently under consideration as the permanent site for the event.

The seeing was remarkable with the entire southern horizon over the Bay of Fundy giving jet black skies! (The Helix Nebula was plainly visible in 7X35 binos!) In addition, the park features excellent camping, hiking, swimming and sightseeing, as well as a large lecture hall with complete audio-visual services. For those of us who prefer a roof over their heads, there are accommodations (motels and chalets) right in the park. The staff were more then helpful, and the astronomers responded with three well attended public viewing sessions. The site offers the added advantage of being centrally located between astronomy groups in Halifax, Saint John and Summerside. Indeed, the site is also within easy reach of the many members in Quebec and the eastern United States, suggesting that with a bit of advertising, the attendance could be even better! All of you who did not attend and missed a good time should plan on attending next year. If you do, bring a friend, the more the better!! Ω



NOW
EAST 87

Those Speedy Double Stars

Len Larkin

This article is based on the talk which I presented at Nova East '87 (the joint camping-observing event for the Halifax Centre and the Saint John Astronomical Society) held in Fundy National Park this past August. Since I did not have time to prepare handout sheets and there was lots of unmemorizable data in the talk, I'm pleased that Pat has allowed me some space in **Nova Notes** to present that data in a more accessible form.

Introduction

As astronomy enthusiasts, I am sure you are well aware of the dynamics of the universe. Meteors whiz through our sky nightly, sunspots move across the face of the sun, comets come and go yearly, planetary details change from hour to hour and variable stars have an incredible diversity of brightening cycles.

And double stars also move. But the motion is so ponderously slow that watching grass grow seems like a high speed car chase compared to binary star motion.

Well, there are some star systems that are changing quite rapidly (especially near periastron - the point of closest approach) and this article will highlight a few of those. By the way, visual binary stars systems are double (or multiple) stars which appear to have orbital motion through observations made over several years. Once the orbit for a particular system has been determined, then information on the system for any point in time can be calculated using particular bits of information from the orbit (called orbital elements) and that is exactly what I have done.

The Calculations

I have combined the orbital elements for binary stars found in **Sky Catalogue 2000.0, Volume 2** with a computer program* in my Radio Shack PC-3 pocket computer. Trial calculations for double stars listed in **The Observer's Handbook** showed good correlation between the program and the handbook and it is interesting to note that the most exciting systems which turned up in my search are all listed in the "Double & Multiple Stars" section of the handbook. That, combined with the fact that those listings are updated yearly, should make **The Observer's Handbook** your first reference for double stars.

*For those wishing to have a similar program for their computer, see "The Orbit of a Binary Star" in the July 1987 issue of **Sky & Telescope.**

The Observations

The two measurements, separation and position angle (P.A.) can be estimated quite easily. If you let the stars drift westward through your field of view, then their motion defines the east - west line (90° and 270° P.A. respectively). You should then be able to measure the secondary's position relative to the primary to within five or ten degrees.

Separation can also be estimated if one of the stars is bright enough to have a diffraction ring around its Airy disk. The formula for calculating the radius of the ring is 180/D (where D = aperture in mm) or 7.2/D (where D = aperture in inches, for the non-metric observer like myself). In either case, the answer is in arc-seconds.

The stars listed below have dramatic motions that cause them to be observationally interesting for the next seven or eight years and changes can even be detected from one year to the next. These systems will prove challenging for telescopes with apertures of 80 to 300 mm, so everyone will get a chance to test out their eyes and optics! Here are the stars that you should be keeping an eye on.

Gamma (γ) Andromedae (BC pair)
Magnitudes 5.5, 6.3
Distance: 650 light years
Orbital Period : 60 years

Year	Sep. (")	P.A. (°)
1975	0.5	109
1985	0.6 (widest)	107
1995	0.5	105
2013	0.01 (closest)	287

Comments: Gamma Andromeda has an incredible range of separations due to its highly elongated orbit. This is enhanced due to foreshortening due to the fact that we do not see the orbit face on.

Zeta (ζ) Cancri
Magnitudes 5.0, 6.2
Distance: 81 light years
Orbital Period : 60 years

Year	Sep. (")	P.A. (°)
1987	0.6 (closest)	218
1989	0.6 "	192
1991	0.6 "	170
1993	0.6 "	145
1995	0.7	125

Comments: The best chance to resolve this close double is from the present to 1990-1995. By the year 2000, the separation has dropped to 0.4". It is a good test for 150 mm or larger scopes. Zeta Cancri only varies from 0.6" to 1.1" throughout its orbit but shows a steady ten to twelve degree yearly change in P.A.

70 Ophiuchi
Magnitudes 4.2 6.0
Distance: 16 light years
Orbital Period : 88 years

Year	Sep. (")	P.A. (°)
1987	1.7	260
1989	1.5 (closest)	230
1991	1.7	200
1994	2.4	170

Comments: The closest separation is in 1989 and makes a good catch for a 75 - 100 mm scope. The P.A. change of fifteen degrees per year can also be observed.

Alpha (α) Centauri
Magnitudes 0.0, 1.2
Distance: 4.2 light years
Orbital Period : 80 years

Year	Sep. (")	P.A. (°)
1985	21	212
2005	10	230
2015	4 (closest)	289

Comments: We northerners cannot observe this one but if you do manage a couple of trips south, very modest equipment will show these incredible changes.

Xi (ξ) Ursae Majoris
Magnitudes 4.3, 4.8
Distance: 25 light years
Orbital Period : 60 years

Year	Sep. (")	P.A. (°)
1987	2.0	83
1989	1.5	70
1991	1.0	45
1993	0.8 (closest)	360
1995	1.1	316

Comments: Xi UMa will be interesting and informative to view with a 150 mm scope. A current observation will show the two stars aligned east-west with each one sitting <u>just outside</u> the other's diffraction ring. 1990 will find them in a northeast-southwest alignment siting <u>on</u> the other's diffraction ring. By 1993 they will be positioned north-south in probably a figure eight pattern (of course, bigger scopes should resolve them clearly).

Remember, whether or not you resolve these systems you will have learned a lot about the stars and your telescope. Pleasant viewing! Ω

Halifax Centre's Telescope Policy

Halifax Centre

- The telescope may only be borrowed by members of the Halifax Centre who are in good standing.

- There will be **no** user fee to members who wish to use the Centre's telescope.

- All members wishing to use the telescope **must** attend at least one observing session where they will be checked out to ensure that they are familiar with the telescope's operation.

- A log book will be kept with the telescope and it is expected that anyone who uses the telescope will record their observations in this book.

- A member may borrow the telescope for a period of up to two (2) weeks depending on their observing program.

- A member who borrows the telescope is responsible for picking up and delivering the telescope when the observing period begins and ends unless they have made other arrangements.

- The borrower must ensure that the telescope is available at all of the Halifax Centre's scheduled observing sessions over the term for which they have it.

- All borrowers must be of a minimum age of sixteen (16) and those in the range from sixteen to nineteen (16 - 19) inclusive must obtain the signature of an adult who will assume financial responsibility in the event of loss of or damage to the telescope. Ω

‡‡‡

A Nova Scotia of Note

Mary Lou Whitehorne

There is a new book from Cambridge University Press about the Lick Observatory called **James Lick's Monument** by Helen Wright. It should prove interesting to Nova Scotians as it features one of our own.

James Lick set out to build the world's largest refracting telescope (36") in California during the turbulent late 1800's. Much of the credit for this remarkable telescope belongs to Thomas Fraser, a Nova Scotian. He was a "tireless and obsessive worker" who was Lick's foreman. In 1875, he found the site for the telescope, 4000 feet up, on Mount Hamilton. There were squatters on the mountaintop who claimed ownership of said land. Fraser solved the little problem by setting fire to their shack. Obviously he was a very direct man.

The book should be a lively read - describing the men and the problems they faced and overcame to build this monumental telescope during an especially fascinating era in California's history. Ω

Mostly Meteors

Michael Boschat

[Editor's Note: The following is a collection of notes , reports etc. that I have received from Mike over the last little while. I thought it might be more appropriate to collect them all together and put them under one collective title.]

Radio Meteor Results - April-May

In general, the rates for radio meteors follow a few rules. Firstly, the meteor has to fall at the right angle to deflect a television signal towards you\ You can have five meteors pass right by, but only one or two will be at the necessary angle. Secondly, the higher the radiant, the lower the rates and the lower the radiant the higher the rates. Thirdly, the fainter the meteor, the longer the signal lasts. Almost all of the meteors that you do detect are are faint, from visual magnitude three and up. A meteor of magnitude minus five would produce a signal lasting about twenty-five seconds. Lastly, the meteors that that you detect cannot be seen as it is below the horizon. It would be nice if you could see it, but unfortunately that is not the way it works.So, here are some results:

The Lyrids are semi-poor radio detection. On April 20th there were twenty-one "flickers" seen from 14^h00 -15^h00 U.T. The rate dropped to eight between 2^h00 - 3^h00 U.T of the following day when the radiant was above the horizon.

On May 3rd, the Earth's sporadic E layer deflected a signal on channel 2 which was being broadcast from WTWO TV in Terre Haute, Indiana. At least this tells you that your filter, etc. are working properly! This effect lasted from 22^h00 - 23^h08 U.T.

The Eta Aquarids gave rates of twenty-three "flickers" on the night of May 4th-5th from 1^h00 - 2^h00 U.T. but only nine from 2^h00 - 3^h00 U.T. Rates were low as **The Observer's Handbook** gave the peak as occurring at 1^h00 U.T. on the following day. From noting reports in **Sky & Telescope** it seems as though the visual peak was about twenty-five from 17^h00 -18^h00 U.T. on the 6th.

Although it was overcast for the visual peaks of both of these showers, they at least allowed me to test the system and determine that it is working well.

The following notes are to offer an explanation as to why certain meteor showers are good at times and poor at others.

Quadrantids: variable peak time (± four hours) from year to year. The long duration meteors peak about one and a half hours after the main peak.

Eta Aquarids and Orionids: The peaks for both of these showers are similar; rather broad with several subpeaks. These are very complex meteor showers and predicting their exact peak is futile.

Perseids: The long duration meteors peak about two hours later than the main peak.

Geminids: The long duration peak about three hours later than the main peak.

Lyrids, Taurids, Leonids and Ursids: These showers are now classified as minor.

More data is needed on meteor showers in order to get a better understanding of them, so let's get out and observe them! ω

The Arietid Meteor Shower - 1987

Well, after sweating through three periods of sporadic E interference, the dates of June 5th to 6th were interesting for radio meteors. The dates and times (always in U.T.) are shown below. There were three peaks. I checked with the weather office in Bedford to be sure that there was no electrical activity about - none was recorded.

Date	Time	Meteors	Date	Time	Meteors
5th	1300	3	6th	0100	7
"	1500	3	"	0300	6
"	1700	5	"	1500	8
"	1800	37	"	1600	16
"	2200	6	"	1700	27
			"	1800	23
			"	1900	8
			"	2300	17

Using radar, rates are near sixty per hour, but I was glad to get these. Who says radio meteor observing is hard? After all, one meteor shower was discovered this way! ω

The Interesting Night of July 27th

Ron and I decided to get some meteor observing done so off we went to Mill Lake. Upon arriving we got out the cameras and set them up. We had to wait for some scattered cloud to go. Finally, it was semi-dark. We began at 01^h00 U.T. and ended at 03^h30 U.T. During this time I observed fourteen meteors most of which were either Perseids, Delta Aquarids or Capricornids. At 01^h57 U.T. a faint patch of green light was seen at 350° azimuth and 5° altitude - aurora. Then a flash! At first we thought that it might have been a fireball, but it was coming at intervals. Finally, one flash lit up the clouds on the horizon - lightning!

It was unusual - the faintest stars seen were about seventh magnitude and the Milky Way was excellent overhead. Then we had meteors, the aurora and an electrical storm all in one night. I was hoping for a fireball to fall near Ursa Major since I was taking an exposure of the lightning. It would have made an interesting photo especially being reflected in the still lake water. Well, maybe next time! ω

The Perseid Meteors - 1987

This year's Perseids were as I predicted - poor. Hopefully next year, more early Perseids will be an omen of a better shower. The best night was that of the 12th/13th and even though it clouded over, two meteors were seen in the breaks. Here are my observations:

Visual:

Date	Time (U.T)	ZHR	Avg. Mag.
Aug 2	0200 - 0300	2	+1.0
Aug 3	0100 - 0200	4	+1.5
Aug 7	0100 - 0200	2	+1.0
Aug 8	0100 - 0200	2	-3.0
Aug 12	0000 - 0100	2	-3.0
Aug 12	0147 - 0200	2	-4.0
Aug 13	0100 - 0200	5	-1.0
Aug 13	0200 - 0300	5	-1.7
Aug 13	0300 - 0400	2	+0.0

Radio:

Date	Time (U.T)	ZHR
Aug 9	2000 - 2100	14
Aug 9	2300 - 0000	8
Aug 10	1900 - 2000	9
Aug 10	2100 - 2200	10
Aug 11	2200 - 2300	8
Aug 12	1300 - 1400	20
Aug 12	1400 - 1500	12
Aug 12	1600 - 1700	9
Aug 12	1800 - 1900	8

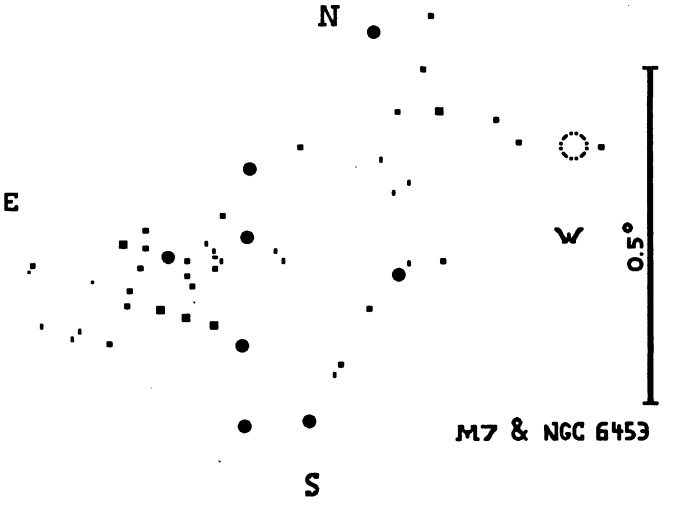
Hopefully the upcoming showers will be better. Keep looking! Ω

****

The Search for NGC 6453

Doug Pitcairn

Last June 16th, we were all out at Beaverbank observing on a clear night with good transparency. (MVM=6). I noticed on my sky atlas a globular cluster, NGC6453, within the open cluster M7. Thinking this should be a cute target, I examined the area with my B&L 4000 and saw nothing. Being used to this, I asked Mary Lou if she could show me the globular in the 8" Meade. To our surprise it was no where to be seen. Time to call for reinforcements! I wrote to Dr. Bishop, Glen Roberts and Dr. Thurlow to ask if they had ever observed this elusive cluster. Dr. Thurlow informed me he had noted NGC6453 through his C8 but hadn't tried his 17.5" Dobsonian on it yet. Dr Bishop replies that through his 8" Newtonian, "it appeared as a round puff of light near the northwest edge of M7". Our problem was the sky pollution from Halifax, forty km to the southeast. Using Roy's excellent sketch of the area (see included), I was able to glimpse (averted vision only) NGC 6453 with my scope from the dark skies at Fundy Park during Nova East 87. It's a challenging object for a mid-sized scope, clear skies! Ω



Gawker's Report

compiled by Pat Kelly

Time: Sunday, August 23rd, 1987
Place: Victoria, P.E.I.
Observer(s): Glenn Roberts
Equipment: SPC8
MVM: 6.0
Weather conditions: Clear and mild.
Seeing: Excellent
Comments: First night viewing here at our home on the island. I'm viewing from the deck on the back of the house. There are some streetlights at the front of the house (towards south) so for now I must be content with viewing the north-east sky.

Objects Observed:

Planets: Jupiter
Planetary Nebulae: NGC 7635, IC 1470
Nebulae: NGC 7538
Globular Clusters:
Open Clusters: NGC 103, NGC 129, NGC 133, NGC 136, NGC 146, NGC 225, NGC 7510, NGC 7788, NGC 7789, NGC 7790, H21
Galaxies: NGC 147, NGC 185, NGC 278

◊◊

Time: Monday, August 24th, 1987
Place: Victoria, P.E.I.
Observer(s): Glenn Roberts, Len Larkin
Equipment: SPC8, 6" refractor, 10x50 binos
MVM: 6.0 - 6.5
Weather conditions: Initially clear, then some cloud, then back to clear.
Seeing: Excellent.
Comments: Finally, Len and I got together for some observing and I got to do some viewing through his "monster" refractor. Len is finally getting some "real" lenses for the thing and the observing keeps getting better.

Objects Observed:

Planets: Jupiter (with Great Red Spot)
Planetary Nebulae: M27 (Dumbbell) and M97 (Owl)
Nebulae: NGC 7000 (North America)
Globular Clusters: M13, M15
Open Clusters: NGC 869/884, NGC 1220, NGC 1245, Kg 5, Tr 2
Galaxies: NGC 1169, NGC 2985, NGC 3065, NGC 3077, NGC 3147, NGC 3348, NGC 3403, NGC 3516, NGC 3735, NGC 4125, NGC 4128, NGC 4133, NGC 4236, NGC 4256, NGC 4291, NGC 4319, NGC 4386, NGC 4589, NGC 4750

Time: Tuesday, August 25th, 1987
Place: Lakeview, Halifax County
Observer(s): Caroline Smith
Equipment: 10x50 binoculars
MVM: N/A
Weather conditions: Clear, with clouds later on
Seeing: Good

Objects Observed:

Planets: Jupiter
Globular Clusters: M13, M92
Open Clusters: M11, M39, NGC 663, Coathanger Cluster, IC 4665
Galaxies: M31
Double Stars: μ Dra, ε Lyr, δ Lyr, Alcor and Mizar

Time: Saturday, August 29th, 1987
Place: Victoria, P.E.I.
Observer(s): Glenn Roberts
Equipment: SPC8, 10x50 binoculars
MVM: 6.0 - 6.5
Weather conditions: Clear and calm
Seeing: Extremely good to excellent
Comments: When I started observing just before midnight, the skies were very clear and as the night continued, it just kept getting better until by 4:00 A.M. I could M33 naked eye with averted vision.

Objects Observed:

Planets: Jupiter
Planetary Nebulae: IC 351, IC 2003
Nebulae: NGC 1333, NGC 1491, NGC 1499 (California), NGC 1624
Open Clusters: NGC 752, NGC 1245, NGC 1342, NGC 1513, NGC 1528, NGC 7772
Galaxies: M33, NGC 16, NGC 23, NGC 214, NGC 670, NGC 672, NGC 708, NGC 750, NGC 753, NGC 777, NGC 890, NGC 891, NGC 925, NGC 949, NGC 1003, NGC 1023, NGC 1058, NGC 1169, NGC 1175, NGC 1270, NGC 1275, NGC 1465, NGC 7137, NGC 7177, NGC 7217, NGC 7331, NGC 7332, NGC 7339, NGC 7448, NGC 7454, NGC 7457, NGC 7469, NGC 7479, NGC 7619, NGC 7625, NGC 7626, NGC 7640, NGC 7662, NGC 7678, NGC 7741, NGC 7742, NGC 7743, NGC 7769, NGC 7770, NGC 7814

Time: Tuesday, September 15th, 1987
Place: Beaverbank Road Site
Observer(s): Jim MacGuigan, Mary Lou Whitehorne, Joe Yurchesyn
Equipment: Meade 2080, 6" refractor, 80 mm refractor
MVM: 6.5
Weather conditions: Clear, cool and damp
Seeing: Fair
Comments: A great night for observing. Saw the dust lanes in Andromeda, spiral structure in both M51 and M33 as well as a hint of bright knots in the spiral arms of M33

Objects Observed:

Planets: Saturn (with Tiatn and one other moon), Jupiter
Planetary Nebulae: Helix and Ring Nebulae
Globular Clusters: M13, NGC 6522, NGC 6528, NGC 6624
Open Clusters: M34, Double Cluster
Galaxies: M31, M32, M33, M51, M101, NGC 205, NGC 5194, NGC 5198 (very faint), NGC 7448
Aurora: A beautiful pale green curtain aurora

◊◊

Time: Early one morning (no date given)
Place: Spruce Lake, New Brunswick
Observer(s): Len Larkin
Equipment: 8x40 binoculars
MVM: 6.0 +

Objects Observed:

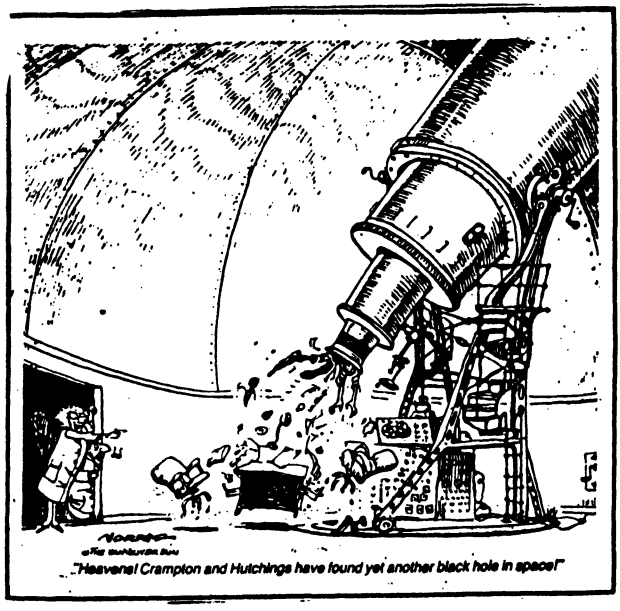
Nebulae: M1 (Crab), M42 (Orion)
Open Clusters: M35, M36, M37, M38, M44, M45 (Pleiades), NGC 1907 (Got it, Doug!)
Galaxies: M31, M32, M33, M110
Meteors: -1 magnitude meteor travelling northward between Sirius and Orion
Aurora: A long arc with occassional spikes in the N and NNW
Misc: The zodiacal light (about 25° long) was seen at an inclination of about 70° - 75° to the horizon. At 5:30 A.M. it was causing some light pollution around M44.

◊◊

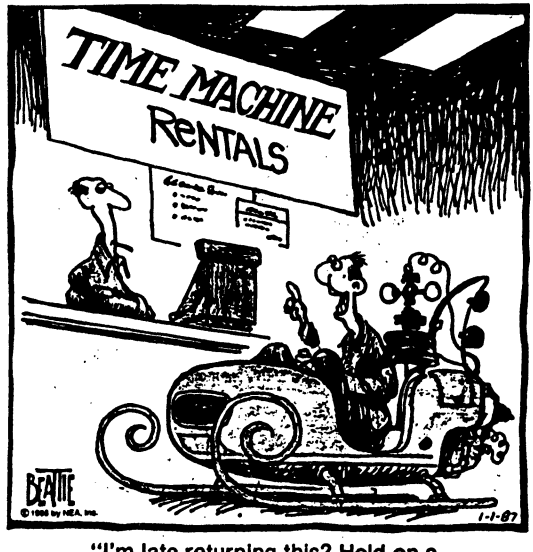
Members are invited to submit their observations to the Editor for inclusion in "Gawker's Report". In order to make the compiler's job easier, please list all information in a format similar to that used for the column. Thanks and clear skies. Ω

∞ ∞

The dates of the regularly scheduled monthly observing sessions can be obtained from the "Calendar of Events" inside the back cover. If the weather does not permit an observing session on the scheduled date, an alternate is set by the Observing Chairman based on the weather. If you wish to be informed of the time of alternate observing sessions, contact the Observing Chairman to have your name added to the list (see the inside front cover).



"Heavens! Crampton and Hutchings have found yet another black hole in space!"



"I'm late returning this? Hold on a minute...I'll be back yesterday."

THE FAR SIDE By GARY LARSON

Inside the sun

THE MILKY WAY
(Detail)

NOVA NOTES INDEX

September - October 1987 Volume 18, Number 5

NOVA NOTES is published bi-monthly by the Halifax Centre of the Royal Astronomical Society of Canada in January, March, May, July, September and November. Articles for the next issue should reach the editor by November 13th, 1987. Articles on any aspect of astronomy will be considered for publication. The editor is:

Patrick Kelly
2 Arvida Avenue
Halifax, Nova Scotia
Canada
B3R 1K6
477-8720

NOVA NOTES is printed courtesy of the Nova Scotia Museum

HALIFAX CENTRE - R. A. S. C.
1987 CALENDAR OF EVENTS

September 1987

S	M	T	W	Th	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	**19**
20	21	22	23	24	25	26
27	28	29	30			

October 1987

S	M	T	W	Th	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	**17**
18	19	20	21	22	23	24
25	26	27	28	29	30	31

November 1987

S	M	T	W	Th	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	**21**
22	23	24	25	26	27	28
29	30					

December 1987

S	M	T	W	Th	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	**19**
20	21	22	23	24	25	26
27	28	29	30	31		

Key to calendars:

Meetings: outlined

Special days: shadowed

Observing sessions: **bold and underlined**

Special Days:

Sept. 1 - Antares 0.3° north of Moon
Sept. 26 - National Council Meeting in Halifax
Sept. 28 - Antares 0.3° north of Moon again!
Oct. 7 - Lunar Eclipse
Oct. 16 - 17 Astronomy Day at the Museum
Nov. 3 - South Taurid Meteors
Nov. 18 - Leonid Meteors
Dec. 14 - Geminid Meteors

Halifax Centre
Royal Astronomical Society of Canada
c/o 1747 Summer Street
Halifax, Nova Scotia
Canada
B3H 3A6

National Office R.A.S.C.
136 Dupont St.
Toronto, Ontario
Canada