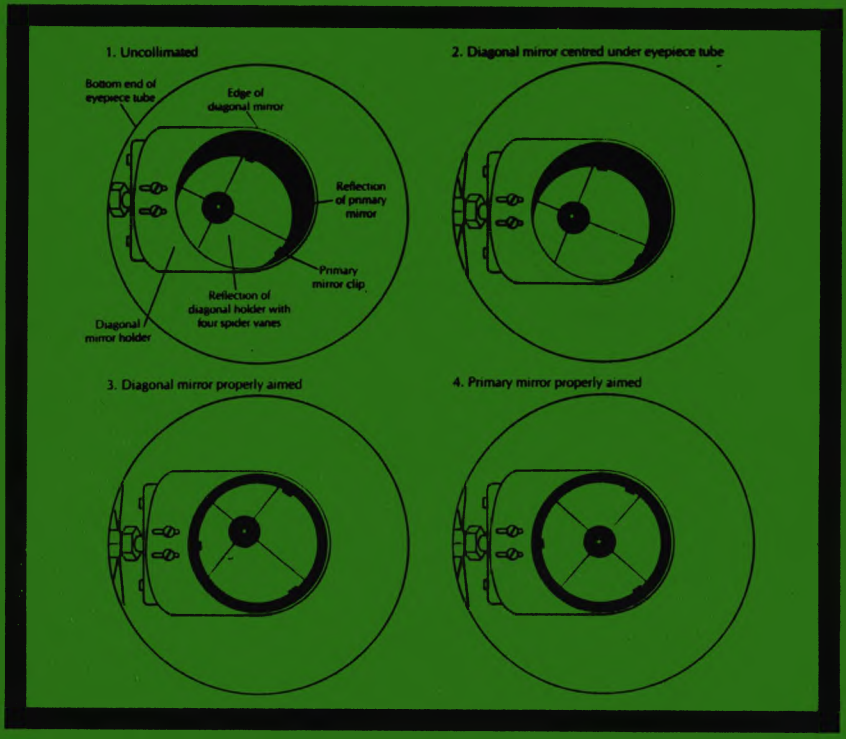
NOVA NOTES



Halifax Centre

ROYAL ASTRONOMICAL SOCIETY OF CANADA
SOCIÉTÉ ROYALE D'ASTRONOMIE DU CANADA
QUO DUCIT URANIA

Sept–Oct 1991
Volume 22
Number 5

1991 Halifax Centre Executive

Honorary President	-	Dr. Murray Cunningham	
President	-	Mary Lou Whitehorne 53 Zinck Avenue Lr. Sackville, N.S. B4C 1V9	865-0235
First Vice-President	-	Joe Yurchesyn 5264 Morris Street Apt. 1104 Halifax, N.S. B3J 1B5	422-8030
Second Vice-President	-	Brian Segal RR#5 Antigonish N.S. B2G 2L3	783-2772
Secretary	-	Wesley Howie 19 Plateau Crescent, Apt. 515 Halifax, N.S. B3M 3K9	457-3052
Treasurer	-	Nat Cohen 32 Roblea Drive Dartmouth, N.S. B2W 1Y7	434-3103
NOVA NOTES Editor	-	Patrick Kelly 2 Arvida Avenue Halifax, N.S. B3R 1K6	477-8720
National Representative	-	Douglas Pitcairn 13 Ferguson Road Dartmouth, N.S. B3A 4J8	463-7196
Librarian	-	Jason Adams P.O. Box 447 Lower Sackville, N. S. B4C 3G4	864-9783
Observing Chairman	-	David Lane 26 Randall Avenue Apt. 4 Halifax, N.S. B3M 1E2	443-5989
Councillor(s)	-	Dr. David Turner	435-2733
	-	Dr. Randall Brooks	434-7567
	-	Greg Roberts	835-6264
Centre's Address	-	Halifax Centre, R.A.S.C. c/o 1747 Summer St. Halifax, N.S. B3H 3A6	

Notice of Meetings

Date: **Friday, December 13th: 8:00 P.M.** for the main speakers.
Place: Nova Scotia Museum, Summer Street, Halifax. Access from the side entrance. Meeting to be held in the lower theatre.
Topic: There will be a discussion for the general public on what not to buy your budding astronomer for Christmas, complete with samples! We will be having a short meeting in order to have a "Christmas social" before the Christmas holidays.

NOTE: DUE TO CHRISTMAS THIS IS THE **SECOND** FRIDAY

Date: **Friday, January 17th: 8:00 P.M.** for the main speaker.
Place: Nova Scotia Museum, Summer Street, Halifax. Access from the side entrance. Meeting to be held in the lower theatre.
Topic: The main speaker for the evening will be **Laurie Reed** of the Astronomy Department at Saint Mary's University who will be talking about "The Globular Clusters of M31".

Date: **Friday, February 21st: 8:00 P.M.** for the main speakers.
Place: Nova Scotia Museum, Summer Street, Halifax. Access from the side entrance. Meeting to be held in the lower theatre.
Topic: The main speaker for the evening will be **Joe Yurchesyn** of the Nova Scotia Power Corporation who will be talking about "Auroræ and the Power System".

Date: **Friday, March 20th: 8:00 P.M.** for the main speaker.
Place: Nova Scotia Museum, Summer Street, Halifax. Access from the side entrance. Meeting to be held in the lower theatre.
Topic: The main speaker for the evening will be **Mary Lou Whitehorne** who will be talking about the star Phi Persei.

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

About the cover:

The cover is one of the figures from *The Backyard Astronomer's Guide* by Terence Dickinson and Alan Dyer. It shows the view down the eyepiece holder at several main steps in the collimation process for a Newtonian telescope.

Editor's Report

Patrick Kelly

I must apologize for the lateness of this issue of NOVA NOTES. I have been rather pressed for time of late. Things should be back to normal soon. The Nov./Dec. issue will be ready for pickup at the December meeting and hopefully the Jan./Feb. issue will be out soon thereafter.

Membership renewals are due before the end of the year. Those who have not renewed at the time of mailing will find their final renewal notice enclosed with this issue. Please renew soon, as the '92 handbooks are in and you won't want to start the new year without it. Nat and I would like to thank those who renewed early. It makes life a lot easier for both of us.

As you probably know by now, we are now paying to have NOVA NOTES printed. You may have read in the last BULLETIN that we were considering a surcharge to cover this extra expense. However, at a recent executive meeting we carefully went over our financial state . We found that we could avoid a surcharge if we are careful in all areas of spending. Nevertheless, it was decided to reduce NOVA NOTES from twenty-four pages per issue to twenty. Hopefully it will not detract too much from members' enjoyment.

You may have also noticed that the last issue was extra thick. We thought that this would be the last "free" issue, but we were wrong and had to pay for the extra pages. However, the printer accidentally printed 300 more copies than requested (we didn't have to pay for those), so we have lots of samples to give out to prospective members!

Based on a suggestion by Peter Edwards, we have been investigating the possibility of moving our regular observing site from Beaverbank to Dollar Lake Provincial Park. It has been found to be much darker than our current site and about the same distance. We have already obtained a key to the main gate and when things are finalized we will put a map and directions in a future issue of NOVA NOTES.

At the November meeting, the executive also approved a one time grant of $100 to the Nova Scotia Planetarium Advisory Committee. This money is being used as seed money by N.S.P.A.C. whose goal is to bring about the construction of a major planetarium in the metro area. As many of the directors of N.S.P.A.C. are also executive members of the Halifax Centre, we wanted to eliminate the possibility of a conflict of interest. As a result, the decision was conditional on the approval of the regular members at that meeting. I am happy to say that the vote was unanimous in support of the grant. N.S.P.A.C. will be reporting back to the membership on a regular basis. Ω

The 1990 Highland Star Party

Cape Breton Astronomical Society

We would like to thank all of the people who took part in the Highland Star Party which was held at the end of July in 1990. We had our surprises waiting for us. When we arrived, the group campsite was closed due to a severe bear problem, so our group was moved to the main campsite at Broad Cove Beach. Then despite the forecast of clear skies, the weather did not co-operate. On Friday night the overcast was solid from horizon to horizon. This, however, did not stop us from trading tales around the old gas lamp and we all enjoyed the evening.

The next morning the sky was full of broken clouds. We set up the scopes for public solar viewing, but the sky did not clear enough to afford a decent look. This did not stop us from having our corn boil and all participants ate their fill of Florida corn. And then it rained, and rained hard! However, by late evening the rain stopped and the skies cleared. We set up scopes at the public observing site and waited for the skies to get dark. The sky conditions looked great and a large crowd waited for a look through the telescopes. Then the fog rolled in. With nothing to look at, we gave a brief talk about the different types of telescopes assembled and waited for the fog to lift.

At around midnight most of the public left and we broke down our equipment. Three of us then drove up to the alternative site on the glacial plane to see if the sky there was clear. We arrived after twenty minutes of uphill driving to find the sky clear and on fire due to a spectacular display of aurora that extended up far past the zenith. We rushed back to the campsite to get everyone who was interested back up to the other site. To our surprise, the skies at the campsite had cleared also. Not only that, but everyone had gone to bed! We rudely woke up John Fraser and our group of four stayed up all night and took in the clear skies.

Sunday morning was clear and hot. We set up the telescopes for public viewing and nobody was disappointed. The solar disk had sunspot groups from one side to the other, with one very large group near the eastern limb. Some of us got sunburn, but overall the afternoon was a success. Later, we had a hot dog roast and relaxed for the afternoon. Later that afternoon we set up at the public observing site and again, no one was disappointed. The skies were clear and everyone had a look at just about every kind of object there is to look at!

Overall, everyone had a good time and we are looking forward to next year. A special thanks to Darrell DeWolf and Mike Cassie, both of the R.A.S.C. who came down and helped out in the public viewing sessions. Ω

Transits of Venus

Randall Brooks

After the total solar eclipses of 1970 and 1972 visible in Nova Scotia, I had always planned to go the the eclipse in Mexico, but as many of you know, a new job put a crimp in that plan. So now I'm looking forward to the next outstanding predictable events, the transits of Venus on 8 June 2004 and 5-6 June 2012.

When young and not so knowledgeable, I predicted the passage of Mercury across the face of the Sun—a transit—on the basis of the diagram of the orbits of Mercury, Venus, Earth and Mars in Menzel's *Field Guide to the Stars and Planets*. On the appointed day I took out my trusty 2" Tasco to perfectly sunny conditions - initial euphoria turned to disappointment when a nice circular spot about the expected size turned out to be no more than a sunspot. The problem was, of course, the chart didn't provide all the information required; Mercury's orbit is tilted to that of the Earth and, on that day, Mercury was too far above the plane to cross the small diameter of the Sun.

However, tales of 18th century astronomers spending years crossing the globe to catch a glimpse of a couple of transits of Venus had piqued my fancy so I still wanted to see a transit. A bit of research soon revealed that a transit of Mercury would occur on 9 May 1970. One problem was that it was in progress at sunrise for observers in the Maritimes so timing the ingress (the first contact with the Sun's disc) was not on. However, conditions were clear and the slowly moving disc of Mercury was easily observed by Dale Ellis, I and several other physics and math students on the physics building at Mount Allison University.

So why are transits so interesting? In 1639 an English mathematician and astronomer, Rev. Jeremiah Horrocks, was computing tables for the positions of the planets based on Copernican theory. In doing so he discovered that Venus would soon cross the face of the Sun (3 P.M. 24 Nov. OS); he and an observing friend, William Crabtree, observed the event though Horrocks missed first contact because it was Sunday and he was preaching—one suspects the sermon may have been shortened a bit that day! None the less, their observations confirmed Horrocks' formulas and calculations - a triumph of the Copernican theory. Kepler had calculated a transit for 1631 but it occurred during the night in Europe and was not observed. Calculations by others for the 1639 event were several days in error so Horrocks' calculation and observation - correct within a few minutes! - was the first successful event of this type. Unfortunately, Crabtree was so excited by the appearance of Venus on the Sun's disc, that he forgot to note the times of first and second contact!

Now to answer the question put above. The orbit of Venus is suitably placed so that when observations of the contact times with the Sun's disc are made from widely separated locations, one can determine (in theory) the mean distance of the Earth from the Sun or Astronomical Unit (A.U.). The angle measured from the Earth is referred to as the "solar parallax" (Fig. 1). The angle for the accepted A.U. is 8.8 seconds of arc but before the 1761 transit values from 10-15" were obtained through evidence suggested that values on the lower end were nearer the truth.

In 1757 the French Academie des Sciences requested that J.-N. Deslisle and the Marquis de Chabert (Canada's first astronomer at Louisbourg in 1750-51) report on the observation of the transit due in 1761. It was this report, prepared by Chabert, which reiterated the almost forgotten importance and usefulness of the event. On the basis of that report, the French prepared several teams of observers to travel to the Indian Ocean, Russia, etc. to make the requisite observations. After his chilly winter in Louisbourg, Chabert preferred to stay in Paris and observe in the company of the king at Verseilles. The amazing tales of the voyages of the French astronomers is related in Don Fernie's book *The Whisper and the Vision* (available in the centre's library). The British only mounted last minute observing teams – mostly surveyors including Mason and Dixon sent to South Africa – without providing any special equipment or training.

The French astronomer, Pringré, left Paris on 17 Nov. 1760 for Rodrique in the Indian Ocean. Despite having special papers from the British Admiralty guaranteeing safe passage for his ship (recall the Seven Years War was on), they brushed with the British during the expedition. Unfortunately, Pringré missed first contact in the morning due to rain though it cleared later so some useful observations were obtained. Despite two British raids on Rodrique and being taken prisoner, he made it back to France on 28 April, 1762. The expeditions of Chappe to Siberia – 4000 miles in the dead of winter (where was he when Napoleon needed him!) and of LeGentil to the Indian Ocean are the most remarkable tales of perseverance in scientific history but you should read about them in Fernie's book. No other scientist has spent such a period waiting and preparing for just two events lasting a few hours (he left France on 26 March 1760 and finally returned 8 Oct. 1771!) as did LeGentil.

Unfortunately, an unforeseen effect made the results questionable. As the disc of Venus approached the edge of the Sun for first contact, a bridge suddenly appeared between the discs when still a noticeable distance apart (Fig. 2); this effect is referred to as the black drop effect. The timings were therefore uncertain and the distance or solar parallax remained uncertain. British, German and Russian teams were no more successful.

Because of the importance of the measurement for computing tables of planetary positions (to aid navigation), greater effort was made to prepare teams for the subsequent event in 1769.

The results of the 1769 transit, despite all the precautions and new instrumentation devised for its observation, were again disappointing because of the tear drop effect. James Short, reduced all the observations and deduced a value of the solar parallax of 9.2 arc seconds, but was still uncertain by about 4%.

By the time of the 1874 and 1882 transits, solar parallax had been much better determined by other means, yet several expeditions were sent out to attempt the required observations but with little more success than their predecessors. The events of 2004 and 2012 will only be for curiosity since radar techniques have provided a measure of the solar parallax which could never be exceeded by observations of a transit. Since that of 2004 is only the 6th transit of Venus since Horrocks' observation, one may want to plan for its observation – 4 or 5 generations of astronomers have passed since the last event of this type!

If one lists the sequence of transits seen since Horrocks' time you will see a pattern – Dec. 1631, Dec. 1639, June 1761, June 1769, Dec. 1874, Dec. 1882, June 2004, June 2012, i.e., 8, 121.5, 8, 105.5 years, etc. The eight year repetition is the multiple of the synodic periods of Venus and Earth and Venus is still close to the plane of the Earth's orbit after the eight years but then moves too far from the plane of the Earth's orbit for the next possible transit eight years later. The paths of the pair of events will be parallel but displaced (Fig. 3a,b). Comparing the pairs one discovers that in 1631/39 and 1874/82 Venus was at an ascending node of its orbit and in 1761/69 and 2004/12 at a descending node. Thus the true period of the sequence is 243 years.

Now that you're intrigued and want to observe the next transit of Venus, what are the prospects? Well, unfortunately for us in Canada, we will only see part of these events since, in 2004, Venus will have already made first contact before sunrise. In 2012, the opposite will be true, i.e. we will be able to see first/second contact but the Sun will then set before completion of the transit. The Fig. 4 shows areas where the entire event may be observed (clear areas), where the ingress or egress (but not both) will be visible (cross hatched) or not visible at all (dotted areas). For a further novelty in 2012, one will be able to see the ingress in the evening and wake to see the egress in the morning – but only in Iceland. No doubt Roy Bishop will provide us with details in the *Observer's Handbook* of the best places from which to observe taking local weather conditions into account so we won't have to duplicate LeGentil's extended excursion! – but then if I had a chance to live on Mauritius or the Seychelles for 10 years while collecting a salary, I might be inclined to stay too! Ω

Royal Astronomical Society of Canada - Halifax Centre
COMPARITIVE BALANCE SHEET - YEARS ENDING Sept. 30th, 1990 and 1991

	Year ending September 30th		Amount of increase or (decrease) during 1991	Breakdown per member for 1991	Percentage of Cash		Percentage of Total Assets	
	1991	1990			1991	1990	1991	1990
ASSETS:								
Cash	$2,994.19	$4,418.56	($1,424.37)	$20.51	100.00%	100.00%	30.49%	49.61%
Est'd Membership Receivable (net)	-	-	-	-	-	-	-	-
Accounts Receivable	83.75	-	83.75	0.57	2.80	-	0.85	-
Handbook Inventory	-	-	-	-	-	-	-	-
Merchandise Inventory	42.00	329.02	(-287.02)	0.29	1.40	7.45	0.43	3.69
Prepaid Expenses	-	-	-	-	-	-	-	-
Investments	2,500.00	-	2500.00	17.12	83.50	-	25.46	-
Est'd Library	2,033.16	1,998.16	35.00	13.93	67.90	45.22	20.71	22.44
Observatory Equipment	1,915.57	1,909.97	5.60	13.12	63.98	43.23	19.51	21.45
Estimated Miscellaneous	250.00	250.00	0.00	1.71	8.35	5.66	2.55	2.81
Total Assets	$9,818.67	$8,905.71	$912.96	$67.25	327.92%	201.55%	100.00%	100.00%
LIABILITIES:								
Estimated Handbook Payable	$203.45	$248.55	($81.10)	$1.39	6.79%	6.44%	2.07%	3.20%
Estimated Operating Expenses	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Total Liabilities	$203.45	$248.55	($81.10)	$1.39	6.79%	6.44%	2.07%	3.20%
CAPITAL:								
Equity	$9,615.22	$8,621.16	$994.06	$65.86	321.13%	195.11%	97.93%	96.80%
Retained Revenue	-	-	-	-	-	-	-	-
Total Capital	$9,615.22	$8,621.16	$994.06	$65.86	321.13%	195.11%	97.93%	96.80%
Total Liabilities and Capital	**$9,818.67**	**$78,905.71**	**$912.96**	**$67.25**	**327.92%**	**201.55%**	**100.00%**	**100.00%**

Royal Astronomical Society of Canada - Halifax Centre
COMPARATIVE INCOME STATEMENT - YEARS ENDING Sept. 30th, 1990 and 1991

	Year ending September 30th		Amount of increase or (decrease) during 1991	Breakdown of the $32 membership fee	Percentage of Membership Fees		Percentage of Total revenue	
	1991	1990			1991	1990	1990	1989
REVENUE:								
Membership Fees	$4,432.40	$3,920.00	$512.40	$25.00	100.00%	100.00%	63.10%	55.89%
Life Members Grant	310.00	280.00	30.00	1.75	6.99	7.14	4.41	3.99
Donations	220.27.00	195.52	24.75	1.24	4.97	4.99	3.14	2.79
Educational Activities	-	-	-	-	-	-	-	-
Interest & Dividends	292.68	559.44	(266.76)	1.65	6.60	14.27	4.17	7.98
Sales of Handbooks (net)	76.22	599.87	(523.65)	0.43	1.72	15.30	1.09	8.55
Advertising	20.00	200.00	(180.00)	0.11	0.45	5.10	0.28	2.85
General Assembly (inc. grant)	618.20	171.65	446.55	3.49	13.95	4.38	8.80	2.45
Other Grants	-	1,000.00	(1,000.00)	-	-	25.51	-	14.26
Miscellaneous	1,054.69	87.00	967.69	5.95	23.80	2.22	15.01	1.24
Total Revenue	$7,024.46	$7,013.48	$10.98	$39.62	158.48%	178.92%	100.00%	100.00%
EXPENDITURES:								
Fees to National Office	$2,787.20	$2,565.00	$222.20	$15.72	62.88%	65.43%	39.68%	36.57%
Library	35.00	120.92	(85.92)	0.20	0.79	3.08	0.50	1.72
Meetings & Newsletter	1,047.93	2,176.60	(1,128.67)	5.91	23.64	55.53	14.92	31.03
Annual Dinner (net)	(97.15)	(114.68)	17.53	(0.55)	(2.19)	(2.93)	(1.38)	(1.64)
General Assembly (excl. grant)	956.40	238.00	718.40	5.39	21.58	6.07	13.62	3.39
Equipment & Supplies	5.60	652.80	(647.20)	0.03	0.13	16.65	0.08	9.31
Office Administration	380.42	510.48	(130.06)	2.15	8.58	13.02	5.42	7.28
General Expenses & Audit	2,500.00	-	2,500.00	-	56.40	-	35.59	-
Educational Activities	-	257.35	(257.35)	-	-	6.57	-	3.67
Insurance	-	-	-	-	-	-	-	-
Awards & Donations	151.70	180.00	(28.30)	0.86	3.42	4.59	2.16	2.57
Operating Expenses - Observatory	-	-	-	-	-	-	-	-
Miscellaneous	681.73	266.73	415.00	3.85	15.38	6.80	9.71	3.80
Total Expenditures	$8,448.83	$6,853.20	$1,595.63	$33.55	190.62%	174.83%	120.28%	97.71%
Surplus or (Deficit)	($1,424.37)	$160.28	($1,584.65)	$6.07	(32.14%)	4.09%	(20.28%)	2.29%

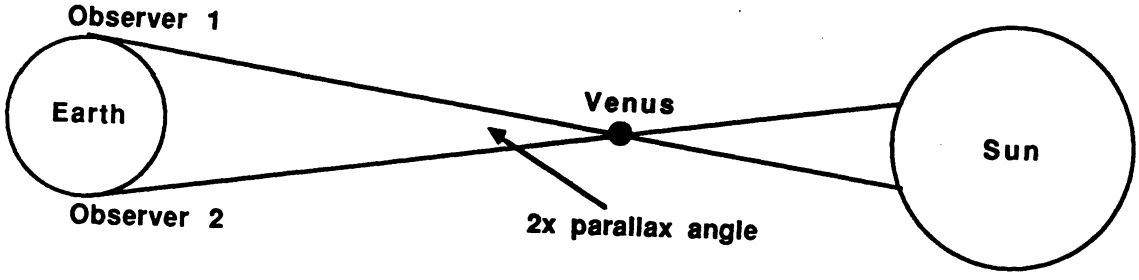


Figure 1: Measuring solar parallax

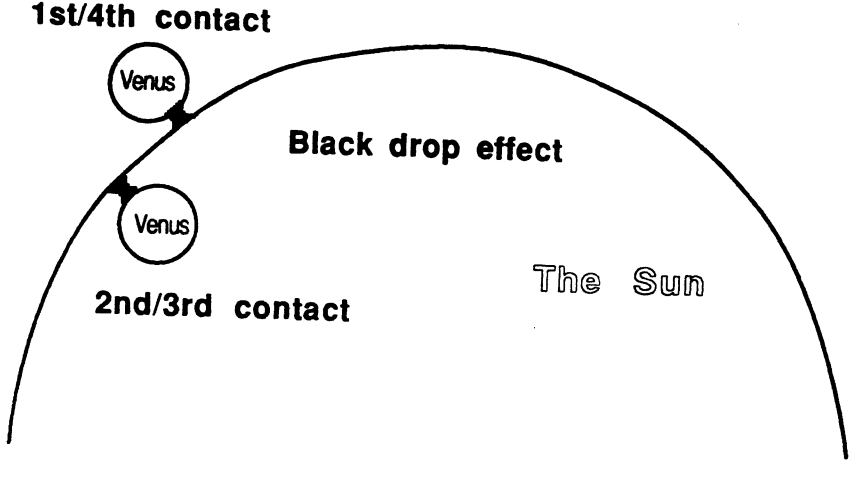
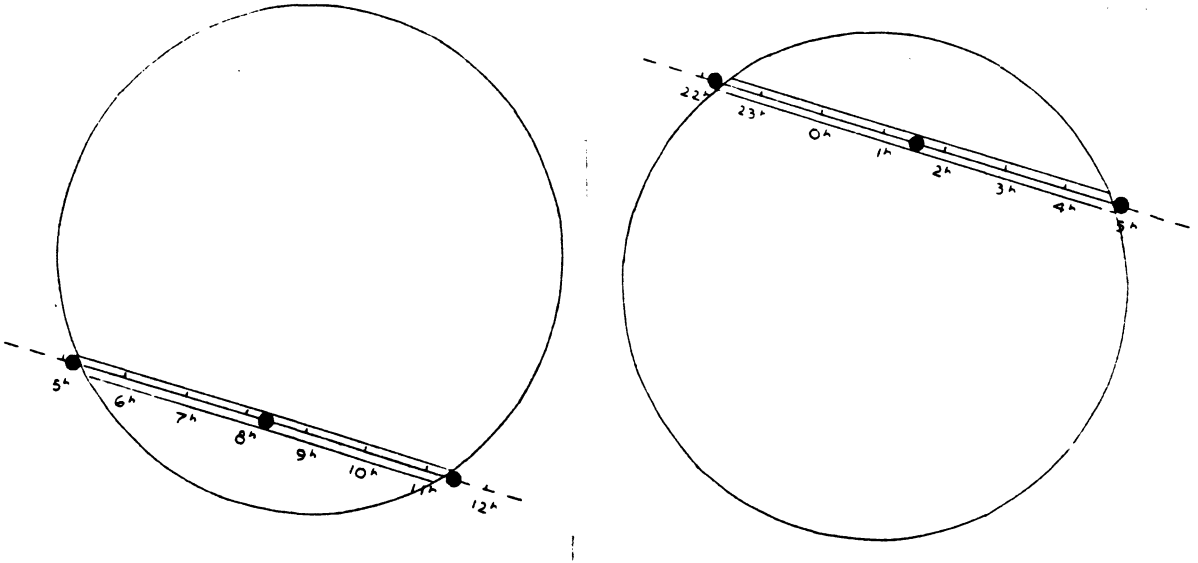


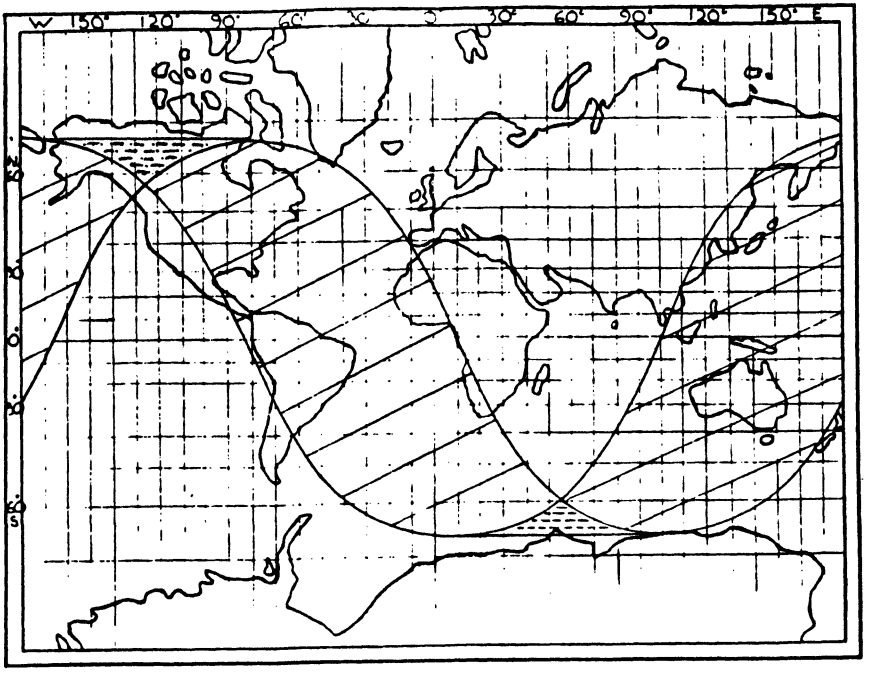
Figure 2: The tear drop effect

Figure 3: Paths of Venus across the solar disc for a geocentric observer.

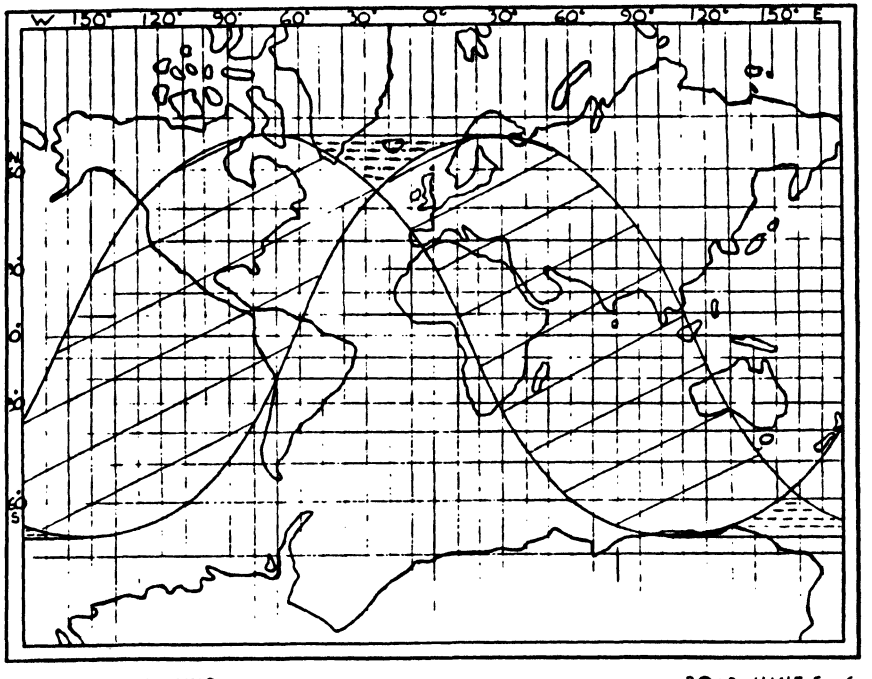
2004 (left),2012 (right)

Figures 3 and 4 are from Peter MacDonald, *BAA Journal*, **101**,p.176-8,1991.





TRANSIT OF VENUS 2004 JUNE 8



TRANSIT OF VENUS 2012 JUNE 5 - 6

Figure 4

Treasurer's Report

Nat Cohen

This will be my last report to you for a while as our constitution requires that I relinquish the post, having held it for three years. Now it would be most remiss of me to end my term without acknowledgement of the contribution to this office by Joe Yurchesyn. Joe set up the system on Lotus 1-2-3 in such a way that we are able to track our financial situation on an ongoing basis, much the same as a business normally would do. The advantage of being able to do this is inestimable, and the centre really owes him a great debt of gratitude. Basically what I have done for the last three years is to continue using this system under his guidance. What exactly has this meant? Well, should any member had requested, and I have to remind you all that you are entitled to request, I could have given you a complete up to date report on all our finances. Joe's system allows us to generate a monthly report which shows us not only exactly how we are doing, but what our prospects are.

Let us now deal with how we are doing. As Mr. Bird said to the boys "In this life, one thing counts, in the bank, large amounts" (Oliver that is.) *[Editor's Note: Alas, I wish I could reproduce Nat singing this verse at the November meeting]* I am pleased to report that in spite of a slightly diminished membership, and higher expenditures, we still have a fairly respectable bank balance. As I said last year, although we are not a business as such, and do not have to make a profit, the fact that we have cash assets puts us in a good position to influence events, even if in only as minor way, at least we are able to make some small contribution. I speak of the hope that the metro area may one day acquire a planetarium.

In any case, lack of funds to pay our way is always more of a headache than a certain measure of affluence. Although the financial statements appear elsewhere in this issue I will very briefly summarize our position based on these sheets.

There is one thing you should note. Because the interest on our G.I.C. is not paid until the second week of November, it does not show up on this sheet. This shows a decrease of $266.76 over last year, but in fact we have already received our dividend of $287.50 so we are actually $20.74 better off than last year. Total interest for last year was $559.44 and for this year is $580.18.

I have not done the arithmetic to see if we did better with the G.I.C. than we would have if we had left all of our funds collecting daily interest. We did get 11.5% on the certificate at a time when interest rates were starting to fall. As they have now fallen very drastically, had I been a true prophet I would have taken out this

certificate for a longer period than one year. What I have done is to renew the certificate for this year and have increased its value to $3000.

At the same time we now have $4598.23 in the current account, but I am going to have to send something to National Office before too long, otherwise they may become somewhat impatient with me. We have on hand fifty membership renewals (not counting life members or any that I receive before making my submission). This means that, thus far, we owe National Office something like $900 so we still have about $3500 in cash to call our own. I really don't know what Mary and I are doing here, as this amount would have comfortably transported us to Mizpe Ramon where we could have been enjoying beautifully clear dark skies and the use of a real telescope. What can I say, especially after the weather we have had this past while. But, back to the matter at hand.

Our total revenue this year was $7024.66 compared to $7013.48 last, but last year we put in $1000 as a grant under "Donations & Grants". This was really a fictitious thing, as it was meant to cover the cost of printing the newsletter which we were getting for free. This year we have had to pay for this so we no longer show this as a revenue, because it is now a genuine expense and is going to rise with the increasing cost of postage.

The general expense and audit expense of $2500 is, of course, our G.I.C. but this shows up again as an asset on the balance sheet, therefore you should not be too scared by the -$1424.37 figure on the comparative income statement. The bottom line is, that compared to last year, in terms of total cash and assets, we are s$931.96 better off.

Thank you all for putting up with me. Only those who wear little white coats should be so inflicted. Between now and the end of the year I shall hand the reins back to Joe. In the meantime, as I have the system of membership renewals and National Office submissions tuned to a fine art with WordPerfect, I shall continue this end of it, so you may renew through Pat or myself until the end of the year. T.T.F.N. (which for those of you old enough to remember a certain B.B.C. radio show is "Ta ta for now!") Ω

Astro Ads

FOR SALE: TASCO 4.5 INCH REFLECTOR

- tripod, case, etc. - excellent condition
- asking $225

Call Barry Marr - (902) 865-5769 (Lower Scakville)

NOVA NOTES INDEX

September-October 1991 Volume 22, Number 5

1991 Halifax Centre Executive	Halifax Centre	81
Notice of Meetings	Halifax Centre	82
Editor's Report	Patrick Kelly	83
The 1990 Highland Star Party	C.B.A.S.	84
Transits of Venus	Randall Brooks	60
1991 Financial Statement	Nat Cohen	88
Transits of Venus (Figures)	Randall Brooks	92
Treasurer's Report	Nat Cohen	95
Cartoon	Meddick	74
Ask GAZER	GAZER	78
Astro Ads	Halifax Centre	80

NOVA NOTES is published bimonthly by the Halifax Centre of the Royal Astronomical Society of Canada in January, March, May, July, September and November. Opinions expressed in articles and/or columns are those of the author and are not necessarily those of the Halifax Centre. Articles for the next issue should reach the editor by January 17th, 1992. Articles on any aspect of astronomy will be considered for publication. The editor is:

Patrick Kelly
2 Arvida Avenue
Halifax, Nova Scotia
Canada
B3R 1K8
477-8720

NOVA NOTES is printed on 50% recycled paper containing at least 5% post-consumer fiber.

HALIFAX CENTRE - R. A. S. C.
1991/92 CALENDAR OF EVENTS

November

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

December

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

January

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

February

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

Key to calendar:

Regular Meetings: **bold and shadowed**

Special days: **bold** (On dates marked with an asterisk, the event occurs on the **morning** of the date given. Check your Observer's Handbook for details)

Possible observing sessions: underlined

Special Days:

December 14 - Geminid meteor shower
January 4 - Quadrantid meteor shower

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

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