



NOVA

NEWSLETTER OF THE VANCOUVER CENTRE RASC

VOLUME 2003 ISSUE 1

JANUARY/FEBRUARY 2003

The One That Got Away	1
Old History	2
President's Message	3
Uranometria 2000.0 Vol. 1	6
GA 2003 Report	7
Upcoming Events	8
Members' Gallery	11

Looking Ahead

Remember, you are always welcome to attend meetings of Council, held on the first Tuesday of every month at 7:30pm in the G.S.O.

Jan. 14: Ray Villard, PR Director for the Space Telescope Science Institute.

Feb. 11: Dr. Alan Shotter, Director of TRIUMF, on Nuclear Astrophysics.

Mar. 11: Dr. Fred Raab, Director of Hanford's Gravity Wave Observatory, on gravity wave astronomy.

Next Issue Deadline

Material for the March Nova should be submitted by Monday, Mar. 3, 2003. Please send submissions to:

Gordon Farrell
(gfarrell@shaw.ca)

The One That Got Away

by Bill Ronald

We have been very lucky when we have gone hunting total solar eclipses. In 1998, on the *Norwegian Sea* in the Caribbean, Linda and I had Jay Anderson on board to find the hole in the clouds.

rewarded with perfect weather.

It was therefore with a fair degree of confidence that I planned to view the December 4, 2002 eclipse, from the deck of the *Olympic Countess*, in the Indian



In 1999, we luckily chose to view from the deck of the *Vistafford* in the Black Sea, and had perfect skies, while much of Britain and Europe was clouded out. In 2001, we went with Alan Dyer to the Zambezi Valley in northern Zimbabwe and were again

Ocean south of Madagascar. Alan Dyer had suggested that we join him for the 'sunset eclipse' in Western Australia, but it was only 30 seconds long and I just have to take pictures, so I chose the one minute and forty seconds in the

continued on page 8

Old History

by Marc Verschueren

We observers can only see the visible light. We do know that even then we look back in history. When we look, this time of the year, at the brilliant Betelgeuse or Rigel, we are seeing these magnificent stars like they were a few hundred years ago. This sets us on the road to the history of the universe.

I do, in general, not like an expression such as: “This is the greatest discovery of the century.” It is impossible to make a statement like that. Discoveries cannot be ranked like horses crossing the finish line on the track, but we can certainly say that some discoveries are extremely important. One of the deepest insights astronomy has acquired in the last century or so is that the universe had an origin. Long before that, people like Laplace already realized that stars had a lifetime; they were born and they died. But that the universe as a whole had an origin and a history dates back to cosmologists like Lemaitre and Friedman and others. They got their ideas from the Einstein equations which made it possible to think of an expanding universe. Space-time grows on us, so it could have had a beginning. As a concept, many will readily accept this—we are after all used to the idea of evolution. But it is essential to have some experimental justification for the concept—some totally independent observations, some measurements—that are consistent

with the basic idea. Gamov and his coworkers presented, in the early fifties, a reasonable description of the evolution of the very early universe which predicted that there should be some electro-magnetic radiation left over from these very early moments of the universe. And this radiation was found, in 1964, by Penzias and Wilson. Now that was one of these great discoveries. As a measurement, it was totally independent of the Einstein equations or Gamov’s considerations, but it confirmed the latter.

But there was a problem. This radiation, commonly known today as the Cosmic Microwave Background (or CMB for short) was absolutely the same in all directions, and the universe is not like that. If it were like that, it would be a very boring night sky. No, the sky is full of stars and nebulae and galaxies—matter is not spread out uniformly. From very early on the universe must have been non-uniform to some degree. The non-uniformity could then create stars and galaxies. But then the CMB interacting with this very early matter would also be non-uniform, anisotropic. In 1992, George Smoot and a small army of collaborators announced exactly that. If you look in different directions at the universe, the cosmic background radiation is different. The differences are very small but they are large enough to allow for the creation of structures such as stars and

galaxies and they are large enough to be measured.

But there always is a problem. In the last few years, people have found more and more detail in the structure of the CMB. The Map satellite, with which UBC is closely connected, is doing work in this field. But it is always possible to claim that the anisotropy of the CMB is caused by absorption by large scale structures in the universe, absorption that happened as the radiation travelled to us today. There is a possibility to decide this. If the anisotropy in the CMB is caused by scattering by anisotropic matter in the early universe, this radiation will be partially polarized and will have moved more or less freely ever since. Polarization means that the electrical and magnetic fields of the radiation oscillate more in some directions than others. This phenomenon is actually quite well known. Light of the Sun reflected by the air in the sky is partially polarized. Light reflected from a highway is partially polarized. The functioning of polaroid sunglasses is based on this.

We are asking for a lot now. First one has to discover the very weak CMB; that was done. Then we needed a structure in this radiation. That was done. Now we need a polarization, and has been done as well. In my opinion, this is once again one of these great discoveries. It was announced last

continued on page 9

President's Message

This year is going to be a busy and exciting one for the Vancouver Centre. At the January Council meeting, we outlined the usual schedule of events for the year, and in addition we are considering some interesting new public outreach events such as a "National Dark-Sky Week" and a "Mars Week." We are also looking at a new location, in the Merritt area, for the second club star party this year. However, the big event of the year is that Vancouver Centre is hosting the annual General Assembly of the Royal Astronomical Society of Canada, at the end of June. It is particularly significant for us because it is the 100th Anniversary of Royal Recognition of the Astronomical Society, and it happens in a year when one of our centre's members, Rajiv Gupta, is the National President.

I hope that this year will also be the "Year of the Volunteer" in our centre. It is not uncommon that as a club's membership grows, the percentage of members who get involved tends to get smaller. I find that at many outreach events there are a lot of familiar faces; those of Council members and a few die-hard volunteers. However, at least once a year, on Astronomy Day, there is a good turnout. Lots of members join in, the work gets spread around, people get to know each other and everyone has a good time.

This year we are offering you many chances to get involved and
continued on page 5

2003 Vancouver Centre Officers

President

Bill Ronald 604-733-7036
ronaldb@shaw.ca

Vice-President

Nicole van den Elzen 604-501-2656
nicole@deepskyobjects.ca

Secretary

Ron Jerome 604-298-3292
jerome3292@shaw.ca

Treasurer

Marc Verschuere 604-986-1485
marcver@shaw.ca

Librarian

William Fearon 604-939-1895
williamfearon147@hotmail.com

National Representatives

Pomponia Martinez 604-215-8844
pomponia@telus.net
Bob Parry 604-215-8844
robpar@telus.net

Membership

Dan Collier 604-732-6046

Chair, CARO Committee

Bob Parry 604-215-8844

Director of Telescopes

Phil Morris 604-734-8708

Public Relations

Norman Song 604-299-7924
norman_song@telus.net

Speakers

Barry Shanko 604-271-0615
barry.mail@intouch.bc.ca

Merchandising

Doug Montgomery 604-596-7058
moondoug@home.com

Nova Editor

Gordon Farrell 604-734-0326
gfarrell@shaw.ca

Webmaster

Jason Rickerby 604-502-8158
rickerby@dccnet.com

Greeter

Greg Price 604-377-5547
glm-price@telus.net

Trustees

Sally Baker 604-324-3309
Lee Johnson 604-941-5364

About RASC

The Vancouver Centre, RASC meets at 7:30 PM in the auditorium of the H.R. MacMillan Space Centre at 1100 Chestnut St., Vancouver, on the second Tuesday of every month. Guests are always welcome. In addition, the Centre has an observing site where star parties are regularly scheduled.

Membership is currently \$51.00 per year (\$26.00 for persons under 21 years of age) and can be obtained by writing to the Treasurer at the address below. Annual membership includes the invaluable Observer's Handbook, six issues of the RASC Journal, and, of course, access to all of the club events and projects.

For more information regarding the Centre and its activities, please contact our P.R. Director.

NOVA, the newsletter of the Vancouver Centre, RASC, is published on odd numbered months. Opinions expressed herein are not necessarily those of the Vancouver Centre.

Material on any aspect of astronomy should be e-mailed to the editor, mailed to the address on page 5, or uploaded to SpaceBase™ at 604-473-9358, 59.

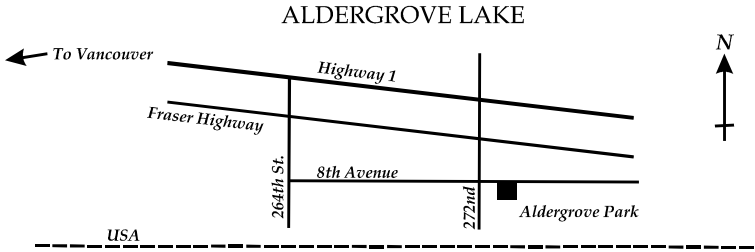
Advertising

Nova encourages free use of its classified ads for members with items for sale or swap. Notify the editor if you wish your ad to run in more than one issue.

Commerical Rates

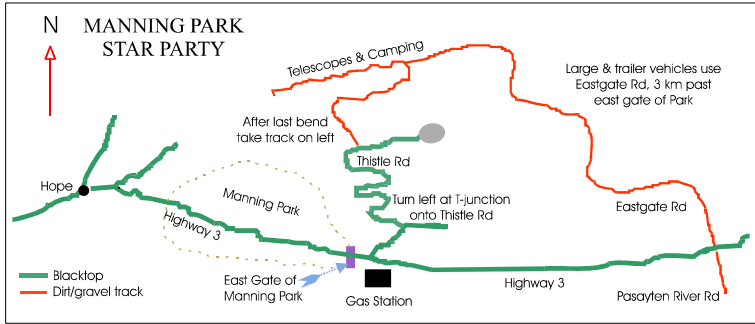
1/2 Page: \$25.00 per issue
Full Page: \$40.00 per issue
Rates are for camera-ready, or electronic files. Payment, by cheque, must accompany ad material. Make cheque payable to: RASC Vancouver Centre.

Observing Sites

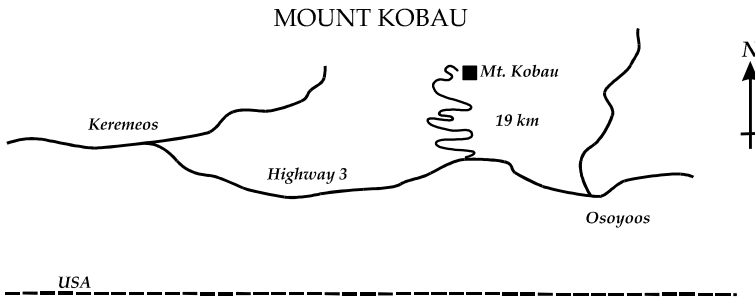


Dale McNabb Observatory in Aldergrove Lake Park (RASC Vancouver Centre's regular viewing site)

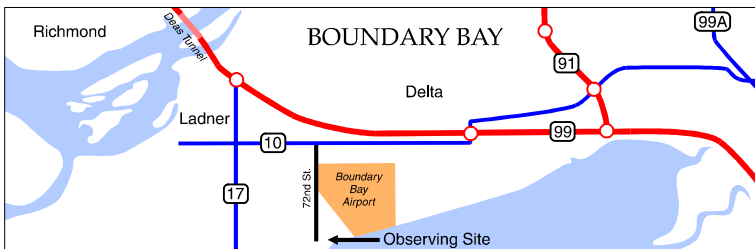
Contact Mike Penndelton (604-888-1505) or Howard Morgan (604-856-9186)



Site of the annual star party organized by the RASC Vancouver Centre



Site of the annual Mt. Kobau Star Party organized by the Mount Kobau Astronomical Society



Site of the regular Thursday night star party. On the dike at the foot of 72nd St.

continued from page 3

to have a lot of fun doing it. The usual events, such as Astronomy Day (May 10), Fraser River Festival (June 1) and Sidewalk Astronomy evenings in April and October are easy to get to and don't take an excessive investment in time and effort. There is a great deal of satisfaction in showing off celestial beauties, such as Saturn's rings, Moon craters and sunspots to the public, particularly to the kids. A good recent example resulted in a picture and a story in the Vancouver Sun on December 28, when one member went out on the street in front of his apartment with a loaner telescope... congratulations and well-done Hassan. Members who have a loaner telescope signed out should also remember that they are expected to bring it to an outreach event if one occurs during their loan period.

The most important event this year is obviously the GA2003 and to make it work, the Vancouver Centre membership really needs to step forward and help out. Attending a GA is a great experience and one that everyone should have at least once. What could be better than to have it right here, in the summer, on the beautiful campus of the University of BC? Craig Breckenridge and the GA2003 Committee have been working very hard for a year and have done most of the groundwork. Now is the time for you to get involved and help us welcome the rest of Canada to really a great and memorable GA.

– Bill Ronald ★

ASTROCOMPUTING

SpaceBase™ (604-473-9358,59). Affiliated since 1992 with RASC Vancouver, our link to RASC Net, RASC Members only chat area. Future data distribution hub for CARO Project. Features include latest HST images, current world space news and astronomy programs. Provides a file uploading facility for submitting articles and imagery to Nova.

LIBRARY

The centre has a large library of books, magazines and old Nova's for your enjoyment at the GSO. Please take advantage of this club service and visit often to check out the new purchases. Suggestions for future library acquisitions are appreciated.

RASCVC on the Internet

<http://members.shaw.ca/rascvan/>
or <http://www.rasc.ca/vancouver>

H.R. MACMILLAN SPACE CENTRE

The Pacific Space Centre Society is a non-profit organization which operates the H.R. MacMillan Space Centre and Gordon M. Southam Observatory. Annual Membership (\$30 Individual, \$65 Family) includes a newsletter, Discounts on Space Camps, special programs and lectures, Vancouver Museum Discounts, and free admission to the Space Centre. Admission to the Space Centre includes: Astronomy shows, Motion Simulator rides, multimedia shows in GroundStation Canada, and access to the Cosmic Courtyard Exhibit Gallery. For Membership information, call Mahi Jordao at 604-738-7827, local 237 for information. You can also reach them on the Internet at <http://www.hrmacmillanspacecentre.com/>

MEMBERSHIP HAS ITS PRIVILEGES!

New members, did you know? The Vancouver Centre has 8 telescopes available for loan free of charge! We have telescopes ranging from 60mm to 10" diameter. For more information see Phil Morris, Director of Telescopes in the lobby of the GSO *after* the members meeting. All telescopes are to be picked up and returned at the GSO. The loaner period is for one month, to be returned after the next meeting. Telescopes are not allowed to circulate outside of these meetings. You can now reserve 2 different telescopes per year and use what is left at the end of the meeting anytime. Phil can be reached at 604-734-8708.

Your greatest opportunity as a member of the R.A.S.C. is to take advantage of the company of other enthusiasts to increase your knowledge, enjoyment and skill in astronomy.

The best thing you can do to gain the most from your membership is to get active! Take in the club meetings; engage other members with questions; come out to observing sessions (also known as "star parties"), and, by all means, volunteer to take part in our many public events.

Observing takes place at the Dale McNabb Observatory in the Aldergrove Lake Park, located in Langley, on 8th Avenue, just east of 272nd Street. We are there most clear nights. Contact Mike Pennedlton at 604-888-1505 or Howard Morgan at 604-856-9186.

RASC
1100 Chestnut Street
Vancouver, B.C.
V6J 3J9
604-738-2855

Uranometria 2000.0 Volume 1

Wil Tirion, Barry Rappaport and Will Remaklus Willmann-Bell, 2001, 336 pages. ISBN 0-943396-71-9

Review by Craig Breckenridge

Back in November our Librarian spent some of his budget to purchase the newly updated Uranometria 2000.0 Volume 1. Being the kind heart that I am, I volunteered to do a book review on it and compare it to the older one that I already have. Needless to say, a bit of start testing was required and since November and December did not provide any clear skies, I wasn't able to get out for viewing until January.

My copy of Uranometria 2000.0 was printed in 1991, so to say that I expected some changes and corrections should not be surprising. The changes are apparent from the second you open the two printings side by side: where the older version has the index of the charts buried near the back of the book, the current printing has them on the inside front cover and first three pages. This makes it much easier to find which chart you need. In addition, they have added darkened tabs at the edge of each page with the latitude range printed on them. Even in the dark with my red light, I was still able to find the correct pages easily. The first few pages of the book have an additional set

of index chart that are finer in detail than the main index charts. When you are spending an evening in one particular area these come in very handy. The arrangement of charts now makes more sense with them progressing from east to west rather than jumping around as they did in the old edition. The number of charts was reduced from 473 to 220 but each chart is now a double page and has a scale of 1.85 cm per degree of declination.

The introduction has been expanded with a greater amount of information added. In addition to the 280,035 stars shown (down from 332,556), 25,000 galaxies down to 15th Magnitude are depicted and over 30,000 non-stellar objects are plotted. Stars are now plotted as faint as 9.75 magnitude which helps immensely when comparing the faint patch of sky that is in your viewfinder to the charts. There are 26 'close-up' charts at X2 and X3 added that plot stars down to 11.0 magnitude. Magnitudes represented in the book are derived from the Tycho-2 Catalogue published by ESA and derived from the Hipparcos satellite's mapper. The Hipparcos magnitudes and the Tycho-2 magnitudes match the visual magnitude very closely and this results in a more accurate representation in the Uranometria. A simple side by side comparison of the charts shows the increased number of objects immediately.

Another important addition to Uranometria are the indexes given

at the back of the book. In the past, if you knew a star's proper name but did not know which constellation it was in, your hopes of finding it by flipping through the charts was very slim. Now all you have to do is look in the rear indexes and the chart number is given. The Bayer stars, Common names for non-stellar objects, Messier, IC and NGC objects are all listed. This made it so much easier to find anything that I was beside myself. I spent several evenings just going to things listed in the back of the book that I had not looked for before.

For those of us who like to use printed charts when viewing, this new edition of Uranometria 2000.0 is a 'must-have.' ★

GA 2003 Report

With this being the first newsletter of 2003, it is only fitting that I remind everyone that the 2003 General Assembly is under 6 months away. We have a lot of organization to do still and every helping hand we can get is greatly appreciated. To this end I am calling for volunteers to head specific sub-committees and for people to start volunteering for these committees. While it may at first seem like a daunting task, you will quickly find out that we have organized the duties in such a way as to make them fairly easy to accomplish with a minimum amount of time required. There are only a small number of us who are having a large amount to do.

You might be asking yourself why you should volunteer and there are several responses to that. The first is that you would be helping the Vancouver Centre put on an event that we want the Society at large to remember for many years to come. We want the attendees to remember Vancouver's 2003 GA as the best one they have ever been to. With that in mind, we have assembled an amazing group of speakers with a definite Canadian Content; we are after all the Royal Astronomical Society of Canada.

Our speakers are finalized and include Dr. Gordon Walker, who was instrumental in developing the methods used to discover extra-solar planets. In addition to his work in astronomy, Dr. Walker has been on many committees to

advise observatories and their viewing programs, most notably representing Canada for the Gemini Telescopes. Dr. Walker will be our Northcott lecturer on Sunday afternoon. David Levy will speak on our dinner cruise Saturday night and participate in a workshop on observing techniques Friday afternoon. We have been fortunate enough to have Alan Dyer present a talk full of his images at our Banquet on Sunday night. Alan will also participate in a workshop Friday to discuss imaging processes. Jack Newton will provide inspiration at the workshops with David Levy and Alan Dyer. I think the presentation of two different methods of observing and imaging in each of these workshops respectively will provide some new ideas for all of us. We will have Dr. Jaymie Matthews present his MOST findings hot off the press on Saturday afternoon. We all know Jaymie for his wit and great presentations and now that National has had a taste of him at the Montreal GA, we are fortunate to have him right here at home. We hope that the HR MacMillan Space Centre's David Dodge will have the same effect on the audience that he has on our regulars. Mr. Dodge rounds out our speakers for Saturday. On Saturday morning we have the Plenary session to officially open the conference and we have invited the Honorable Adrienne Clarkson to attend. We will have

Mr. Peter Broughton present a short talk on the history of the RASC at that event. For those of you who don't know him, Peter is the historian for the Society and the author of 'Looking Up,' which presents the history of the Society from its inception. Peter will be helping us to celebrate the 100th anniversary of the receipt of the Royal Charter. On Sunday we will have the Annual Meeting itself and will follow it with a workshop that will showcase two of the latest Canadian software offerings. Carol Leggat and John Nemy will present the latest offering from Starry Night and Peter Cerevolo will showcase Desktop Universe. Both of these products look absolutely amazing and I am sure we will all want to participate in that workshop. In addition to all these workshops and talks we will be having Paper Sessions, a tour of the TRIUMF facility, a planetarium tour, a CAROp tour and as many chances to observe as we can.

The committees we have set up are as follows:

1. Public Relations: Norman Song, with assistance of Pomponia Martinez and Doug Montgomery.
2. Murphy Night: Dan Collier.
3. Wine and Cheese Party: Hassan H.
4. Food Committee: Doug Montgomery and Glenn MacAskill.
5. Transportation: Doug

continued on page 10

Upcoming Events

February

22 – Young Naturalists
28 – Messier Marathon 1

March

2 – Messier Marathon 1 (rain date)
16 – Artificial Star Party (tentative date)
28-30 – Messier Marathon 2

April

11-12 – Sidewalk Astronomy 1
25-26 – Sidewalk Astronomy (rain date)

May

10 – Astronomy Day
15 – Total Lunar Eclipse

June

1 – Fraser River Festival
26 – 2003 General Assembly begins

July

1 – 2003 General Assembly ends
25-26 – Manning Star Party & Manning Outreach
26 – Mt. Kobau Star Party begins

August

2 – Manning Star Party ends
12 – Perseid meteor shower; observing at Aldergrove Lake
TBD – Mars Week

September

26-27 – Merritt Star Party

October

17-18 – Sidewalk Astronomy 2

December

9 – AGM

continued from page 1

Indian Ocean. The cruise ship coordinator was Ted Pedas, the father of ‘eclipse-cruising,’ which he had originated in 1972. I figured the odds for seeing the eclipse would be pretty good since Ted had a perfect record up to that point. Also on board as lecturers were Ed Krupp of the Griffith Observatory in Los Angeles, astronaut Scott Carpenter, eclipse photographer George Keene and geologist Jolyon Halse.

We sailed from Athens on November 8 and headed for Egypt where we visited the pyramids, the Sphinx, the Valley of the Kings, etc., all under heavily armed guard. We then sailed through the Suez Canal down to Djibouti, where we saw warships from France, Germany and the United States. Along the way divers inspected the hull of our ship for unwanted attachments, Egyptian troops used binoculars to record every

movement on the ship and we were buzzed by a US helicopter/gunship. We slipped quietly past Yemen and then headed out into the Indian Ocean for the Seychelles. At this point I began to get a bit nervous, because we had to spend extra time there to



avoid tropical storm Bourra, which was to the south of us. Where were the clear skies and soft summer breezes? By the time we got to Durban, South Africa, by way of Mauritius and Madagascar (where half of the passengers learned the hard way not to eat the local food), we had gone through two major storms which had attempted to turn the old ship into a corkscrew.

Astronomically, we did get to see some of the southern sky

notables. I finally saw the Large and Small Magellanic Clouds and Toucanae 47. They are so easy when it is the right time of year. Orion was sharp, beautiful and upside-down. So was the Moon and it does look like a rabbit rather than a man from that angle. Most of these were observed through partly clouded skies, in the company of a very small group of intrepid astronomers, on the foredeck of a bouncing old ship with nothing to sit on, hold onto or lean against as you held up your binoculars.

At Durban, most of the British and European passengers left the ship. They hadn’t been told about the eclipse cruise, so we had just over 200 eclipse chasers and about 325 crew on a ship designed to carry over 800 passengers! The weather appeared to calm down as we headed for the viewing site. The day before the eclipse, Ed Krupp held a ‘dress-rehearsal’

continued on page 9

continued from page 8

where we all set up our equipment and pretended to observe the big event. It was so bright and sunny that I got a sunburn.

Eclipse Day dawned cloudy but there were a few holes in the clouds. We all crossed our fingers, quickly grabbed some breakfast and set up our equipment. The clouds seemed to be forming several layers, all moving in different directions and the holes came and went rapidly. Every time we headed for a big one it disappeared. We just managed to detect first contact with our telescopes and occasionally saw partial phases after that. By the time second contact arrived, it was obvious that we weren't going to

see the corona or prominences. The wind increased and it got very cold, even though my temperature experiment only showed a maximum drop of two degrees C. For the first time, I got to look all around me during an eclipse. I saw a diffuse shadow approach on the clouds, the light all around the horizon when it became dark, a pelagic seabird coming to join us for the 'night'. It was completely unlike any of our previous experiences.

When totality was over, I hung around until my temperature measurements were finished, then quietly packed up my almost unused telescope and photographic equipment. The temperature rose several degrees

and it began to feel quite warm under the heavy clouds, as we raised the 'eclipse flag,' toasted it with lots of champagne and took part in the dancing and singing. There was some disappointment, particularly among the 'first-timers.' The strange thing was that my disappointment was more for my 'first-timer' friends than for myself, because they didn't realize what they had missed. I hadn't seen the 'neat stuff' but I had stood again in the shadow, bringing my total to almost exactly eleven minutes, and I had had a 'totally' new experience. Maybe I shouldn't call it "the one that got away" but rather "the one that gave a new perspective." ★

continued from page 2

September by a team of the University of Chicago working at the South Pole. The news got somewhat lost among so many other messages about new discoveries. It is not something that makes the headlines of the

newspapers, but it confirms that our ideas of the early universe are based on solid ground. The new challenge is to find the polarization by scattering from gravitational waves from the early universe. For this we will have to wait a while. Possibly the Planck

satellite to be launched in 2007 could do this.

When we look this winter at Rigel and Betelgeuse, we know a little bit better how they are the last stages of a long, long history. ★

continued from page 7

- Montgomery.
6. Registration: Ron Jerome is the chair, volunteers are Jason Rickerby, Bob Parry, Pomponia Martinez, Marc Verscheuren, Gordon Farrell and Bill Ronald.
 7. Paper Sessions: William Fearon.
 8. Hospitality: **Volunteer required.**
 9. Door Prizes: Norman Song will keep track of them; all GA members encouraged to seek them but to be coordinated by Norman.
 10. Sunday morning church service: **Volunteer required.**
 11. CAROp Tour: Craig has asked Eric Fuller.

12. Pictures: position filled.
13. Program: Gordon Farrell, any input to Gordon is much appreciated.
14. Promotional Items: Doug Montgomery.
15. Speakers: Craig Breckenridge.
16. Finance Committee: Marc Verscheuren.
Any of these Committee heads could use a great deal of help so I am sure they would appreciate your call to assist them. If only 10% of membership volunteered we would have an easy time of it. As a special deal for volunteers, they will be entitled to register for the conference for half price of the full conference fee.

We are hoping this will be the biggest event ever staged by Vancouver Centre and the one which puts Vancouver on the map as far as being good hosts. The location at UBC showcases the scenery that surrounds us to excellent advantage. The assistance of the Conference staff at the UBC Conference Centre and Tourism Vancouver should ensure that we provide a General Assembly that reflects the professionalism that we are capable of.

I look forward to any comments and volunteers.

Craig Breckenridge
2003 GA Committee Chair *



Outgoing President Craig Breckenridge presents the Vancouver Centre's Member Service award to Lee Johnson at the December AGM. Congratulations, Lee!



CAROp's Cookbook

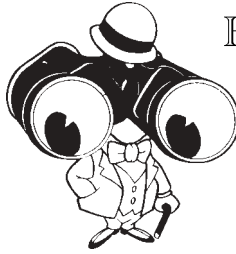
Camera

Constructed by Dan Collier.
Insets show the camera's
CCD (bottom) and the first
light image (top).

RASC MERCHANDISE

Available for purchase after meetings:

Calendars	\$12.00
Beginners' Guides	\$15.00
Observers' Guides	\$20.00
Star Charts	\$10.00
Cloth Crests	\$11.00
Lapel Pins	\$ 6.00
L.E.D. Flashlights	\$22.00



HARRISON SCIENTIFIC INSTRUMENTS LTD.

**Telescopes - Binoculars
Microscopes & Accessories
Weather Instruments**

DEALER FOR

**ZEISS • PENTAX • CELESTRON •
BUSHNELL/BAUSCH & LOMB • SKYWATCHER •
OLYMPUS • STEINER**

CD-ROM Astronomy Skymaps for PC's
"Like New" Consignment Equipment

**1859 West 4th Avenue, Vancouver, BC V6J 1M4
tel: 604-737-4303 fax: 604-737-4390
e-mail: harscope@direct.ca**

Vancouver Telescope Centre

Telescope, Binocular, Microscope Specialists
PROPRIETOR JOHN HARTLEY
2565 Yew Street, Vancouver, B.C. V6K 2E3
Phone 604-738-5717

New

Telescopes, Binoculars, Spotting
Scopes and accessories by

**MEADE
CELESTRON
BAUSCH & LOMB
OMCON-KOWA
BUSHNELL
SWAROVSKI-STEINER
SWIFT-PENTAX
CARL ZEISS-NIKON
SKY WATCHER
VISTA ANTARES**

Assorted eyepieces, barlows,
star diagonals 0.96" - 2"

New and second hand

Visit our Web site at

www.vancouvertelescope.com

e-mail: john_hartley@telus.net

Second Hand

JMI NGC Micro-max (C8/GP mount)	\$ 300.00
Meade 4" Ring Tube C/Weight	\$ 45.00
Meade APO Universal Thread Adaptor	\$ 39.00
Meade 2080 8"SC + many accessories	\$ 2500.00
Meade Pictor CCD Autoguider model 201XT	\$ 599.00
Meade 10" f/4.5 Starfinder/equatorial mount plus accessories	\$ 1500.00

Now in stock: Pentax XL Eyepieces