NOVA NOTES

Volume 24 Number 6 December 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 **January 14, 1994**. 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. 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)

Inside This Issue...

Nova Notes is printed on recycled paper

The New 1994 Executive

Following the November Annual Meeting, the following are the slate of elected executive members of the Halifax Centre for 1994.

President	*David Lane*
First Vice-President	*Patrick Kelly*
Second Vice-President	*Mary Lou Whitehorne*
Secretary	*Patrick Kelly*
Treasurer	*Ian Anderson*
Nova Notes Editor	*David Lane*
National Council	*Joe Yurchesyn*
Librarian	*Shawn Mitchell*
Observing Chair	*Paul Gray*
Councilors	*Blair MacDonald*
	Dr. David Turner
	Doug Pitcairn

RASC, Halifax Centre 1993 Treasurer's Report

by Ian Anderson

The Halifax Centre of the RASC had one of its strongest performances ever in terms of cash growth. Thanks to our 1993 GA committee, a good year was made even better by a net contribution in excess of $2,300 to our purse.

The GA also gave the centre the opportunity to sell merchandise that netted us over $1,000. In addition there were other benefits which probably made the 1993 General Assembly one of the most successful for a hosting centre.

In as much as 1993 was a good year, our activities have made the accounting for the centre a more complex process than before. Because our centre has outgrown its petty cash box status in terms of size, it has outgrown the cash box style of accounting which has served us until now.

As your treasurer, I have recommended the centre adopt changes in its accounting policies. The impact of these changes will mean consistent annual reporting from year to year, and a more accurate reflection of the centre's financial position at any time.

After a year like 1993, a few words might be in order to anyone who may have forgotten the meaning of a not-for-profit organization as defined by the tax man.

Strictly speaking, profit is not permitted in an association such as ours. The sale of merchandise at more than its cost to the centre is a commercial activity which places the Halifax RASC perilously close to a "profitable business".

To the credit of Joe and Nat as former treasurers, our centre's cash has been managed very frugally, and growth in our centre has been steady to 1993. In recent years, we have taken advantage of investment certificates to earn a higher interest yield than a chequing account would pay.

Our operating expenses have consistently been much less than our revenues. As we have enjoyed an increasing cash position for a number of years, it is time we stated a purpose for this cash excess. We are in the lucky position of having money to dream with.

Some ideas proposed by the executive include the purchase of some land to install a permanent observation

Royal Astronomical Society of Canada, Halifax Centre
Comparative Income Statement
Years Ending September 30, 1993 and September 30th, 1992

ADJUSTED TO REFLECT END OF MEMBERSHIP YEAR	Years Ended September 30		Amount of Increase during 1993
	1993	1992	
REVENUE			
Membership Fees	$3,062.00	$3,187.00	($125.00)
Life Members Grant	396.80	396.80	0.00
Donations	40.74	126.52	(85.78)
Educational Activities		20.00	(20.00)
Interest & Dividends	492.23	427.43	64.80
Sales of Handbooks (Net)	454.46	45.73	408.73
Sales of Merchandise	2,227.55		2,227.55
Advertising		20.00	(20.00)
General Assembly (inc. grant)	1,296.52	359.06	937.46
Other Grants	853.00	195.34	657.66
Miscellaneous	128.12	250.05	(121.93)
Total Revenue	$8,951.42	$5,027.93	$3,923.49
EXPENDITURES			
Fees to National Office	$1,819.20	$1,843.20	($24.00)
Library		19.80	(19.80)
Meetings & Newsletter	1,093.25	1,054.00	39.25
Annual Dinner (net)		(185.69)	185.69
General Assembly (inc. grant)		613.11	(613.11)
Equipment & Supplies			0.00
Cost of Goods for Sale	981.75		981.75
Office Administration	121.99	201.93	(79.94)
General Expenses & Audit		1,500.00	(1,500.00)
Educational Activities		300.00	(300.00)
Insurance			0.00
Awards & Donations	142.39	185.72	(43.33)
Operating Expenses - Observatory			0.00
Miscellaneous	123.78	35.85	87.93
Total Expenditures	$4,282.36	$5,567.92	($1,285.56)
Surplus or (Deficit) on Operations	$4,669.06	($539.99)	$5,209.05

site for centre members. The re-assessment of our library material, and possibly some more educational activities. By my calculations, the next twelve months could be an excellent time to foster new interest in the association by youth members.

It is night. The stars are out. Let us do some dreaming! (The full Treasurer's report for 1993 is available upon request). Ω

General Assembly Financial Report

by Joe Yurchesyn

Introduction

All bills for the GA, except for one, have been received and, I am pleased to announce that a healthy profit of $2,169.77 has been realized from a total revenue of $25,931.48, equating to 8.4%. The Centre hosting the GA is permitted a maximum profit of 5% of the total revenue, amounting to $1,296.57 in this case; the remaining $873.20 (40.2%) being submitted to the RASC National Office.

Summary

Table 1 (on page 4) summarizes the collected and disbursed revenue and the profit or loss associated with each of the 1993 GA's functions. Figure 2 (on page 4) graphically shows the distribution of revenue and profit.

Included in the General Registration Expenses is an estimate for the GA Organizing Committee's share (50%) of the cost of page charges for publishing the transcript of the Ruth Northcott lecture in the Journal, as well as for 25 reprints (including covers). This cost has been estimated because the actual bill will not be forthcoming for several more months. The GA Committee's liability for this cost is estimated to be $350.00 (±$50). Since this cost is assumed to be known close enough to allow the GA accounts to be settled now, $350.00 has been transferred to the Halifax Centre's bank account to cover this future bill.

Records were kept in an excellent state of affairs prior to the start of the GA, but the recording of moneys collected during the GA became increasingly sketchy as the GA progressed. This is primarily due to a state of confusion being the norm at the registration desk and also due to the rotation of desk attendants. In addition, matters are further confused by pin and GA T-shirt sales by the Halifax Centre, as well as book sales for David Levy. It also appears that the University has slightly under billed the GA organizing committee for the number of meals purchased. It is for these reasons that the some of the activity items are being reported as exactly break even. Since the profit margins associated with these items are very small (1-2%), the profit allocation error resulting from this reporting simplification is very small.

Two significant items of profit and loss require discussion for the purpose of clarification. These include: General Registration and Tour #1 (Bluenose).

.The $500ish loss on the General Registration is primarily due to the purchase of less than the minimum

Royal Astronomical Society of Canada, Halifax Centre
Comparative Balance Sheet
Years Ending September 30, 1993 and September 30th, 1992

ADJUSTED TO END OF MEMBERSHIP YEAR	Years Ended September 30		Amount of Increase during 1993
	1993	1992	
ASSETS			
Cash	$6,374.47	$2,435.08	$3,939.39
Est'd Membership Receivable (net)			$0.00
Accounts Receivable	627.26	157.49	469.77
Handbook Inventory	218.50		218.50
Merchandise Inventory	266.24	203.03	63.22
Prepaid Expenses			0.00
Investments	3,209.39	3,000.00	209.39
Accrued Interest	174.89	0.00	174.89
1993 GA Account	1,296.52	1,000.00	296.52
Est'd Library	2,052.96	2,052.96	0.00
Observatory Equipment	1,918.57	1,915.57	3.00
Est'd Miscellaneous	250.00	250.00	0.00
Total Assets	$16,388.80	$11,014.13	$5,374.68
LIABILITIES			
Est'd Handbook Payable	$1,168.50	$550.00	$618.50
Fees owed to N.O.	0.00		$0.00
Other (GST Owed to N.O. for HB's)	87.11		$87.11
Total Liabilities	$1,255.61	$550.00	$705.61
CAPITAL			
Equity	$15,133.19	$10,464.12	$4,669.06
Total Capital	$15,133.19	$10,464.12	$4,669.06
Total Liabilities & Capital	$16,388.80	$11,014.13	$5,374.68

number of residence room nights which would have resulted in the waiving of the university auditorium and room rental fees.

The $1,350ish profit on the Tour #1 (Bluenose) is primarily due to a last minute change in the fee charged to the RASC by the Nova Scotia Government for a total boat rental. This resulted in the fee being about ½ that charged to commercial charters. This money helped to subsidize the loss incurred on the General Registration.

In addition to the financial information reported here, I am sure there are numerous miscellaneous expenses by many members of the Halifax Centre for volunteer activities associated with the 1993 GA, as well donations of time. The 1993 GA Organizing Committee wishes to express its appreciation to anyone who made such a donation. Without volunteers, the 1993 Halifax GA would not have been so successful and profitable.

Respectfully submitted,

Joe Yurchesyn, P. Eng
Financial Chairman,
1993 GA Organizing Committee Ω

Meeting Report: October '93
by David Turner

The meeting of the Halifax Centre on October 15th was held in conjunction with the beginning of Science and Technology Awareness Week locally. The meeting began nearly on time with a few brief announcements from Pat Kelly (El Presidente), following which Ian Anderson took the floor to present a colourful (literally!) *(Even Nat was impressed! - Ed)* and heavily-discussed report on the Centre's finances (post GA). This included an intriguing glimpse at the money-laundering practices of recent centre treasurers. At this point in the meeting, Paul Gray gave his Observing Chairman's report, which was highlighted (naturally) by remarks on the visibility of the planet Venus - clearly de rigueur since Dave Lane's tenure in the OC position!

Pat then introduced centre member Larry Bogan from the Physics Department at Acadia University to talk about "Earth-Based Asteroid Studies". Larry described some of the research done during his recent sabbatical year at the University of Victoria, where he became involved in the study of asteroids with the encouragement of Journal editor Jeremy Tatum. Following a general introduction to asteroids which was illustrated by slides of Gaspra, Toutatis, and Ida and a discussion of their orbits and the connection to comets, Larry went on to describe his work in determining the rotational characteristics of the asteroid 198 Ampella using CCD observations of its brightness variations. His research entailed finding a best-fit light curve for several nights of observation of the asteroid over a two month period, determining the asteroid's rotation period (about 10 hours), and crudely estimating its shape from the long-term variations in its brightness. Ampella appears to be fairly symmetric according to Larry's observations, although these represent only a beginning to the study of this main-belt asteroid. Ω

Scheduled Observing Sessions

Club Observing Session
Saturday, January 8 - Beaverbank Observing site. If cloudy (or too cold!) it will be on Sunday, January 9

Club Observing Session
Saturday, February 12 - Beaverbank Observing site. If cloudy (or too cold!) it will be on Sunday, February 13

For information or for directions to the Beaverbank site, call Paul Gray (864-2145) or Dave Lane (443-5989)

25 Years Ago - A Celestial Christmas:
by Roy Bishop

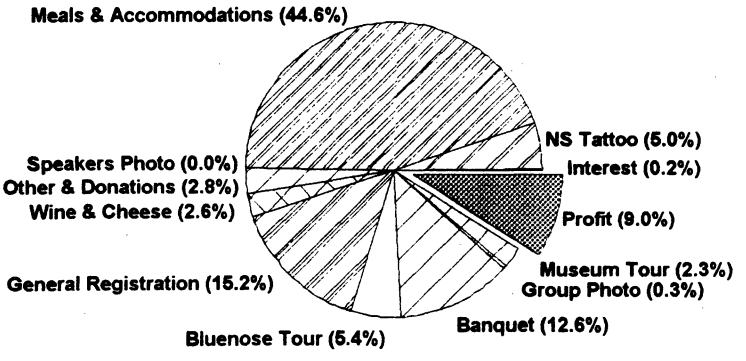
It is now a quarter century since humans first left this planet and traveled to another world. On the morning of 21 December 1968 the third immense Saturn V rocket ever to be launched shook the Florida landscape as it thundered into space. Not only was this the first such rocket to carry humans into space, but it propelled them to escape speed, thereby freeing them from Earth's gravitational well and launching them on the first lunar voyage. That same evening, 12 km above Earth on a DC-9 heading from Winnipeg to Halifax, I scanned the skies southward in a futile attempt to see any sign of the third stage rocket which had hurled Apollo 8 out of Earth orbit a few hours earlier. The race-track of low-Earth orbit with Earth filling half the sky had been left behind. Over the next three days the men of Apollo 8; Frank Borman, James Lovell, and William Anders, became the first humans to see Earth as a small, blue-white planet receding into the inky blackness of space.

Three days later, on Christmas Eve, as families gathered to share this special time of the year, television brought into their homes live images from the command module of the Apollo 8 in lunar orbit. The sight of the bleak lunar landscape drifting past the windows of the spaceship, of

TABLE 1			
	Revenue	**Expenses**	**Profit**
General Registration	3,512.99	4,089.57	(576.58)
Meals & Accommodation	11,506.54	11,506.54	0.00
Wine & Cheese	930.00	660.66	269.34
Banquet	3,240.00	3,240.00	0.00
Group Photo	590.00	87.76	502.24
Speakers Photo	70.00	12.74	57.26
Tour #1 (Bluenose)	2,800.00	1,445.44	1,354.56
Tour #2 (Museums & PC)	940.00	604.00	336.00
Tour #3 (NS Tattoo)	1,378.00	1,285.30	92.70
Other & Donations	868.10	779.70	88.40
Interest	95.85	50.00	45.85
Total	**25,931.48**	**23,761.71**	**2,169.77**
Profit to Centre			**1,296.57**
Profit to National			**873.20**

1993 Halifax GA

Disbursement of Collected Revenues



Breakdown of Profit

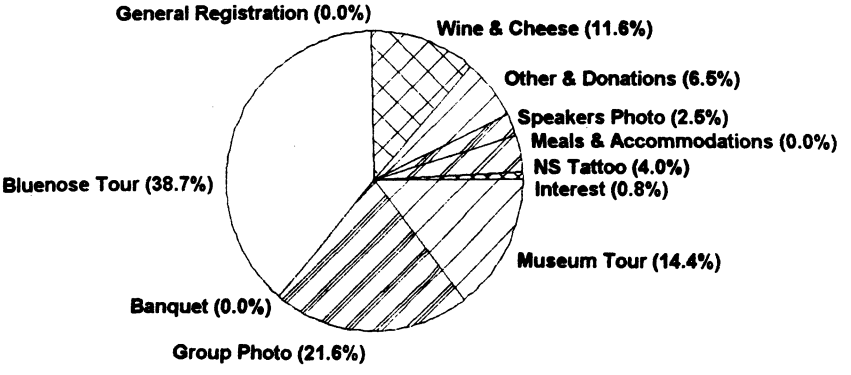


Figure 2. (Note: General Registration loss been subracted from Bluenose Tour profit)

distant Earth coming into view above the lunar horizon, accompanied by the commentary of three humans far further from home than anyone had ever been before, is etched in my memory of that remarkable evening. Here was an historic moment that surely will be remembered as long as civilization endures.

For many viewers, the high point of that Christmas Eve was the reading of the first ten verses of the Book of Genesis (King James version). As stark craters drifted past, Anders, followed by Lowell, and then by Borman, shared the reading of these immortal verses from lunar orbit - verses dealing with the creation of Heaven and Earth, of darkness and light, of dry land and seas. Borman ended the transmission with the works:

"And from the crew of Apollo 8, we close with good night, good luck, a Merry Christmas, and God bless all of you - all of you on the good Earth".

Shortly thereafter, Apollo 8 freed itself from the grip of lunar gravity and began its return home. Thus ended a unique and magical evening for upwards of half a billion viewers back on Earth. Ω

In Praise of the Small Scope:
by Blair MacDonald

It all started some four years ago; my wonderful wife gave me a small **TASCO** telescope for a Christmas present. This was my first telescope, after years of reading astronomy magazines and various books on physics and cosmology, I was actually going to get my first look at the universe beyond the Earth's atmosphere.

It was going to be cold that night so I bundled up in my ski clothing and headed outdoors to set the scope up to cool. After supper I headed out into my back yard for the first look through my new toy. Now, my backyard is in Halifax, not too far from a container pier, with light pollution limiting me to bright objects, so I scanned the sky for Jupiter.

The few sources of information I had at the time told me that the giant planet was in Taurus, so I patiently looked for a stellar pattern that resembled a bull. Well, I'm sorry, but to this day I cannot see a bull in Taurus, so I finally gave up and after much effort and centered the scope on the brightest object I could find.

WOW!! There in the field of view was Jupiter, not just a fuzzy dot, but bands, moons and all. I must have studied the image for over an hour soaking up every bit of detail I could see.

Next came M42. After much tinkering with the poor excuse for a finder-scope, I managed to find the nebula. My efforts were rewarded by a wonderful first view of this object, the trapezium and glowing clouds of gas filled the field. I dashed into the house to offer my wife a look, but alas she declined and headed back to her reading muttering something about -20 degrees and men in white coats.

That small scope introduced me to the wonders of astronomy and showed me all of the Messier objects. Sure it had a spherical mirror and poor eyepieces, but it offered me pleasing views and a very portable package that was easy to use. I even managed to get some very good lunar and planetary photos as well as some guided piggy back shots of the milky way with the scope.

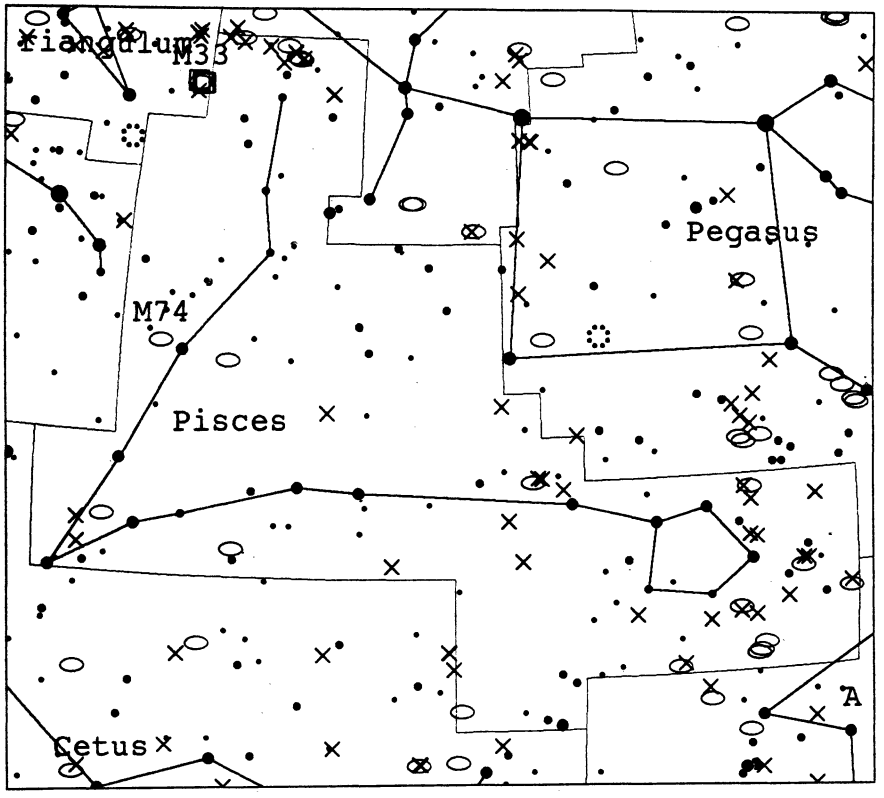
Today my toy collection has expanded to include an eight inch schmidt-newtonian and an excellent 60 mm guide scope that I occasionally use for razor sharp views of the moon. By using small scopes at the start I was able to learn to see faint objects and fine detail, a skill that has stayed with me even as I acquired larger instruments *(He has also learned how to imagine faint objects and fine detail, a necessary skill! - Ed)*. Unless you are fortunate enough to own a *really big* scope, detail in many objects will be forever beyond your reach. The joy in much of my observing is tracking down fainter objects at the limit of my abilities. Whether I am using a small scope or my larger schmidt-newtonian, the fun is in the hunt. Ω

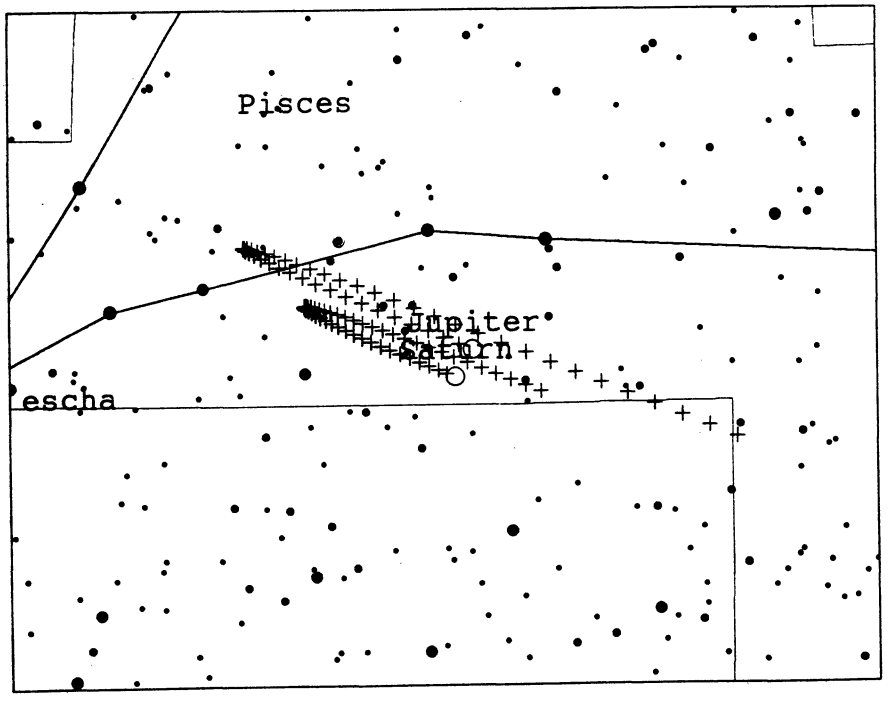
Constellation of the Month: Pisces
by Joe Yurchesyn

Pisces is a large constellation comprised of 4th magnitude and fainter stars in the form of a < shaped asterism - the southern arm of which is terminated in a circle of stars. Pisces lies in a rather barren area of the sky north of Cetus and east of Aquarius - another two rather large and dim constellations - and wraps around the eastern and southern sides of the *Great Square* of Pegasus. The proximity to the Great Square dramatically reduces the difficulty in locating this constellation - particularly in light polluted skies. Despite being only 30° south of the winter Milky Way, the brightest deep sky objects include only galaxies. Despite the constellation's large size, only one Messier object (the rather faint M-74) is found within its boundaries.

The constellation Pisces dates back to antiquity. The brightest star AL RISCHA is derived from the Arabic *Al Risha*, "The Cord", perhaps derived from the earlier Babylonian *Riksu*, which also means cord. Another name OKA is from the Arabic *Ukd al Haitain*, which seems to refer to a "flaxen cord" or bond which ties the two fish of Pisces together. At a distance of 130 ly, Alpha is a binary star of 720 year period, the components of which are magnitudes 4.33 and 5.23 and both components are also spectroscopic binaries. Currently separated by 1.5", they are closing to a minimum of about 1" in the year 2060. Discovered by William Herschel in 1779, when near maximum separation, it seems to display a variety of colour contrasts, depending on the observer. What colours do you see?

Located about 1.5° SSW of Delta Piscium, lies the white dwarf star known as van Maanen's star - named after its 1917 discoverer. At a distance of 13.8 ly, it annual proper motion of 2.98" led to its discovery as the first





The Paths of Jupiter and Saturn every 4 days ending at October 4th 7 BC

"late type" degenerate star to be discovered. With the exceptions of the faint companions of Sirius and Procyon, it is probably the closest white dwarf to the solar system. At apparent visual magnitude 12.4, the surface temperature is 6,000°C and the luminosity is 1/5,800 that of the Sun. At a diameter of 12,480 km, or very close to the size of the Earth, it is among the smallest known stars. With a mass comparable to our Sun, the density is 20 tons/in^3, or about 20 times that of Sirius B, the most famous of the degenerate stars. Energy production has long since ceased, and this star is slowly cooling to become a "black dwarf".

Located about 1½° ENE of Eta Piscium lies M-74, an almost perfect face-on Sc-type spiral galaxy. First observed by Mechain in September 1780, it was confirmed by Messier a month later. John Herschel incorrectly classified M-74 as a globular star cluster, and this mistake was erroneously carried over into the NGC. M-74 is one of the faintest and most elusive of the Messier objects, requiring a dark clear sky and a low power eyepiece. At a distance of between 25 and 33 million ly, the 9' diameter corresponds to 80,000 ly's and a mass of 40 billion solar masses; making this galaxy a little smaller than our own, but much less luminous, unless the computed distance is considerably underestimated. Its red shift implies a distance of about 42 million ly's, which would put the luminosity and computed mass into closer agreement with the figures obtained for many other large spirals. The edge-on spiral NGC-4565 in Coma also shows a similar discrepancy.

The two galaxies NGC-7619 and 7626, a pair of ellipticals lying right on the border with Pegasus, form the core of a remote cluster of galaxies called the Pegasus I Cluster. The galaxy NGC-128 is often described as lenticular, as its centre has an odd box shaped central mass. The galaxy NGC-520 appears as an irregular patch of faint light, while a large amateur telescope reveals a mottled non-uniformly illuminated nebulosity that appears twisted. Large professional telescope photographs show a distorted and possibly erupting system of two interacting systems.

Pisces may also have been the celestial site for the *Star of Bethlehem*. An eclipse of the moon three months prior to the death of Herod dates his demise to early February, 1 BC or early December, 5 BC. The February, 1 BC date is in better agreement with other historical evidence of weather

related annual events that are most probably linked to certain months. This dates the Star of Bethlehem prior to February, 1 BC.

During the summer of 5 BC, the planets Jupiter and Saturn performed nearly simultaneous retrograde loops south of Mu Piscium. This gave rise to three conjunctions, in that year, of these two planets (-05-06-22, -05-10-15, -05-10-26), followed by Mars-Saturn and Mars-Jupiter conjunctions (-04-02-20, -04-03-05) as well. Jupiter and Saturn were both at the end of their retrograde loops during the months of October and November, so were in close proximity for a full two months. During a time when people were generally more knowledgeable about the night sky and professional astrologers pondered the physical significance of unusual occurrences in the sky, these events would certainly have attracted great attention. Therefore, this triple conjunction is believed to be the celestial event that started the Magi on their journey to pay homage to the baby Messiah. Traveling along the fertile crescent, the Magi probably arrived in Judia early the following year, sometime in 4 BC.

The shepherds, as described in the Bible, may have been tending sheep during the lambing season, indicating spring time. This explanation of the Star of Bethlehem places the birth of Jesus sometime in the spring of 4 BC - if the account of the Magi greeting an infant is to be taken literally. It occurs three years prior to Herod's death, which is consistent with the later Biblical account of Herod's order to execute all Jewish male children that were two years of age and under.

Just a little something to ponder, when you next gaze in the direction of Pisces. Now!... If I could just figure out how to relive the celestial events of 5 BC. Ω

Notes from the Chair
by Paul Gray, Observing Chair

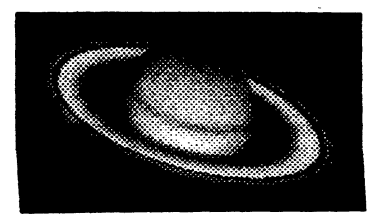
Well, its time to write an article again since I was notified by our great editor who pumps this newsletter out on time (and that's no easy feat). Anyway, I hope now that winter is here, we can get some nice observing weather for a change. There are many events coming up over the next six months that would be of great interest to local astronomers and the public. I would like to take this opportunity to mention some of them so that if anyone reading this article is interested in observing these events with our dedicated and leisure astronomers, just contact me and I will be glad to fill you in on the details of where we are going to be and what we are planning to do.

The next thing we will know is that Xmas will be here, but so will the Geminid meteor shower. For most of the 1980's this shower has been known as the year's best annual shower with a ZHR of 110. The plan for this shower is to go to the Beaverbank observing site and catch this great show. A week later, I am also tempted to get a couple of people together to observe the Ursids. This is a little known meteor shower with its radiant in the little dipper. This is good, because it means the shower is up all night and can be observed anytime after sunset. It is, however, of very short duration, only being 20 hours long, but can be very strong during the peak. Reports in 1986 showed visual rates of over 100 meteors per hour!

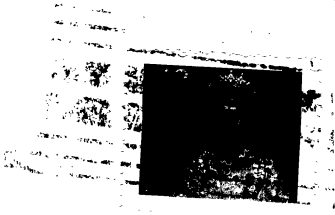
January is normally a month in which we never used to go observing much due to the cold winter and great amount of snow. It makes for a horrible time of lugging the telescope up and down the hill. Last year, though, I had three sessions during January and for the past two years in a row have been lucky to catch the peak of the Quadrantid meteor shower. We have been very lucky because the peak is only 12 hours long despite our horrible weather! Well, this year does not look so good though. The peak of this shower is during daylight hours for us, so we miss it completely, but there is something else to observe. For the past two years there has been reports submitted to the IMO about a large number of sporadic meteors from the overhead point on the same day as the Quadrantids. These reports have come from Hungary to England and France and yes, we also noticed them and notified Bob Hawkes who informed us of the other reports. That was a relief; now we don't feel like uneducated beginners in meteor observing.

So, for this year it would be nice to have as many people join our group of six to help with this shower. The meteors will have to be plotted on a chart of the part of the sky you are looking at and that is it. It is quite simple and no expensive equipment is necessary. All you have to do is draw a line on a chart for each meteor you see. The reason I would like more people is because of the cold weather. Sitting on a lawn chair in the cold for more than a couple hours is very hard, but can be done. I will be out for all of the time that anyone else is there but people may feel free to come for an hour as they please. The ideal situation would be two or three groups of four. Since I will be there all of the time, we really only need groups of 3. If each group of three stayed for two hours we would cover 6 hours - no problem. We just need 9 dedicated people to participate. It would be for the evening of the 3rd or 4th of January from 6:00pm to 12:00pm AST.

Here we have a chance to do some very valuable research that otherwise would not get done. We are in a very important position on the globe, since there will be no observations though 4 time zones to Europe, and often if we are clear that time of year, the Eastern time zone is not. This means that our reports can often fill a hole in the IMO's 24 hour coverage which they manage through their 150+ worldwide observers. Not only can we help the IMO, but we have the chance to help confirm a possible new shower! If you are interested in joining us just call me and we will be glad to include you in our plans. Ω



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 and Events

Date:	**Regular Meeting - Friday, December 17th: 8:00pm**; 7:00pm for the executive meeting (all welcome).
Place:	Lower Theatre, Nova Scotia Museum of Natural History, Summer Street, Halifax. Access from the parking lot.
Topic:	**Ask the Astronomer** - A panel of knowledgeable amateurs and pros will be assembled to take your most difficult questions. Please come with your questions ready! We will also have our annual Christmas party!
Date:	**Regular Meeting - Friday, January 21st: 8:00pm**; 7:00pm for the executive meeting (all welcome).
Place:	Lower Theatre, Nova Scotia Museum of Natural History, Summer Street, Halifax. Access from the parking lot.
Topic:	To be announced.

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.

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	678-8009
Nova Notes Editor	David Lane	443-5989
National Representative	Joe Yurchesyn	422-8030
Librarian	Shawn Mitchell	865-7026
Observing Chairman	Paul Gray	864-2145
Councilors	Dr. David Turner	435-2733
	Doug Pitcairn	463-7196
	Mary Lou Whitehorne	865-0235

$$$$$$$$$
DUES ARE PAST DUE!
$$$$$$$$$

If you have not renewed your membership yet, this will be your last issue of *Nova Notes*. Renew as soon as possible so that you do not miss any issues of *Nova Notes* or the National publications!