

NOVA NOTES

Volume 24 Number 1 February 1993

THE NEWSLETTER OF THE HALIFAX CENTRE OF THE RASC
c/o 1747 Summer Street, Halifax, N.S. Canada B3H 3A6



NOVA NOTES, the newsletter of the *Halifax Centre of the Royal Astronomical Society of Canada*, is published bi-monthly in February, April, June, August, October, and December. The opinions expressed herein are not necessarily those of the *Halifax Centre*. Material for the next issue should reach the editor by **March 5, 1993**. Articles on any aspect of astronomy will be considered for publication. "Letters to the Editor" or to our resident expert: *G.AZER* are also most welcome. The editor can be reached at:

David Lane
4-26 Randall Avenue
Halifax, Nova Scotia
B3M 1E2
E-mail: dlane@husky1.stmarys.ca
CompuServe: 71601,247
Phone: (902) 443-5989 (home)
(902) 420-5633 (work)

My First Notes from the Chair	
- <i>Paul Gray</i>	8
Maple Grove Astronomy Club Report	
- <i>Robert MacConnell</i>	9
RASCAl Happenings	9
Ask <i>G.AZER</i>	9
Notice of Meetings	10
Halifax Planetarium Shows	10
Observing Sessions	10
1993 Halifax Centre Executive	10

Editor's Report

This issue marks the first issue of 1993 and the first to contain our new social column (alias - the gossip column) "RASCAl Happenings". I hope you enjoy it and remember to keep your ears open - we will always be looking for material to pass onto our Gossip Editor - *G.AZER*.

I would also like to bring to your attention the Centre's *Burke-Gaffney Award*. It is given for the best article published in a given calendar year of *Nova Notes* (assuming the judge's minimum standards are met). So, get out your pen (or word processor) and write that award winning article! Ω

President's Report: by Patrick Kelly

I hope that all of you have enjoyed a pleasant holiday season and that you are eagerly looking forward to all that the new year has to offer.

Sales of the new RASC calendar have been quite good. We have already sold well over half of the shipment that we received and this is before the January meeting. For those

Inside This Issue...

Editor's Report	1
President's Report	1
Letter to the Editor	2
NSPAC Update	2
US Naval Observatory Requests	
Issues of the RASC Journal	
- <i>Roy Bishop</i>	3
The 1993 Quadrantid Meteor Shower	
- <i>Paul Gray and Dave Lane</i>	3
Constellation of the Month: Orion	
- <i>Joe Yurchesyn</i>	4
The Boars Back Lunar Eclipse	
Gathering '92	
- <i>Larry Coldwell</i>	8



Nova Notes is printed on recycled paper



"Astrophoto of the Month"

M8 and M20

Blair MacDonald took this 20 minute exposure of the Lagoon (M8) and Trifid (M20) Nebulae with his 8" f/4 Meade Schmidt-Newtonian telescope. The film used was Ektar 1000. This reproduction does not by any means show the nebulosity visible in the original print.

of you who have not yet gotten one, you had better act quickly before they are all gone. See the advertisement on page 3.

The Centre has established a new award called the *Publication Award*. The basic purpose of this award is to recognize the contribution to professional astronomy by amateur members of the Centre and to help defray some of the costs of either page charges or reprint charges incurred in publication. The first member to receive this award is Mary Lou Whitehorne, who had an article on Be stars published in a recent issue of the *Journal*. The financial part of the award was used to defray the costs of having reprints of the article produced.

Our new observing chairman, Paul Gray, has done it again! This year he was able to convince FIVE other members, to observe the Quadrantid meteor shower (*Editor's Note: see the article on page 3*). We met at Paul's house (in time to watch Star Trek!) and went over the way that we were going to handle the observations. Paul had done his homework well as he had forms that the recorder would be filling out for each fifteen minute period as well as a rotation schedule of who would be looking in which direction and during which shift. We also had to go over the method that is used for determining the minimum visual magnitude, which consisted of counting the number of stars visible inside various geometrical shapes in the sky. Well, I guess I should stop here - I don't want to spoil your reading of Paul's article! Ω

Centre Thank You's

The Centre would like to thank the outgoing executive members (**Wes Howie**, **Brian Segal**, and **Walter Zukauskus**) for their service to the Centre. We also welcome the incoming: **Jason Adams** (Secretary), **Nat Cohen** (2nd VP), **Ian Anderson** (Treasurer), **Paul Gray** (Observing Chairman), and **Shawn Mitchell** (Librarian).

Special thanks are due to **Ralph Fraser**, our *Cookie and Coffee Chairman*. Its a thank-less job, but we really do appreciate your efforts, Ralph!

Scheduled Observing

Observing during the winter months is often difficult at both of our observing sites due to the lack of snow clearing and the freezing temperatures. But, the keeners do attempt to get out anyways if the temperature is not too cold. If the conditions look good, give us a call and join us!

For information call Paul Gray (864-2145) or Dave Lane (443-5989)

Letter to the Editor

Dear Editor:

It has been some time since I have attended a regular monthly meeting of the Halifax Chapter of the RASC. However, thanks to your bi-monthly publication of *Nova Notes*, I have maintained a rather distant but enjoyable connection with the Centre. I look forward to reading the publication from cover to cover. I am also thankful for receiving the journals and bulletins of the RASC and of course, the yearly, *Observer's Handbook*.

I became a member of the Halifax Centre in 1973, thanks to local telescope builder and astronomer, Dr. Roy Bishop. Roy encouraged me to complete my first telescope and introduced me to Dr. David Dupuis of Saint Mary's University who aluminized the mirror. The monthly meetings that I traveled to Halifax from Avonport with Roy Bishop, Sherman Williams, Larry Bogan, Lamont Larkin, and the late Dr. William Holden, will always be remembered. I was a high school student at the time and would have found these trips impossible. Many Thanks!!!

I have missed the meetings of the Halifax Centre and the friendships that were made. Names like; Diane and Randall Brooks, Mike and Peter Edwards, Walter Zukauskas, Dr. Murray Cunningham, Wilf Morley, Debra Burleson and many others will be remembered for their enthusiasm for astronomy.

I am very pleased to learn that Halifax will be hosting this year's General Assembly of the RASC. I

have set this date aside on my calendar and look forward to it with great anticipation.

Sincerely yours,

Larry Coldwell
Boars Back Observatory

NSPAC Update:
by David Lane

As most of you know, the *Nova Scotia Planetarium Advisory Committee* (NSPAC), an extension of a Halifax Centre committee, has the goal of realizing a major public planetarium for metro Halifax.

We have been meeting regularly for about a year with the initial goal of obtaining funding to conduct a feasibility study. So far, we have been unsuccessful at obtaining any government funding. But, with the generosity of the *Halifax Centre* membership, we have raised over \$3000 in private donations! Thanks very much!

Since last April we have been meeting with various government agencies attempting to obtain government funding. After we were given verbal indications from the *Atlantic Canada Opportunities Agency* (ACOA) that our application for 50% funding would be looked upon favourably. We applied formally and were turned down. The reasons were somewhat vague, but one reason given was that they would not fund a feasibility study for a project in which they could not fund the capital costs.

We then went to *Industry, Science, and Technology Canada* (ISTC) on ACOA's suggestion. No luck there, but they suggested the *Nova Scotia Department of Tourism*. They were no help - they sent us back to ACOA! In both cases, there seemed to be a fear of capital funding.

Our latest attempt has been an application for funding from the "Cooperation Agreement on Cultural Development" administered by the *Federal Department of Communications*. Our application was initially turned down because "our

project did not fit their mandate" because, they did not consider a planetarium facility a cultural entity, when museums are eligible. It turns out (thanks to John Hault's knowledge of the museum business) that the federal government classifies a planetarium as a museum. This was pointed out to them and they are re-considering our application.

There is some good news, however. We have obtained the much needed services of the Halifax law firm *Armsworthy Lynch*. Gary Armsworthy has joined our team and we are all grateful. He and his law firm have given the project a 5-7 year commitment to provide free legal services. Gary has also been able to enlist the accounting firm *Levy Casey MacLean*.

We are also investigating the possibility of changing our legal status to a "foundation". We have obtained a wealth of information from the Edmonton Space Sciences Foundation describing how they were formed. The main reason to go this route is to obtain charitable tax status with Revenue Canada so that we can issue tax receipts directly.

It is a long road to our final goal to have a planetarium built and operating, but we are making progress! Stay tuned for future developments. Finally, if you are interested in helping out in any way, please give Mary Lou Whitehome a call. Ω

1993 RASC National Calendars Still Available

This calendar contains a wealth of astronomical information with a Canadian slant. Sun and Moon rise and set times, Moon phases, meteor showers, and much more. It also contains great Canadian amateur astrophotographs - one for each month. The cost of this calendar is only \$6 if picked up at a meeting or \$7 by mail to the Centre address.

Order your copy today!

US Naval Observatory Requests Issues of the RASC Journal: by Roy Bishop

The Flagstaff, Arizona branch of the US Naval Observatory (where Pluto's satellite was discovered) is missing the following copies of the RASC Journal: August 1988, December 1988, and all six issues for 1989. If anyone has extra copies or copies that they are willing to part with, bring them to a meeting of the Halifax Centre and give them to me. (If I am not present, place them in the Centre Library and I will pick them up at the next meeting). The US Naval Observatory provides data for our *Observer's Handbook* each year. It would be nice to help them for a change. Ω

1993 Halifax GA Registration Packages Available

Registration packages for the 1993 General Assembly of the RASC sponsored by the Halifax Centre are now available. They can be picked up at any Centre meeting or requested individually by calling Mary Lou Whitehome (865-0235) or David Lane (443-5989) or by writing to:

1993 RASC GA
c/o David Lane
4-26 Randall Avenue
Halifax, Nova Scotia
B3M 1E2

The organizing committee would like to know as soon as possible how many Halifax Centre members will be attending and if you will be staying in the university residence.

The 1993 Quadrantid Meteor Shower: by Paul Gray and Dave Lane

A group of five observers from the Halifax Centre of the RASC gathered to observe the *Quadrantid Meteor Shower* on the evening of January 2. Observing conditions were perfect this year, except for the weather. The

Moon would set at about 2:30am and the peak of the shower was predicted to occur at sunrise when the radiant would be almost overhead from our northern east coast location.

In Nova Scotia, we have very few clear nights, especially in winter - after all being a peninsula, we are surrounded by water! An arctic high with its northwest winds blowing off the water were creating clouds and flurries during the day - this one did not look good. Also, the public weather service had issued a severe wind chill warning for the night.

In fact, the clouds remained until about 1am local time. Since we were already gathered for some pre-shower social activity, we decided to "Go for it!". Our Beaverbank observing site was the chosen location.

We arrived at the site and settled into our chairs to begin observations at 2:30 AST (Jan 3, 6:30 UT). The temperature was about -18°C with a 10 knot wind speed, which converts to a "wind chill" factor of about -35° C. About 45 minutes after the start, our only flashlight refused to work! We could no longer record our results to send in to the IMO! We memorized our counts for the next 15 minutes which was coincident almost perfectly with loss of feeling in some of our observer's feet! We followed the guidelines in Alan MacRobert's article in the February *Sky and Telescope* on winter observing, but there are limits and we were forced to "pack it in".

Over all, the shower did perform very well, even though our limiting magnitude was not good due to some high haze or ice crystals. The five observers: Jason Adams, Paul Gray, Pat Kelly, Dave Lane, and Shawn Mitchell recorded a total of 93 meteors of which 73 were Quadrantids. When corrected for the limiting magnitude of each observer, and the position of the radiant, the Zenithal Hourly Rate (ZHR) ranged from 70 to 130 meteors for a single observer under ideal conditions. This compares favourably with the predicted maximum of 95 per hour printed in the *1993 Observer's Handbook*.

This shower is known to have a peak of very short duration, so if we

had survived until dawn, it could have been quite a show. (Editor's Note: This article was forwarded as an observing report to *Sky and Telescope* magazine and the official results were forwarded to the IMO) Ω

Constellation of the Month: Orion

by Joe Yurchesyn

The Great Hunter or Celestial Warrior *Orion*, most brilliant of the constellations, is visible from every inhabited part of the Earth. The constellation was *Caomai*, the "Armed King", to the early Irish, *Orwandil* to the Norsemen, and *Ebuorung* to the ancient Saxon tribes. Ovid and Hyginus refer to it as *Urion*, suggesting that the mighty hunter was also regarded as some sort of star-god. A very popular Arabian name for Orion was *Al Babadur*, "The Strong One", but is better known by the Arabian name *Al Jabbar*, "The Giant", obviously derived from the older Syriac *Gabbar* and the Jewish *Gibbor*. Orion, under the name *Sahu*, was one of the most important sky figures to the ancient Egyptians. He was regarded as the incarnation (or soul) of the great god of the after world, *Osiris*. References to Orion occur in the famous *Book of the Dead*, which dates back to the very earliest period of Egyptian history. In a late version, the *Papyrus of Ani* which is at least 3,000 years old, the scribe Ani is promised entrance to the heavenly regions and to become one with *Sahu*.

As with Hercules, Orion has been associated with great national heroes, warriors, or demigods in virtually all ancient cultures. The origin of the name Orion is obscure, with possible connections to the Greek *Arion*, or more likely the Greek word: *Ὠρπιων* which simply means "warrior", it being referred to as *Oarion*. Its origin may be related to the Akkadian *Ura-Anna*, the "Light of Heaven", although the name is also used in early Babylonian writings in reference to the Sun-god.

In contrast to Hercules, who has a very definite personality and is

credited with a detailed series of exploits, Orion appears to be a vague and shadowy figure. In Greek mythology, Orion, a son of Neptune, was simply a great and powerful hunter; possibly with a boastful disposition, as he may have claimed dominion over all living creatures. Homer refers to him as, "*The tallest and most handsome of men.*" Orion is the giant who pursued the Pleiades, particularly Merope, and who was consequently blinded by the angry *Oenopion*, King of Chois. However, on the advise of Vulcan, Orion climbed the great mountain on or near the island of Lemnos, where his sight was restored by facing the rising sun. The Greek historian Diordorus, writing in the days of Julius Caesar, tells that Orion was credited with building the great harbour dam at Messana, and the Promontory of Pelorum in Sicily. After instigation of her brother Apollo, Orion was unintentionally slain by an arrow from the bow of Diana, the divine huntress, whom he had come to love. In another version of the story, Orion was killed by the sting of the deadly scorpion, sent by Juno to punish him for his arrogant pride. Nevertheless, he was honoured by a place in the heavens, with the scorpion placed in the exact opposite part of the sky, so that it could never threaten him again.

In classical times, Orion was associated with stormy wintry weather, a tradition also mentioned in Babylonian myths and in still older Hindu legend. Polybius, in the 2nd century BC, attributes the destruction of the Roman squadron during the First Punic War to the fact that the fleet unwisely sailed with the rising of Orion. Virgil, Pliny, and Horace all speak of Orion with adjectives that may be best translated as "The Bringer of the Clouds", the "Stormy One", or "He Who Brings Peril to the Seas". [See *Burnham's Celestial Handbook, Vol. #2* for more detailed references to Orion in antiquity, English literature, and the Bible.]

Orion is a large generally rectangular constellation outlined by stars brighter than 3rd magnitude. It immediately jumps out of the winter

sky, and as such is the ideal starting point for getting one's bearings during winter twilight or for learning the winter constellations, particularly after a budding young amateur astronomer receives his/her first observational astronomy book as a Yuletide present.

Orion straddles the celestial equator, lying just west of the winter Milky Way, and southeast of Aldebaran and the Hyades. To the west lies the faint constellations Eridanus and Cetus. The constellation Gemini lies across the Milky Way to the northeast, and Monoceros straddles the Milky Way due west. The belt stars point the way southeast to Sirius in Canis Major, the brightest star in the sky. All of the bright stars have interesting individual features and variable stars abound. Although some galaxies are near Orion's borders, none brighter than 13th magnitude are to be found in Orion. The proximity of the Milky Way means that Orion is rich in galactic clusters (NGC-2194) and nebulae (NGC-2023 & 2068 (M78), IC-434 and B33 (Horsehead)), but by far, the most dominant deep sky object is the Orion Nebula (M42 & M43). Of some 22 star clusters, the best offerings are NGC-2194, NGC-2186, and NGC-2112.

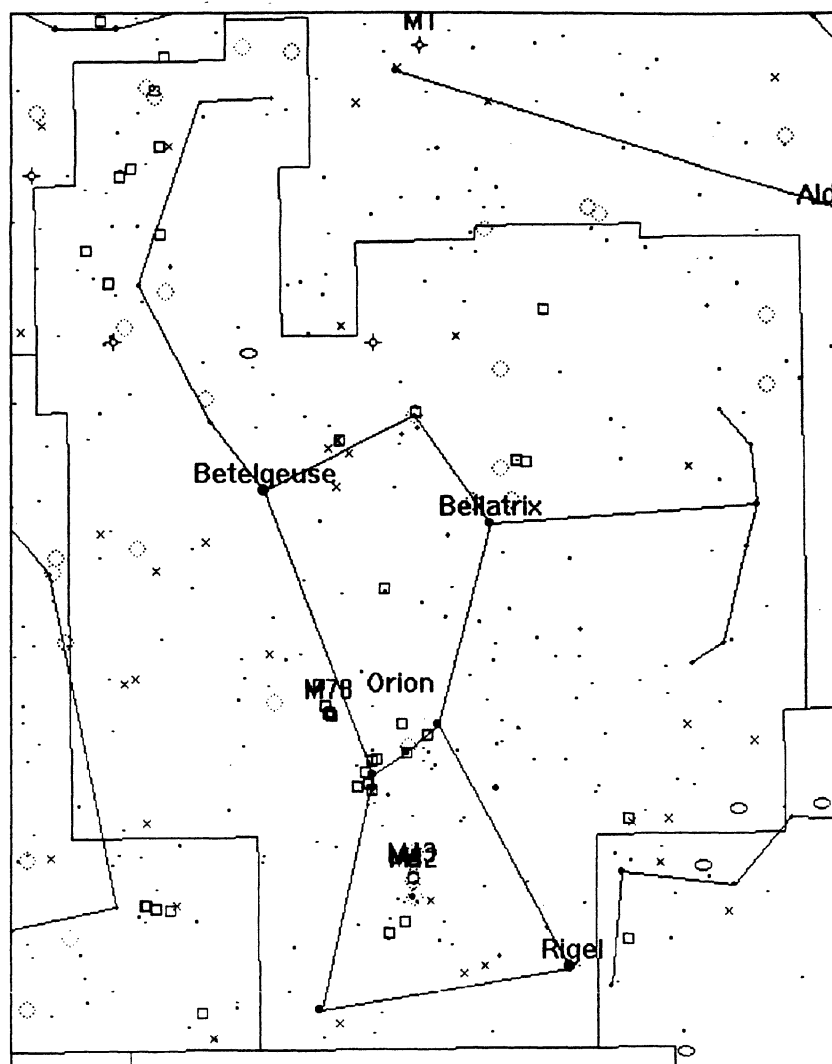
Alpha Orionis, also named Betelgeuse or Betelgeux, marks Orion's right shoulder. The name is from the Arabic *Beit Algueze* or *Bed Elgueze*, which are very corrupted forms of *Ibt al Jauzah* or *Yad al Jawza*, usually translated "The Armpit of the Giant" or "Arm of the Central One". It is believed that this name did not originally refer to a giant, but was a term for a sheep marked with a central spot or belt. Therefore, a fair translation might be "The Front Leg of the White-belted Sheep". Unfortunately the connection to sheep lacks heroic grandeur. Other Arabic names include *Al Mankib*, "The Shoulder", *Al Dhira*, the "Arm", and *Al Yad al Yamna*, "The Right Hand". It has also been called "The Martial Star", in reference to its ruddy colour, although it is really more orange than red. The exotic word *padparadaschad*, meaning "The Royal Jewel of the Lotus Blossom" and used

in India to designate the rare orange sapphire, might be a more appropriate name.

Betelgeuse, a type M supergiant (i.e. red-giant) star, is the 11th brightest star in the sky. With a surface temperature of 3,100°K, only about 13% of its emitted radiant energy is in the form of visible light, not unlike an incandescent lamp. The apparent radiometric magnitude is about -2.8, the largest known for any star. If our eyes were sensitive to all wavelengths, it would be the brightest star in the sky. It is the only first magnitude star that is obviously variable, the light variations probably first being noticed by Sir John Herschel in 1836. The main period appears to be about 5.7 years, superimposed over a smaller amplitude shorter period varying between 150 and 300 days. At maximum, the star's luminosity rises to 14,000 suns and it may reach magnitude 0.4, rivalling Rigel and Capella. It may have reached 0.2 in 1933 and again in 1942. At minimum, its luminosity is about 7,600 suns, and it may drop below magnitude 1.2, a maximum change in light intensity of two times.

Betelgeuse is also one of the largest stars known. On December 13, 1920, it was the first star to actually have its diameter measured (0.044") using a beam interferometer mounted on the 100" Hooker telescope at Mt. Wilson. Its angular size varies between 0.034" and 0.054", and an estimated distance of 520 ly's implies a diameter ranging between 480 and 800 million miles, or 550 to 920 times the size of the sun. This change is from a size equal to the Jovian orbit to a size equal to the Martian orbit. Betelgeuse is one of the few stars whose disk is theoretically resolvable in large modern reflectors. Some actual detail on the disc of Betelgeuse has been revealed. Mottling of the disc and large dusky areas may represent areas of different temperature and light intensity, comparable to flares and dark spots seen on the sun.

In volume, Betelgeuse exceeds that of the sun by a factor of at least 160 million. With a mass of probably no more than 20 suns, the average density



ranges between 0.0000002 and 0.0000009 times the average density of the sun. Such star material is less than one ten-thousandth the density of sea level air, and is often called a "red-hot vacuum".

The left knee of Orion is marked by Beta Orionis, also named Rigel, from the Arabic *Rijl Jauzah al Yusra*, the "Left Leg of the Giant". At magnitude 0.14, and despite its "Beta" designation, Rigel is the brightest star in Orion and the 7th brightest star in the sky. Its parallax is too small to be accurately measured, and it is generally accepted to be about 900 ly's distant. Rigel is a true supergiant, a white-hot star with a 12,000°K surface temperature, and a luminosity of 57,000 suns. This equates to a star 50 solar diameters (orbit of Venus) in size and mass of about 50 suns. It is one of the most luminous stars in the galaxy, and if it were as near to us as Sirius, it would be apparent magnitude -10!

With a 6" telescope, a small bluish companion star (mag. 6.7) can be seen 9" distant at PA 202°. The pair have showed virtually no change since their discovery in 1831, but the pair is thought to be physical (separation not less than 2,600 AU) since they have very similar radial velocities.

The right knee of Orion is marked by Kappa Orionis. It is a B-type star shining with a luminosity of 50,000 suns, rivalling Rigel, and at 2,100 ly's, it is more distant than the other bright Orion stars.

To the west of Betelgeuse, and marking the left shoulder of Orion, is Gamma Orionis, called Bellatrix, the "Amazon Star". It is a B-type star 470 ly's distant with a luminosity of 4,000 sun that is surrounded by diffuse nebulosity. This is merely an illuminated portion of the general nebulous haze which envelops much of Orion, and which becomes visible near highly luminous stars.



Nova East '92 - A popular summer activity sponsored by the Halifax Centre

Marking the head of Orion, is Lambda, lying some 1,800 ly's distant. It is an elegant double star, with both members being type O and separated 4.4" (2,400 AU). Both should appear white, but yellow & purple, yellow & red, white & violet, and white & white have been reported. Lambda Orionis forms a small $\frac{1}{2}^\circ$ triangle with the two fourth magnitude stars to the south, Phi-1 and Phi-2.

The three belt stars are type B or O, about 1,500 ly's distant, and have luminosities ranging from 20,000 to 40,000 suns. The three stars are (from west to east) Delta, Epsilon and Zeta. Delta is named Mintaka, from *Al Mintakah*, the "Belt". It has a magnitude 6.7 companion 52.8" to the north, implying an actual separation of 27,000 AU, nearly $\frac{1}{2}$ ly. Delta was the first star (Potsdam Observatory, 1904) discovered to show stationary spectral lines (of calcium), and thus prove the existence of interstellar matter. Epsilon is named Alnilam, "A Belt of Pearls", and is surrounded by the faint formless nebulosity NGC-1990, another portion of the great nebulous haze similar to what surrounds Gamma. Zeta is named Alnitak from *Al Nitak*, "The Girdle". Zeta is a difficult triple star, and also lies in a remarkable field of bright nebulosity which it excites to the point of luminosity. About 15' east is NGC-2024, a bright glowing mass split by a wide dark lane, and with intricate

interior detail. Directly south of the star, a faint reef nebulosity, IC-434, runs southward for over a degree. It is sharply bordered on the east and fades into a diffuse luminous haze toward the west. Along the eastern edge and midway along at a probable distance of about 1,200 ly's, lies the great dark mass of the Horsehead Nebula (B33) - probably the most famous of the dark nebulae. [See *Burnham's Celestial Handbook, Vol. #2 or Deep Sky #9 Winter 1984 or S&T Sept. 1987 for a more detailed discussion on the Horsehead Nebula.*] Located 2.3° northeast of Zeta is M78 (NGC-2068). Discovered in 1780 by P. Mechain, it appears as two stars veiled in nebulosity.

The end of Orion's sword is marked by Iota Orionis, known to the Arabs as *Na'ir al Saif*, the "Bright One of the Sword". An O-type star, some 2,000 ly's distant, Iota shines with a luminosity of 20,000 suns. It is a triple star, with a magnitude 6.9 companion 11" distant, and a magnitude 11 companion 50" distant.

From the above discussion, it is obvious that all of the bright stars of the constellation are either B or O type and very large and luminous. This region of the sky, called the *Orion Association*, is remarkable for the abundance of B-type stars, which includes most of the prominent stars that make up the familiar figure of Orion, and the vast clouds of bright

and dark nebulosity which surround them. The Association has at its heart the Great Orion Nebula with its knot of giant stars. These stars must be young, since at the present rate of energy consumption, they can only live a few million years. The presence of many T-Tauri type variable stars is more convincing evidence for the extreme youth of the region. The Orion Association is an area where star birth must presently be in progress.

The Orion nebula (M42/43, NGC-1972/82 & 1973/75/77) is generally considered to be the finest example of a diffuse nebula in the sky, and one of the most wondrously beautiful objects in the sky. For the amateur, there is no other object so perfectly suited for observation by low power wide angle telescopes. A dramatic way to appreciate the nebula is to set the telescope ahead of the nebula, and let it drift slowly across the field. This way, the nebulosity can be traced out far beyond the usual limits.

Although indistinctly visible to the naked eye under the best conditions, it is not mentioned in any known ancient or medieval records. Strangely, it was also missed by Galileo who paid great attention to Orion. Discovery is credited to Nicholas Peiresc in 1611. (Also said to have verified by experiment Harvey's discovery of the circulation of the blood.) The next recorded observation is by Cysatus, a

Astro-Ads

Celestron 50mm Finder with mounting bracket. Asking \$45.
 60mm Pentax Refractor. 700mm focal length. Alt-azimuth mount with wooden tripod, slow motion controls, finder-scope, 25mm and 12.5mm Kellner 0.965" eyepieces, 6mm Orthoscopic eyepiece. Asking \$150 (over \$400 when new). For both items call Daryl Dewolfe - 542-2357
(Astro-Ads is a free service to Centre members. Non-members are asked to make a small donation to the Centre)

Swiss Jesuit, who used it as a comparative referencé for a comet visible at the time. In 1656, Christian Huyghens published the first drawing and description, calling attention to the multiplicity of the bright star Theta. Observations of such objects became a life-long study for William Herschel after he was amazed by the view of the nebula through a reflecting telescope of his own construction in 1774. The nebula was also the first to be successfully photographed by Henry Draper in 1880, with an 11" refractor and a 51 minute exposure.

The Orion nebula is a vast cloud of glowing gases, with an immensity beyond comprehension, and physical conditions almost unimaginable. Although it is among the nearest of this type of object, its exact distance is uncertain but generally accepted to be between 1,600 and 1,900 ly's. If this distance is correct, the nebula, as it appears in typical photographs, is about 30 ly's across and the central region is 5-6 ly's across. The best photographs reveal that the nebula extends out to cover almost the entire constellation of Orion, and although the density of the material is less than a millionth the density of the best laboratory vacuum, the total mass is about 10,000 suns. In the early days of spectroscopy, unidentified lines were first ascribed to a hypothetical element called *nebulium*, but were eventually associated with common elements when excited under very rarefied conditions. These lines are chiefly greenish (4959 and 5007 Å) and due to doubly ionized oxygen. These, so called forbidden, emissions give the nebula the greenish hue sometimes seen in larger amateur telescopes. The other fainter hues, known to be present from photographs, are too faint to be detected visually. The calculated

composition of a cubic foot of the nebula is as follows:

Element	Atoms/ft ³
Hydrogen	25,000,000
Helium	2,500,000
Carbon	15,000
Oxygen	6,250
Nitrogen	5,000
Sulphur	900
Neon	250
Chlorine	50
Argon	38
Fluorine	3

The Orion Nebula is the brightest feature of a chain of objects called the "Sword of Orion". Half a degree north, is 42 Orionis, surrounded by the nebulosity NGC-1977 and adjacent to NGC-1973,75. It is fainter than M42,43 and shows little detail in small instruments. Another ½° north is a scattering of 8th and 10th magnitude stars designated NGC-1981. Half a degree south of the nebula is the triple star Iota, and in the heart of the nebula is the quadruple star Theta Orionis.

Theta is probably the best known multiple star. The four brightest components form a quadrangle called the *Trapezium*. The four stars are designated A, B, C, & D in order of RA. Star C, being the brightest at mag. 5.4, is the true primary of the group, followed by D (6.3), A (6.8), B (8.0). Both stars A and B are eclipsing binaries. Stars E and F, both 11th magnitude were identified in 1826 and 1830, and stars designated as G and H, both 16th magnitude, were discovered in 1888 with the 36" Lick refractor. The E and F stars are visible today in a 6" telescope, but were missed by William Herschel with his giant telescope. Perhaps these stars have brightened?

The Trapezium is the bright core of a compact cluster of faint stars which

may form an expanding association. Within 5' of the Trapezium are more than 300 stars brighter than 17th magnitude. Based on the expansion rate and a H-R plot, the cluster may be no older than 300,000 years, making it one of the youngest clusters known. Some of the fainter stars have not yet reached the main sequence and may still be contracting gravitationally. Photographic plates taken in 1947 and 1954 show conspicuous progressive changes in some of the small nebulous knots. A number of extremely red stars have also been discovered, and it would appear that the colour is due to 5 to 10 magnitudes of visual absorption.

The general visual appearance of the nebula gives an impression of chaotic turbulence, and this has been verified by radial velocity measurements. In addition, the central region appears to be expanding, caused by the radiation pressure of the Trapezium cluster. One model which matches best with measurement implies an age of 23,000 years since the Trapezium stars began to radiate. Such an active region might show an abnormal frequency of supernovae, but no outbursts have been recorded in the 3½ centuries the nebula has been under observation. However, one probable supernova remnant is Barnard's Loop, similar to the Veil nebula in Cygnus, a partial arc 5° in radius to the east of and encircling the stars of the belt and sword. The western half is made up of scattered patches, including the "Witch Head Nebula" (IC-2118) in Eridanus, which may be illuminated by Rigel, 2½° away. In addition three O and B type stars, AE Aurigae, 53 Arietis, and Mu Columbae show high velocity outward from the Orion nebula. These stars appear to have been expelled about 2-5 million years ago for unknown, perhaps supernovae related, reasons.

The possible presence of a "black hole" in the Orion Complex remains speculative. An unconfirmed X-ray source (2U0525-06) does lie close to Theta-2 Orionis, 135" from and the closest bright star to the Trapezium. Theta-2 is known to be a spectroscopic binary, and if the X-ray source is

actually the companion to Theta-2, the system may bear a close resemblance to the fairly convincing black hole candidate Cygnus X-1.

Just a little something to ponder, when you next gaze in the direction of Orion. Now!... I wonder what the Orion Nebula looks like from the other side? (Next issue will report on the constellation Leo) Ω

The Boars Back Lunar Eclipse Gathering '92:

by Larry Coldwell
Boars Back Observatory
Harmony, N.S.

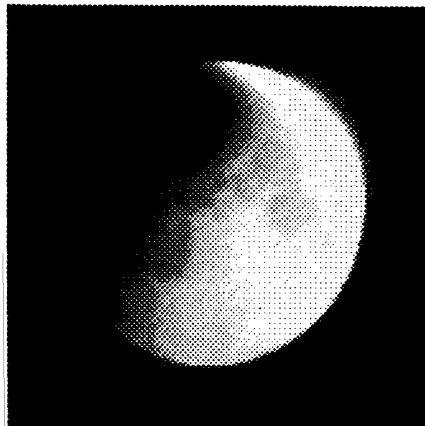
It was a clear, cold night (-9° Celsius) atop the South Mountain in Harmony, Kings County, N.S. Five members of the West Kings High School "Outsider's Club", sat on the living room floor eating supper while watching Richard Zurawski's weather forecast and the lunar eclipse coverage. We were excited about the eclipse, bit in no hurry to get outside for two reasons; firstly the telescopes which had been inside and needed to acclimatize to the outside temperature and secondly, the moon was not yet above the trees to the east of the Coldwell's residence. Besides, changing stored solar energy in food to usable body heat was necessary to brave the cold night.

At 5:45pm we went outside to see that the lower left limb of the moon was darkened. The moon had also lost most of its yellow-orange glow as seen during early moonrise.

Two warm-up exercises were planned to keep observers occupied and moving during the eclipse. Firstly, a campfire needed human support or vice versa to produce warmth. Secondly, the telescopes needed a workout before focusing them on the blinding Moon. We looked at Venus, noting its phase, Saturn and its inspiring rings. However, it was the binoculars which proved to be the big hit. They produced an apparent 3-D effect to the observer, giving a most spectacular look at the Moon.

As we looked north and down across the Annapolis Valley towards

Greenwood, it was clear that most of its residences would not see the eclipse. Snow flurries were blowing off the bay, and could be seen reflecting in the sky above the amber glow of street lights. The sight reminded me of the glow often seen above Halifax as one approaches the city from the darkened countryside.



The December 9, 1992 Lunar Eclipse
by Dave Lane

Shortly after 7:00pm we huddled around the fire to count the seconds to totality. It was like a space launch, the disappearance of the last reflected solar rays took longer than anticipated, so we had to recount several times. The speed of the Earth, the Sun, and the Moon all being relative, we surmised that it should take longer because the sunlight traveled an extra 800,000km. (from the Sun, past the Earth to the Moon, and back to Earth). More than likely it was just us getting cold. At one point we stopped counting to hear the familiar sound of Canada Geese as they flew across us from the northeast. Coincidentally, Sherman Williams in Avonport reported on the CBC the next day that he had also heard a flock of geese fly over at totality (What is the chance, that it could be the same flock?). When totality finally arrived the breeze picked up from the northeast. Was it the fast moving geese stirring up the wind (*ridiculous*), the loss of reflected sunlight heat from the moon (*even more ridiculous*). We finally decided that being human, we associate light with heat. No moonlight, no heat, who cares when you are cold and getting colder.

For most of the observers this was their first time studying an eclipse. For me, this was the darkest eclipse that I had ever seen. There was very little colour, unlike the copper-orange coloured Moon I had seen in the past during other eclipses. Nevertheless, it was interesting to see the Moon suspended in front of a curtain of stars. The image reminded me of stereo images produced by my *View Master* that I had as a child. During totality we looked at Andromeda, star clusters, nebulae and constellations; objects not normally viewed during a full moon.

As the Moon began to emerge from the Earth's shadow, we decided to avoid frost bite and head to our respective homes. It was a night to remember. Ω

My First Notes from the Chair: by Paul Gray

Now that I have officially taken over as Observing Chairman, I felt that I should keep up the tradition of writing a few words for *Nova Notes*. I hope with the editor's permission, that this will become a standard column in our great newsletter (*Editors Note: Flattery will get you everywhere!*). The topics will vary, but will all be related to observing in general. If there is anything you would like to have mentioned or written about, just call me, or see me at a meeting.

After thinking about what I could write about for my first article. I decided that I would use this chance to introduce myself to those of you who may not know me. To start with, I am a 20 year old SMU student which probably makes me the youngest observing chairman that the Centre has had. I have been an amateur astronomer for five years now and have been an active observer for most of that time. I started with a 60mm refractor which was eventually replaced by a 4" f/4 rich-field refractor. I pushed this little scope to the limit, but it has since become the "finder" for my recently completed 13.1" Dobsonian.

Over the past five years, I have made as many observations as the

Nova Scotia weather would allow me. I have done everything from variable star estimates in my backyard to general observing at Beaverbank and Nova East. I have observed the nine planets in one night with a fellow member and once joined a group for a Messier Marathon in Digby. My field of specialty would have to be meteors. In 1992, a couple of fellow members and myself observed the Quadrantids and had our results published in the IMO's newsletter (*Editors Note: see the article in the January/February 1992 Nova Notes*).

By looking at many of the other Centres who have observatories of some sort or another, I can't help but see how important observing is to them. I hope that over the next year that my young blood and my interest in observing along with a revised "Gawker's List", will encourage more of us to get out and enjoy the night sky. Till next time, clear skies - *Quo Ducit Urania!* Ω

Maple Grove Astronomy Club Report
by Robert MacConnell,
Teacher-Advisor

The Maple Grove Astronomy Club in Hebron, Yarmouth County is off to a great start this year with over 10 active members, plus parents and local adult enthusiasts, one with a new 10" Meade computer-driven telescope.

In September, we visited the space barn museum of retired NASA Space Scientist Harry Taylor. All who attended were amazed at the sophistication of the display and talk.

We have had several fall observing sessions. Those members who correctly identify 10 constellations w/o maps will have loan of the club's homemade 10" Dobsonian Reflector. The first looks at Saturn were awe-inspiring.

On December 9th, we held a lunar eclipse pizza party, with all members, parents and friends attending. The club's B & L 8000 plus our 10" reflector helped viewers to see the spectacle of the year. Ω

RASCAL Happenings
by Gazer

Well, for gosh sake, I finally get to put some words to paper in *Nova Notes* and our editor had the audacity to put me on page 9! But, I guess since everyone reads *Nova Notes* from cover to cover, I suppose it doesn't matter.

Word has reached my desk that the prominent Maine astrophotographer (who frequents *Nova East* and is a member of our Centre) is reported to be travelling this month to the *Winter Star Party* in Florida. Insiders say that the reason he is going south is to avoid his Byers telescope mount from freezing up in the Maine winter weather! Your editor is reported to be going down also, to ensure that all the *Nova East* astrophotography rules are strictly adhered to!

Meanwhile, back home one of our MacIntosh computer proponents was attempting to plot the position of Mars during the current apparation using the popular *Voyager* program. After admitting defeat, his associate pointed out that the year was 1992, not 0092!

We also have a celebrity among us. One of our members has apparently had a real (no kidding!) dinosaur named after him, specifically *Peratodactylopus Bishopii*.

Most members are aware that there has been discussion of late about the future of the society's *Journal*. In the middle of a discussion on the subject, one of the strong *Journal* supporters was reported to have said, "The *Journal* is supposed to be boring!"

At a recent executive meeting, turned observing session (not a difficult transition when the meeting place has a dome on the roof!) one of our "professional" members, who having just finished observing *Comet P/Swift-Tuttle* was asked was it look like and replied: "Well, it looks like a comet!" Fine observation indeed!

Well, that's all I have for now. Keep your ears open and drop me a line if you hear anything juicy! I will print just about anything! Ω

Ask GAZER by Gazer

Dear Gazer:

What the tarnation is all this hullabaloo about a comet goin' to smack into ol' Mother Earth in the year 2126??? I reckon I heard somewhere that comets 're called "Dusters" - no wait - that ain't right - "Broom Stars!" That's better; I knew it had somethin' t'do sweepin' away yer dirt! Also called "Hare Stars" ain't they? And the comet in question has the moniker "Swiftly Turtle", eh?

So is it a rabbit or a tortoise? If'n its gonna hit, its gotta be a few days late fer its periheel with the Sun, right? And we knows from the story of the tortoise and the hare, that the slow and steady feller won the race. So this here comet, this Swiftly-Turtle, if'n its name is anything t'go by, why, it ain't gonna be late; it'sa gonna be early! So, what's all the fussin' about?

Besides, if'n it does hit, it might'n't be such a bad thing after all - this Broom Star Comet'll make a clean sweep of the ol' planet that us'n been muckin' up pretty good lately.

Yers for the 135 year count, Josephine the Plumber

Dear Josephine:

Well, has anyone ever told you not to "believe everything you read!" This is an example where that old adage applies. Poor old Brian Marsden at the IAU Central Bureau briefly mentions the remote possibility of Comet Swift-Tuttle (not **Turtle!**) hitting the Earth the next time around and the media pounces on it. All I can say is it must have been a slow news week! Thank goodness our local media presented a realistic view with the correct players - not asteroid "Swift-Turtle" as the Associated Press was reporting!

Worst of all there were few reports that your "duster" could be observed in our sky! Finally, my recommendation is that you tune in to the local media and turn off CNN!

Till next issue. *Gazer*

Nova Notes Editor, Halifax Centre
 Royal Astronomical Society of Canada
 c/o 4-26 Randall Avenue
 Halifax, Nova Scotia
 B3M 1E2



National Office R.A.S.C.
136 Dupont St.
Toronto, Ontario
Canada
M5R 1V2

Notice of Meetings

Date: Regular Meeting - Friday, February 19th: 8:00pm;
 7:00pm for the executive meeting (all welcome).
Place: Lower Theatre, Nova Scotia Museum, Summer Street,
 Halifax. Access is from the museum parking lot.
Topic: "Meteor Showers and Meteor Observing" by Paul
 Gray, Observing Chairman.

Date: Regular Meeting - Friday, March 19th: 8:00pm;
 7:00pm for the executive meeting (all welcome).
Place: Lower Theatre, Nova Scotia Museum, Summer Street,
 Halifax. Access is from the museum parking lot.
Topic: "What is the RASC?" by Peter Broughton, the National
 RASC President. It is tradition in the RASC for the
 National President to visit as many Centres as possible
 during their two-year term of office. Peter has accepted
 our invitation and will be our March speaker.

Halifax Planetarium Shows

The Halifax Planetarium, located in the Dunn Building
 at Dalhousie University, provides public shows each week on
 Thursday evenings at 7pm. Upcoming show dates and
 topics are listed below. Contact the *Nova Scotia Museum* at
 424-7391 for details.

Date	Show Title
Feb 11	The Sky of the Month (Doug Pitcairn)
Feb 18	The Zodiac (Joe Yurchesyn)
Feb 25	Long Ago and Far Away (Pat Kelly)
Mar 4	Milky Way is not a Chocolate Bar! (M. L. Whitehome)
Mar 11	The Sky of the Month (Doug Pitcairn)
Mar 18	Long Ago and Far Away (Joe Yurchesyn)
Mar 25	The Seasons (Pat Kelly)
Apr 1	Island Universes (Mary Lou Whitehome)

Observing Sessions (see page 2)

1993 Halifax Centre Executive

Honorary President	Dr. Murray Cunningham	
President	Patrick Kelly	798-3329
1st Vice-President	John Connelly	679-1333
2nd Vice-President	Nat Cohen	434-3103
Secretary	Jason Adams	864-9783
Treasurer	Ian Anderson	679-1333
Nova Notes Editor	David Lane	443-5989
National Representative	Joe Yurchesyn	422-8030
Librarian	Shawn Mitchell	865-7026
Observing Chairman	Paul Gray	864-2145
Councillors	Dr. David Turner	435-2733
	Doug Pitcairn	463-7196
	Mary Lou Whitehome	865-0235