NOVA NOTES

VOLUME 26 — NUMBER 2 — APRIL 1995

THE NEWSLETTER OF THE HALIFAX CENTRE OF THE RASC
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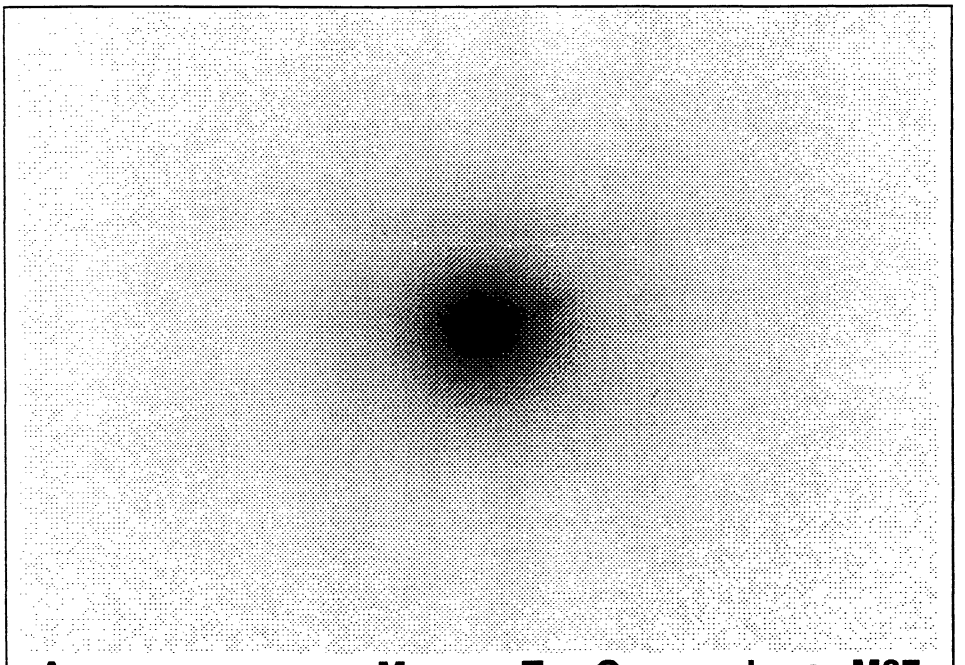
INSIDE THIS ISSUE...

PRESIDENT/EDITOR'S REPORT

I don't have much to report in this issue. I've been very busy the last month or so getting the latest version of my *Earth Centered Universe* program finished and "out-the-door".

However, the most notable item of Centre business is that Joe Yurchesyn and I completed the "re-submission" of our incorporation papers after our first submission "bounced". Among other things, we needed special permission to use "Royal" in our name and permission from the National Socirty allowing us to "exist" (??). There's no word yet on whether we were successful. Ω



ASTROPHOTO OF THE MONTH - THE OPTICAL JET OF M87

This CCD image, taken by Shawn Mitchell, Paul Gray, and David Lane, shows the "optical" jet which is just to the right of the nucleus of the giant elliptical galaxy M87, which is near the centre of the Virgo Galaxy cluster. Recording this feature was once considered very difficult, however, it was quite evident in only a 45 second image using the Saint Mary's 16" telescope. The ~3 arc-minute image above was the sum of five 45 second exposures.

ASTRONOMY CURES THE COMMON COLD:

by Daryl Dewolfe
(reprinted from the NCAC Coordinate)

Many people do not survive a Nova Scotian winter without a cold. I caught mine in mid January. After enduring seven days of misery during two weeks of constant cloud, I awoke from another miserable nights sleep at 5:00 am on Friday, January 27th. I habitually checked the weather conditions outside my south window. There, framed by cloud banks, was a window to beauty. Venus lay east of the northern limb of the crescent moon. I was awe struck by the sight. Venus shone like the purest pearl I'd ever seen. I felt compelled to share this experience with someone. Do I wake my wife and kids?? No, best to let sleeping dragons lie. Where could I find others to share this experience? Where else but at Tim Horton's.

Five minutes later I was at Tim's. I couldn't guess how I appeared to the small group of patrons and staff as a I barged in and ordered a coffee and proceeded to loudly harangue customers to come to the south store window to see our moon and a sister planet dancing in the heavens. Some sanity must have sounded in my voice because they gathered together and we watched this event for a few precious moments. After I left, I had to drive to the South Shore. As I glanced out my driver's side window, this magical pairing followed me through the dawning sky.

The radio played an old Beetles tune, "Well we danced through the night, And we held each other tight, And before too long, I fell in love with her."

I realized that during the entire experience I never sneezed once. Try it. No prescription necessary. Ω

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 **June 1, 1995**. Articles on any aspect of astronomy will be considered for publication. "Letters to the Editor" or to our resident expert: *GAZER* are also most welcome. Contact the editor at:

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MEETING REPORT: DECEMBER 94 by David Turner

The December 16th meeting of the Halifax Centre took place so long ago now that I may have trouble recollecting everything that took place, but here goes. The big news item for the meeting concerned the fact that Shawn Mitchell did not bring any T-shirts to sell — there must have been some sort of rare flu strain affecting him that day. As a result, some members actually left at the end of the evening with a few dollars left in their pockets. The executive meeting featured an interesting argument about the correct spelling for the name of the speaker for the January meeting. Is that George Stevens or George Stephens? Only his barber knows for certain, and he isn't saying much. Roy Bishop, a long-time colleague of George's, finally decided the issue in favour of the "v" spelling.

The regular meeting began in the usual fashion with Paul Gray doing his "What's up?" routine. Well, Mars, Saturn and Venus for sure, plus the January 3rd Quadrantid meteor shower (I'm sure that most of us would have been in shock if he had missed that one!), a supernova in Leo (is Paul psychic or what?), and a near-Earth asteroid flyby on December 9th that was probably responsible for my horrorscope being out of whack that day. Paul also gave a summary of the observing group's results for the Geminid meteor shower that provided a graphic illustration of the differences in visual acuity from one individual to another. Darren Talbot, with his "light-bucket" eyes, is clearly able to see much fainter objects than "braille-eyes" Pat Kelly, and, with Pat's dismal meteor sightings excluded (well, he wasn't looking in the right part of the sky anyway — right Pat?), the shower was found to have a corrected zenithal hourly rate of 250-300 meteors. Of course, no one actually observes meteors at the zenith, but that's another story.

Mr. Excitement himself, alias Dave Lane, then regained control of the meeting to mention a fireball sighting on November 29th that caught the interest of many observers throughout Nova Scotia and New Brunswick. Apparently Bob Hawkes at Mount Allison University received about 140 reports of the event, which likely tracked over Nova Scotia towards the Gulf of Maine. About a dozen people suspected that the meteor might have touched down "just behind their homes," but they will undoubtedly be disappointed by any searches they may make. By chance the fireball occurred at a time of the early evening (6:17 pm) when an electrical storm was also passing through some areas, so there was some confusion between bright flashes arising from lightning mixed in with the fireball reports.

The guest speaker for the evening was Heather Cameron, a grade 10 student from Horton District High School on North Mountain, who was speaking about her prize-winning Canada-Wide Science Fair project on her Solar Observation Station (SOS). She was ably introduced to the members by Roy Bishop. Heather gave a well-organized talk that was presented with the assistance of her father, who was in charge of the overhead transparencies. (He is welcome to assist me in my university lectures any time he wants!) To make a long story short, the talk described Heather's construction of a very low frequency (VLF) radio receiver to detect changes in the reflectivity of the Earth's ionospheric D-layer. Such changes could then be examined in order to disentangle from the signals the various effects of daytime solar ionization, thunderstorms, overhead TV disturbances, the household stove, lights, solar wind-induced geomagnetic effects, and solar storms. Heather went to a great deal of trouble to learn as much as she could about the distant radio station that she was monitoring. That turned out to be a Naval Station in Cutler, Maine, used for submarine communications. She found that the station went off the air every Monday evening for routine maintenance, and the naval personnel were apparently somewhat disturbed when Heather telephoned them to inquire about this.

Heather illustrated a number of interesting effects from her radio signal monitoring. These included detection of the aurora borealis, solar flares, coronal hole days that repeated roughly every 31 days (the Sun's synodic period of rotation at latitudes of 30° to 60°), and a miniature sunset effect that occurred during the May 10th solar eclipse. There were a number of other interesting results mentioned, but, hey, why should I tell you everything? If you missed the December meeting, you missed a very captivating talk by an intelligent young woman. For her troubles, which included answering a deluge of questions after the presentation, Heather was presented with a

complimentary membership in the Halifax Centre.

Sherman Williams did the Handbook Study that evening, appropriately enough on Solar Activity. Sherman demonstrated the sunspot number counts for the Sun and how they were related to the solar radio flux density at a wavelength of 10.7 cm. Say, I used to do this myself when I was a summer student at the Dominion Radio Astrophysical Observatory near Penticton. He then related the graphs plotted in the handbook to the current — synodic (monthly) and yearly — solar activity, with predictions for the future.

Coffee and doughnuts rounded out the evening for most of us. Ω

MEETING REPORT: MARCH 95 by Nat Cohen

Dear fellow members — two things pertaining to my Meeting Report of last month. Number 1: I was told to be brief, and I was.

In spite of the fact that Mary and myself wont to consult "Rosemary's House of Fortunes", and "Astrology Source" on our computer, in order to determine certain courses, I would never be so presumptuous to write of a meeting a year hence *(Editor's Note: It seems I identified his last meeting report as "February 1996").* Having cleared up those two points, let us come to our meeting of 17th March **1995**.

The first item of business must be to congratulate Dave, Paul, and Bev Werstiuk, for finding the Supernova. All of them are far too modest over this, maybe we should strike a medal for the occasion? The usual announcements by El Presidente, followed by Paul's observing report.

My own announcement for our annual dinner followed. The dinner is to be held at the Waverley Legion Hall, the cost will be $20. If your are planning to attend, please advise me at 434-3103, or fax if you wish at 435-0848. A message machine is in use when I'm out. I am hoping that we will have a really good turnout this year, the ladies at the Legion do an excellent job, and give really good value for money. It is a turkey dinner, but for those who so require, a vegetarian plate would be available.

Following my announcement we got down to the main event of the evening. Dr. Christopher J. Corbally, S. J. commenced his illustrated talk with a "set up" slide that particularly took my fancy. It was a logo of the Vatican Observatory with the title "Specula Vaticana" causing me to search my mind for the rough equivalent in an even older tongue than the Latin הראי הכבים סצפה which reads "The mirror for the stars looking". I like it! It has a nice ring about it, as did Dr. Corbally's very pleasant excursions from Rome, Castell Gandolpho, to Tucson, Arizona, and Mount Graham on which the Vatican have built a very high tech observatory. The photography alone was a joy, the discourse that accompanied the slides was undoubtedly the icing on the cake. Commencing with Pope Gregory's need to have the calendar conform more closely to the seasons. Of course, Pope Gregory was not the first priest to have to come to grips with that problem and were it not for the spiritual requirement, telling the time and developing the calendar might have been delayed much further in history.

Dr. Corbally took us through a brief history of the Vatican's interest in astronomy to the new telescope which being a "Gregorian" type naturally suggests a most apt title for his talk: "Vatican Astronomy: From Gregory to Gregorian Chance". We saw the workshops wherein the mirror was centrifugally cast, the construction of the building in progress, as well as a foretaste of the binocular telescope that will eventually be situated on the same mountain. Dr. Corbally enlivened his talk with a very charming dry humour in typical English fashion; he being from England this would be natural to him. After his talk and during the coffee break there was some anecdotal tale of objection by the local Apache tribe to placing the building on what they considered to be sacred ground, also a concern for the red squirrel, however both objections must have been satisfactorily solved, for the building now exists, along with two others.

After Dr. Corbally, our own Dr. Bishop gave another of his "Handbook Talks" and pointed out the utility of the star maps published in the Handbook, which to me made a lot of sense. He then advised us, that if we wished to see the last reasonably close eclipse of the Sun for the next twenty years, we should consider a trip to Monserrat where we would have the best viewing. The cost of this is by no means excessive and would be very tempting. In any case, Roy is making a preliminary trip to scout things out and will give us a report on his return.

The evening concluded with Mary Lou Whitehorne presenting the "Supernova Cake" unfortunately slightly marred by the fact that there was no camera to record such an auspicious event. Ah well, perfect timing eludes even astronomers! Ω

LET'S GET SIRIUS, EH?: by David Turner

"Hey, let's go over to Cyrus to play" is a phrase heard commonly in my neighbourhood during the summer months. The "Cyrus" referred to is Sirius Crescent, the next street over. With street names like Otago, Shalimar, Circassion, and Sirius, this small part of suburbia was clearly planned by someone with a taste for the exotic. It is too bad that they did not share their knowledge with the people who bought homes in the area. Very few appear to recognize the name for the brightest star in the sky (after the Sun) when they see it. For some reason they prefer to use the vernacular local pronunciation of "Cyrus" even if they are aware that Sirius "is some kind of star, isn't it?"

Well, yes, Sirius is indeed "some kind of star." In fact, it is one of the most remarkable stars visible in the

winter evening sky. For one thing, it is reasonably close as stars go, with a distance from the Sun estimated to be about 2.65 parsecs, or 8.62 light years. Sirius is about as far away in light years as the Sun is in light minutes. We know this from the trigonometric parallax of the star, namely half of the value of its apparent annual displacement in the sky due to the Earth's orbital motion about the Sun. That value is 0.378 arc-second, with an uncertainty of perhaps 1% or 2%.

In addition to its very small parallactic motion, Sirius, owing to its inherent motion with respect to our solar system, has a proper motion across the line of sight that amounts to 1.328 seconds of arc per year — an annual motion amounting to 0.07% of the Moon's average apparent diameter as viewed from Earth. It is probably well to consider the minuteness of such observed motions as well as the difficulties involved in their measurement. Small wonder that it has been only within the last 40 years or so that they have been determined with some precision. However, we should not infer that all our information on Sirius has been gathered only recently. One of the most important characteristics of the star was first noticed in 1834.

In that year the astronomer Bessel was busy comparing meridian circle observations of stars from various epochs in order to determine their proper motions when he noticed that the observed mean places derived for Sirius indicated a variable proper motion for the star. By 1844 he was able to deduce that this curious behavior was due to the orbital motion of Sirius about an unseen companion, and, in 1862 while astronomers were still debating the possibility of non-luminous stars, a companion was discovered by Alvan Clark only 10 arc-seconds from the primary.

The discovery of Sirius B, as we now call the companion, was of momentous importance to astronomy. As far as could be determined, the effective temperatures of Sirius A (the primary) and Sirius B (the secondary) were not radically different — they both appear white to the eye (in actual fact, B is a much hotter star) — and yet star A was obviously 10,000 times for luminous than B (their visual magnitudes are –1.46 and 8.48, respectively). It implies that star A must be about 100 times larger than star B, since brightness is proportional to surface area, which in turn varies as the square of a star's radius. With their masses being so similar — an orbit derived by van den Bos in 1960 lists values of 2.15 solar masses for A and 1.05 solar masses for B — one is immediately led to the fact that the density of B is on the order of a million times that of A!

Stars like Sirius B are commonly referred to as white dwarfs. In fact, Sirius B was the first of that class of objects to be detected. Such stars are characterized by extremely low luminosities and high densities, and are considered to be one of the final stages of stellar evolution in addition to black holes and neutron stars. All have masses on the order of or smaller than that of the Sun — typically about 0.6 solar mass. Because of their high mean densities — which are roughly 3000 times the density of lead — matter in their interiors exists in a degenerate state. They are believed to be created from stars with main-sequence masses of up to 8 solar masses (that would have been B-type stars while on the main sequence) which evolved to the red giant branch during their core hydrogen-burning stages, and through core helium-burning to the asymptotic giant branch (AGB). From this stage their further evolution would likely have been marked by prodigious mass loss through the development of a strong stellar wind, and the eventual loss of their entire outer layers as they evolved — as post-AGB objects — to become planetary nebulae. The former cores of such stars became the hot central stars of planetary nebulae, gradually cooling to become isolated white dwarfs. Their outer layers were lost into space, initially illuminated by radiation from the central stars as expanding shells of planetary nebulae, and later dissipating into the interstellar environment. This, then, describes the probable former stages of evolution for stars like Sirius B.

Aside from its obvious interest for theoretical astrophysics, Sirius B has attracted attention from everyday astronomers due to a rather controversial fact about the star Sirius itself, namely that, as recently as 300 years ago, Sirius was referred to as a red star by many authors. Since the bright primary in the system is a hot star of spectral type A1 V, while the companion is an even hotter DA-type white dwarf, both stars are clearly white objects when viewed in the sky. Yet could Sirius once have been a red star?

The answer to the question is a resounding yes. The only way to explain the current status of the two stars in the binary system is to suppose that originally Sirius B was the more massive star in the system, and, as described above, evolved to become a red giant and later a red asymptotic giant branch star. When the star eventually lost most of its outer layers to space through the onset of strong stellar winds and the blow-off of its envelope during planetary nebula formation, the progenitor to the present-day white dwarf was formed as the central star of a planetary nebula. The present primary, the A-type dwarf (main-sequence star) in the system, was presumably always about as massive as it is now, but may have accumulated a small amount of matter from its companion during the AGB and planetary nebula phases of evolution for that star. This is actually not pure speculation, since the atmosphere of the primary does exhibit a few features which suggest that the star has somehow managed to accumulate material during its lifetime. For one thing, the star is a weak metallic-line star (A1 Vm), which means that it is slightly rich in helium and heavy elements — both of which can be produced through hydrogen-burning and other thermonuclear reactions in stellar interiors. The star is also under abundant in the element beryllium

relative to stars like Vega and the Sun, by roughly a factor of 100. Beryllium, like lithium and boron, is an element that is destroyed during hydrogen-burning in the deep interiors of stars. The atmosphere of the current primary therefore shows indications of being contaminated by material thrown off a much more highly-evolved star — probably the present white dwarf in the system.

Based on such evidence, it is quite reasonable to conclude that Sirius once appeared as a red star, at that point in time when the present-day white dwarf companion dominated the light of the A-dwarf primary as it evolved through the red giant and AGB phases. However, could it have changed colour so drastically over a time span of only 300 to 3000 years? Well, no. The time scale for evolution from the AGB to a white dwarf is fairly long, perhaps as much as a million years or more. Unless, like the Big Dipper asterism — which had the appearance of the head of a Great Bear some 100,000 years ago — our collective conscientiousness is recalling details from some extremely distant point in the evolution of Homo Sapiens, there is no point in the history of mankind when we could have viewed Sirius as a "red" star.

The literature references to Sirius as a red star include records in ancient cuneiform tablets from Babylonia, the works of ancient Greek and Roman authors such as Ptolemy, Seneca, Cicero, and Flaccus, and a more current description from Voltaire's *Micromegas* that was pointed out several years ago by RASC President Doug Hube. The topic has been discussed at great length in the astronomical literature, with unconvincing results. It seems clear that the ancient writers were either mistaken or writing about some other star. Sirius can twinkle through all the colours of the rainbow on a clear winter night, but it never gives the appearance of being a white star. The most recent entry into the discussion is a paper by Xiao-Yuan Jiang that appeared in the Chinese journal Acta Astronomica Sinica in 1992. He carefully researched the records of six ancient Chinese scholars who lived during different periods between roughly the first or second century BC to the seventh century AD. In all cases he finds that Sirius is referred to as a red star. In fact, it was generally adopted as the standard for white stars by the ancient Chinese. The western writers must therefore have been mistaken in their descriptions, which must remain unexplained. Ω

CONSTELLATION OF THE MONTH: CEPHEUS

by Joseph Yurchesyn

Lying Northwest of Cassiopeia and Northeast of the brilliant Milky Way in Cygnus and extending nearly to the north celestial pole is Cepheus, the King, — a faint constellation that offers numerous clusters and nebulae.

The star Mu Cephei, often called "Herschel's Garnet Star", may well be the reddest star visible to the naked eye in the northern hemisphere, appearing distinctly deep orange or red to most observers. Mu Cephei varies between magnitudes 3.7 and 5.0 and is semi-regular with a period of about 755 days — with a 12.8 year period also suspected. In addition, Mu Cephei may also change colour as well as brightness.

The exact distance to the star is uncertain, but 800 to 1,200 ly's is suspected. It is a red giant star of the same class as Betelgeuse, but Mu may actually be more luminous than Betelgeuse — which would make it rank among the most luminous of all known red giant stars.

Just south of Mu Cephei is the largest object in the sky, a region of emission nebulosity (IC-1396) which covers nearly 6 square degrees of the sky. This nebula's light is so spread out that IC-1396 appears as little more than a brightening in the Milky Way.

Lying near the eastern border of the constellation and 3° WSW of M52 in Cassiopeia is the compact open cluster NGC-7510. It contains 60 stars brighter than 10th magnitude in an area 4' in diameter. A little over a degree to the SW is IC-1470, an emission nebula measuring 70" x 45", with a 12th magnitude star.

Lying in east central Cephei is the fine open cluster NGC-7762 and further north is the 11th magnitude planetary nebula NGC-40. It is 40" in diameter and sports a 12th magnitude central star.

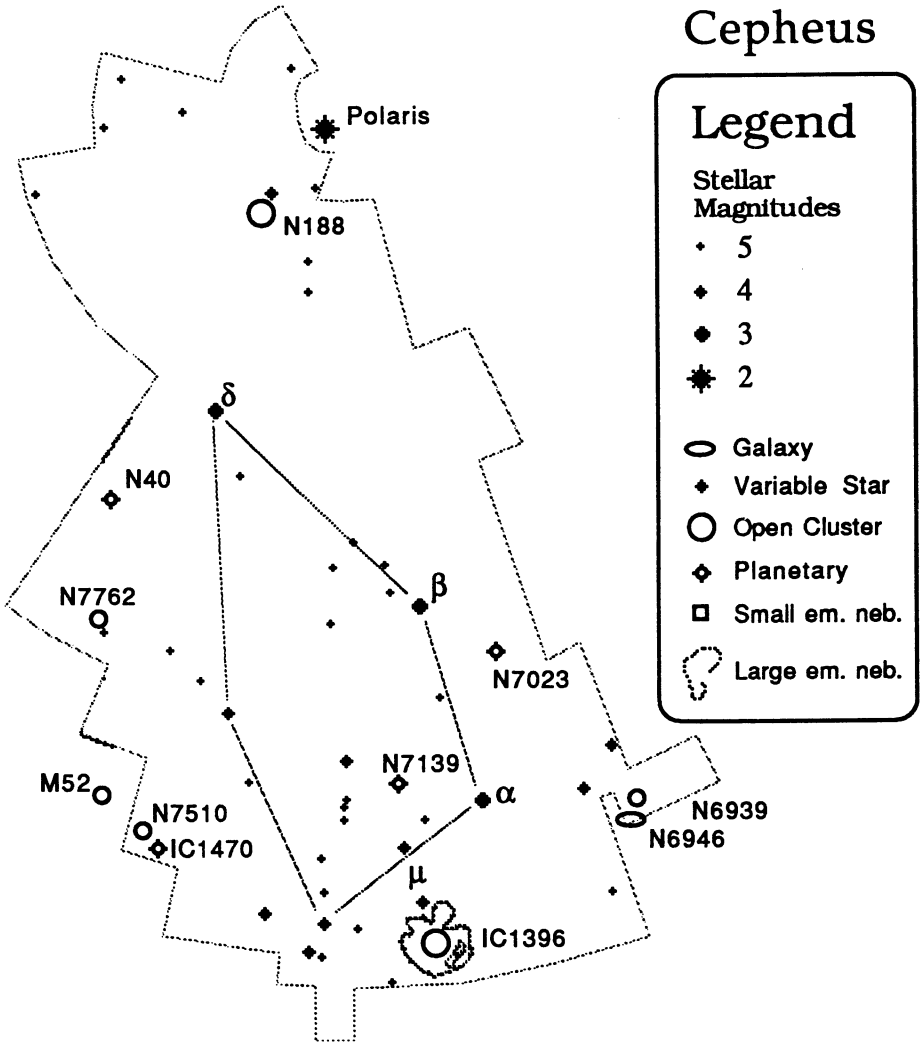
Way up near the celestial pole is the open cluster NGC-188, with 120 stars of magnitude 12 and fainter, packed into 14' and lying 5,000 ly's distant and 1,800 ly's above the galactic plane. NGC-188 is believed to be an amazing 5 billion years old - immensely old for an open cluster. Only NGC-6791 in Lyra and Melotte 66 in Puppis appear to be older. *(Editor's Note: I'm sure our resident Open Cluster "nut" won't let this go by!)*

In west central Cepheus is the reflection nebula NGC-7023. Powered by a 7th magnitude B5e type star, NGC-7023 is fairly large and diffuse, requiring at least a 6" telescope, even under dark skies.

To the SW of NGC-7023 and about 5° north of Mu, is a second planetary nebula, NGC-7139. Large and dim, this 1' diameter, 13th magnitude planetary is visible in a 12" telescope, but is devoid of a central star.

On the south-western border with Cygnus, lies an open cluster galaxy pair that are both visible in a low power field of view. NGC-6939 contains 80 stars brighter than 11th magnitude in 8' of space, making it a rich and stunning open cluster. Nearby is the galaxy NGC-6946, 16 million ly's distant. It is one of the nearest galaxies outside of the Local Group and appears face-on. Large amateur telescopes reveal a mottled haze around the core, suggesting patches of dark dust in the spiral arms.

The bright south-eastern star in the pentagon asterism is Delta Cephei, an unusual star and the prototypical Cepheid variable star — a class of variable stars that has contributed



enormously to our understanding of the universe. First noticed by John Goodricke in 1784, this supergiant star varies between magnitude 3.6 and 4.3 in about 5.4 days. Delta Cephei's light changes have been meticulously recorded for over 200 years.

This type of a variable star has an extremely regular period, some of which are known to a fraction of a second. The brightness changes are due to an expansion and contraction of the volume of the star. By measuring the distances to some cepheid variable stars (through a variety of methods) and then using their apparent brightness to calculating their actual brightness, astronomers discovered a definite relationship between the actual brightness of a cepheid variable and its period of oscillation. This period-luminosity relationship for cepheid variable stars has allowed astronomers to determine the actual brightness of very distant cepheids (for which no other direct means is possible) by simply determining their period of pulsation. The period reveals the actual brightness from the period-luminosity relationship and this compared to the apparent brightness (corrected for interstellar absorption) gives a good estimate of the actual distance to the star or the object in which the star is located.

Just a little something to ponder, when you next gaze at Cepheus. Now, I wonder... Just how far away can Cepheids be seen? Ω

MAY'S ASTEROID — (261) PRYMNO:

by Larry Bogan

Editor's Note: Because last issue's asteroid charts were outdated before Nova Notes was printed, Larry has kindly prepared more charts for another asteroid, this time for May.

Below are the orbital elements and other facts about Prymno. I have made three finder charts. The first is 10 degrees square showing its path from May 1 to June 1 between the iota and kappa in Virgo. The second is a detailed chart (2 degrees square) for the days near May 5. The third is another detailed one for days near May 25. On May 5 Prymno will be about 12.0 magnitude and by May 25 it will have dimmed to 12.5 magnitude. Prymno has had its light curve determined.

(443) Photographica is also on the latter charts. Its path is not shown but its location of May 5 and May 25 at 0h UT are shown. It is dimmer than Prymno, being at 12.8 on the 5th and 13.5 on the 25th.

(261) Prymno

Period of orbit	3.56 years
Perihelion distance	2.12 AU
Aphelion distance	2.54 AU
Orbital elements:	
Semimajor axis	2.3317337 AU
Eccentricity	0.0899530
Inclination of orbit	3.6342551 degrees
Argument of perihelion	65.8782156 degrees
Long. ascending node	96.8160950 degrees
Mean anomaly	50.3204811 degrees
Epoch of elements	JD 2449850.5 (13/05/95 0h UT)
Discovery date	1886 Oct 31
Discoverer's name	C. H. F. Peters
Asteroid diameter	52.6+/- 1.5 km
Albedo	0.10 +/-.01
Rotation period	8.00 hours (Amp.=0.2 mag)

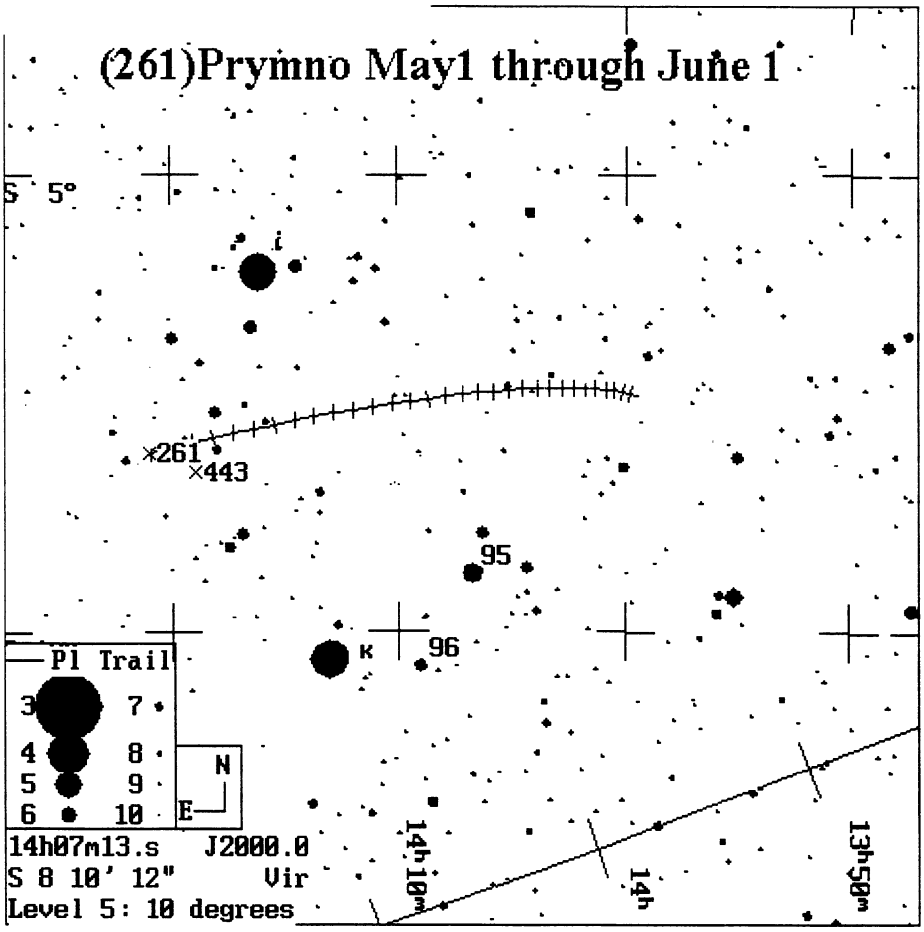
The brightest Asteroid in the same region of the sky is (27) Euterpe. Its Orbital elements are given below to

be put into ECU or Voyager. It stays near gamma Virginis the whole month of May and dims from 10.7 to 11.5 magnitude.

(27) Euterpe

Period of orbit 3.60 years
Perihelion distance 1.95 AU
Aphelion distance 2.75 AU
Orbital elements:

Semimajor axis 2.3472031 AU
Eccentricity 0.1712397
Inclination of orbit
1.5841892 degrees
Argument of perihelion
356.03418 degrees
Long. ascending node
94.818213 degrees
Mean anomaly 83.606581 degrees
Epoch of elements
JD 2449800.5
(24/05/95 0h UT)



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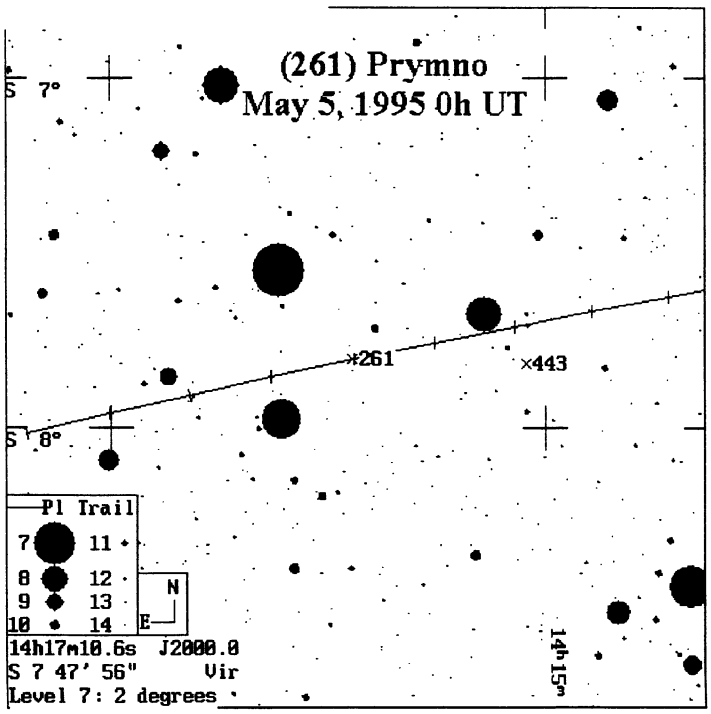

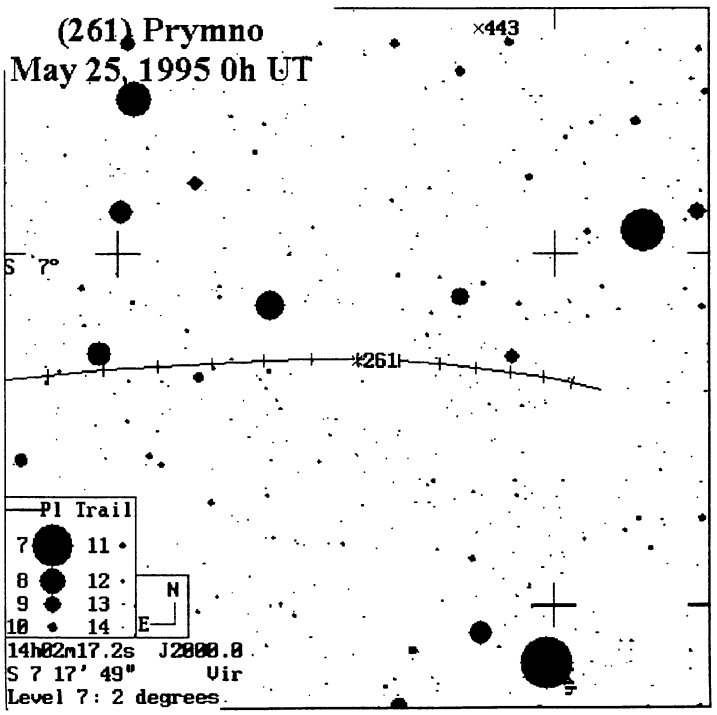

NOTICE OF MEETINGS AND EVENTS

ANNUAL BANQUET

Our annual banquet this year will be held in place of the May meeting on May 19 at the Waverley Legion. The Legion is located on Rocky Lake Drive in Waverley on the right side of the road when traveling towards Bedford.

The speaker will be Dr. Michael West of Saint Mary's University. His talk title and abstract are: **"How Old is the Universe, and How do we Know?"** *Did the universe have a beginning and will it have an end? How old is the universe at present? These are questions which have fascinated human beings ever since our ancestors first gazed into the starry skies. The answers to these questions can be found in physics. In this talk, different methods for determining the age of the universe will be reviewed. Recent results from the Hubble Space Telescope have led to a rather paradoxical situation: the universe appears to be younger than the oldest stars that we observe. How can this be? Possible ways to reconcile these observational contradictions will be discussed.*

The cost is $20 per person inclusive of all taxes and gratuity. Call Nat Cohen at 434-3103 (ASAP!) to reserve your space.

REGULAR MEETING

Date: **Regular Meeting — Friday, June 16th at 8pm**; 7pm for the council meeting (all are welcome)

Place: Lower Theatre, Nova Scotia Museum of Natural History, Summer Street, Halifax. Access is from the parking lot.

Topic: **"Supernova Scotia 1995F"** by Paul Gray and David Lane. A description of the Halifax Centre's supernova search program and the steps leading up to the discovery on SN1995F will be presented.

NOVA EAST 95

The date for Nova East has been changed from that which was advertised at last year's Nova East and on the RASC National Calendar. The new dates are July 28 to 31. The change was made so that Nova East would not conflict with the popular Ontario Star Party "Starfest". The New Brunswick astronomy clubs will be hosting their own star party this year also. Their event, called "Astro Atlantic 95", will be held from June 23 to 26. If you want further information, please contact the editor.

TELESCOPES FOR LOAN

The Halifax Center has several telescopes for loan to members. These include a Celestron C8 equipped for photography, a Questar 3.5", a 4" rich-field telescope, a 4" Maksutov-Cassegrain, and a 10" Dobsonian. Contact the Observing Chairman, Paul Gray, for further information.

PUBLIC HALIFAX PLANETARIUM SHOWS

The Halifax Planetarium, located in the Dunn Building at Dalhousie University, provides shows each week on Thursday evenings at 7pm. Contact the *Nova Scotia Museum of Natural History* at 424-7353 for show information.

ASTRO-ADS

Binoculars

Tasco Model 117BRZ
3-35 x 50mm high-quality zoom binoculars
(214ft at 1000yds at 7x)
Asking $300
Contact: John den Hollander
Phone: 466-5321

T-SHIRTS

We have a large supply of new Centre T-Shirts. These T-Shirts are a 3 colour design which incorporates our new centre logo along with a smaller national logo printed onto high-quality 100% cotton shirts.

These will be available at meetings. For information about mail-orders call Shawn Mitchell.

1995 HALIFAX CENTRE EXECUTIVE

Honorary President	Dr. Murray Cunningham	
President	David Lane	443-5989
1st Vice-President	Blair MacDonald	445-5672
2nd Vice-President	Shawn Mitchell	460-0249
Secretary	Tom Harp	465-4928
Treasurer	Ian Anderson	678-8009
Nova Notes Editor	David Lane	443-5989
National Representative	Pat Kelly	798-3329
Librarian	Clint Shannon	889-2426
Observing Chairman	Paul Gray	864-2145
Councilors	Doug Pitcairn	463-7196
	Dr. David Turner	435-2733
	Mary Lou Whitehorne	865-0235