NOVA

NEWSLETTER OF THE VANCOUVER CENTRE RASC

VOLUME 2000 ISSUE 4 JULY/AUGUST 2000

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.

July: Gary Wolanski and his 16" aluminum wonder.

August: Dr. John Hutchings of the DAO: "Building and operating FUSE: Canada's part in a space telescope"

Next Issue Deadline

Material for the September Nova should submitted by Monday, September 4, 2000. Please send submissions to:

Gordon Farrell
(gfarrell@home.com)

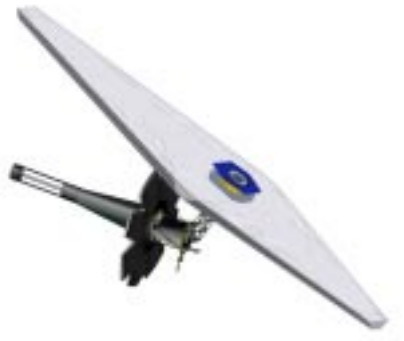
or Bob Parry
(robpar@ballard.com)

Keep Up or Fall Behind

by Barry Shanko

In this technological age, if you don't keep up, you soon fall so far behind that you become obsolete. While the pace of change in professional astronomy isn't as great, it's present.

In a report released at the Canadian Astronomical Society meeting at UBC in May, Canadian astronomers are asking for a more than doubling of the planned federal government funding for astronomy over the next 15 years in order to participate in four new telescope projects.



A proposed design for the Next Generation Space Telescope (NGST)

The report, *The Origins of Structure in the Universe*, points out CFHT will cease to be a front line observatory around 2005. While Canada has a part of the Gemini telescopes, that by itself is not enough to keep the nation at the forefront of astronomical research. The report can be downloaded from http://www.casca.ca/lrp.

While it isn't required that this country contribute to new projects, since individuals can always apply for time by themselves, one well-known Canadian astronomer, who wished to remain anonymous, said, "Partners decide who shall have access to facilities, and there is no guarantee of being able to freeload forever. We definitely can't afford to rely only on this kind of charity. Being involved puts Canada into the scientific driving seat—we design things to do the science we care about."

Canadians' research results are cited in scientific papers with a frequency second only to American and European astronomers, a key measurement of how Canadian work is received in the professional arena. To keep this standing, this nation's astronomical community needs investment in a new group of ground- and space-based observatories.

Rather than thinking of them as separate projects, the report states these facilities will complement each other, discoveries made with one can be followed up with the others. In descending order of importance, it recommends Canada's participation in:

1) *The Atacama Large Millimeter Array*, a group of 64 12-meter radio telescopes spread over 10 square kilometres of Chile. The U.S. and Europe are looking for partners, who could be Japan and Canada. It's a successor to the James Clerk Maxwell radio telescope's probing of the universe

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Manning Mountain Star Party Report

by Bob Parry

Hello to all those chickens that would not go to Manning this year. I must admit that after a long week I did not feel like driving up to Manning Friday evening. That was a shame, as Friday night was a wonderful night from what I was told.

The die-hards were there, Mike Penndelton, Wally Helter, Gary Wolanski and John Sherrett. Pomponia and I arrived Saturday afternoon just as Bryan Kelso and his wife Vera were setting up camp. The weather in Manning Park was quite nice, a big contrast to the thunderstorm that was occurring in Vancouver at the time.

Saturday night was quite lovely; there were a lot of clouds around but it cleared for good periods of time and provided good views through the scopes that were set up. I personally did not get my 10" set up but had some excellent views through the 80mm refractor. Just as we were about to give up for the night and were getting ready for bed—the sky had clouded over and it was now around 1:00 AM—the sky parted and the most impressive view of the Milky Way I can ever remember was "Right There". One could almost reach up and grab ahold. I will remember that view for a long time. We were revitalized and were talking of seeing comet Linear as Andromeda was rising; alas it was not to be as the clouds returned, ending the evening's viewing.

Next morning, Sunday dawned bright and sunny with big puffy clouds and warm sunshine. We went for a walk along a logging road and saw some of the local wildlife such as a grouse and small bird's nest with three blue eggs in it. We were hopeful for a better evening than Saturday, but it was not to be. Just before suppertime, the clouds rolled in and, unlike the night before, did not open up even little "Sucker Holes." Everyone went to bed early after a pleasant talk under the tarp at the Kelso's.

It was unfortunate that the weather did not co-operate; I was looking forward to my first view of the stars in many months. We are owed a few good evenings which I hope start very soon. ✸

Star Party Update

by Angela Squires

Mount Kobau July 29 - August 6, Osoyoos. Billed as "week-long, mile-high observing" some 150-200 enthusiasts attend, mostly from BC, Alberta and Washington. At 6000 feet, nights can get very cold. There are no services except porta-potties, so take all supplies. Fresh food from Osoyoos stores means you brave the road. Allow 50 minutes for this rough ride that has claimed more than its share of mufflers and shocks. Events take place Wednesday through Saturday and featured speakers are:

- Thursday: Dr. Lewis Knee of DRAO; Gary Seronik of Sky & Telescope
- Friday: Tom Cameron of Rothney Astrophysical Observatory; Ken Hewitt-White; Murray Paulson
- Saturday: Jack Newton.

Get your entry forms at the Registration desk for the MKSP astrophotography and amateur telescope makers' contests. Swap meet is Saturday 5pm with the group photo and door prizes draw at 6pm. Kobau Lookout Forest Road is signposted on the north side of Highway 3, on the crest of a hill 35km east of Keremeos, or 11km west of Osoyoos. The gate is always open. Fees are:

- One Night: Single - $15.00; 2 people or more - $25.00
- Two or More Nights: Single - $30.00, 2 or More People - $50.00

Website: http://www.bcinternet.com/~mksp/

Email: Caroline Wallace (Registrar) cwallace@vip.net

Pre-registration not required but appreciated. Make cheques payable to: Mount Kobau Astronomical Society. Mail to: MKSP Registrar, P.O. Box 20119 TCM, Kelowna, B.C. V1Y 9H2.

The Grapevine says that some RASCVC members are going to Manning Park first. Even Giovanni finally admitted to me that Manning is darker than Kobau! MKSP need to do some serious campaigning about light pollution to the local Councils. I have written the owner of the "Esso Nebula" below our Manning site requesting that he turn off his floodlit sign by 11pm, and am taking him a RASC Calendar. Hopefully sugar and bribery will work!

Manning Park 2 September 1st - 4th. We need two New Moons a month in our too short Summer! I'd like to go to Kobau to see people but PMO beckons and then there is…

TMSP July 27-29th. The Table Mountain Star Party (6357ft) is about 20 miles NW of Ellensberg, WA, exit 106 on Interstate 90. Over 1200 attend! The road is paved to within 3 miles and gravel for the rest. It is steep and narrow, one lane with turnouts for passing so be cautious. They offer meals, speakers, workshops, seminars, a swap meet, door prizes, a young astronomer program, and much more to enrich your experience. During the day, in addition to astronomical programming, there are beautiful areas to hike, mountain bike, and explore. This is a remote and primitive high altitude site—medical help is one hour away. Bill Burvee of Ellensburg provides

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President's Message

This month we have put together a committee to bring Ray Villard to Vancouver to speak to us. For those who have heard him speak before, no introduction is necessary; for those who have not, Mr. Villard is the Director of Public Relations for the Hubble Space Telescope. He has spoken to us twice before and has shown us newly released photos from the Hubble each time. Both talks were enthusiastically received with everyone wanting to hear him again. Our goal is to have him in Vancouver this fall.

This is a costly proposal. We have tried to get others to share the costs, such as the Planetarium, UBC, and others. So far we are alone, although every one wants to hear him speak. The committee which consists of myself, Bryan Kelso, Barry Shanko, Craig Breckenridge and Pomponia Martinez is looking at the RASC Vancouver Chapter acting as a "Promoter" and paying the up front costs to bring Mr. Villard to Vancouver. The Club would then charge a percentage of the gate costs from his speaking engagements to recover costs. The intention is to have a private talk for our members at no cost. This however is dependent on recovering costs from other sources. If this is not possible then a small cover charge would have to be charged. Five dollars has been suggested.

As a club we cannot absorb the entire cost, as the budget is approximately half of our annual operating budget. There remains $600 or so in the Casino account that would not have to be repaid but that is the maximum amount that the Club could afford to subsidize this project. The Planetarium seats 240 people which at a maximum charge of $10, with VC getting 50% of the gate, still leaves us outside our budget window. We hope that there are other organizations that may also want to hear Mr. Villard. Please advise any member of the committee if you are aware of any organization that may want him to speak.

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2000 Vancouver Center Officers

President/Nova Editor
Bob Parry 215-8844
robpar@ballard.com

Vice-President
vacant

Secretary/Webmaster
Bill Ronald 733-7036
ronaldb@home.com

Treasurer
Bryan Kelso 261-8292
bryan.kelso@telus.net

Librarian
William Fearon 939-3154

National Rep./Membership
Dan Collier 732-6046

Chair, CARO Committee
Duncan Munro 826-9523
dmunro@sfu.ca

Telescopes
Phil Morris 734-8708

Public Relations
Angela Squires 734-9726
esquire@vcn.bc.ca

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

Nova Editor
Gordon Farrell 734-0326
gfarrell@home.com

Councillors
Dan Grimard 438-5780
Doug Montgomery 596-7058
Marcellus Redmond 533-1830
Norman Song 299-7924
Marc Verschueren 986-1485

Trustees
Sally Baker 324-3309
Lee Johnson 941-5364

CARO
Tony Overton 463-2358

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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.

About RASC

The Vancouver Centre, RASC meets at 7:30 PM, in the auditorium of the H.R. MacMillan Planetarium and Vancouver Museum complex 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 $45.00 per year ($22.50 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 us at the address or phone below.

NOVA, the newsletter of the Vancouver Centre, Royal Astronomical Society of Canada, 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 below, or downloaded via SpaceBase™at 473-9357, 58, 59.

Web Site

http://pacific-space-center.bc.ca/rasc.html
or **http://www.rasc.ca** and follow the link to **Vancouver**.

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

Inns of Comfort

by Angela Squires

An astronomer in search of pristine dark skies who would like to take their partner along can have a problem. Primitive camping on remote mountaintops is bearable for a keen observer but anathema for the non-astronomer or camping-challenged. Astronomy-oriented accommodation provides a solution. RASCals find creature comforts increase the quality of time at the eyepiece, as all Pine Mountain fans will tell you.

The luxurious Egyptian Room at the Skywatcher's Inn

Arizona's clear, dry skies are a magnet for rain-soaked souls from the north. The Skywatcher's Inn is 47 miles east of Tucson near Benson, at 3900 feet elevation, overlooking the San Pedro River valley. The adjacent Vega-Bray Observatory boasts 8 scopes from 6 to 20 inches, most located in a roll-off roof enclosure for convivial observing. A 20" f/10 Maksutov Cassegrain and CCD are housed in a dome and computer-controlled from a temperature-friendly room. There are various rates for driven scopes and experienced amateurs may use the Dobsonians for free—a nice touch. The Inn is stylish, elegantly furnished and spacious with formal living, dining and media rooms. The Egyptian bedroom could tempt some away from the eyepiece much earlier than usual! I'm not surprised it's a favourite for honeymooners and romantic astrotrysts. The bath comes with a jacuzzi and the room is $110 a night. Other rates are from $75 for their astronomer's rooms to $160 for the Egyptian Suite. For that I'd perform the dance of the seven veils!

A delicious full breakfast is included and for other meals you may dine nearby or cook your own food in the facilities—another nice touch. Website: www.communiverse.com/skywatcher/ and phone (520) 615-3886.

New Mexico boasts the Star Hill Inn, the first amateur retreat in the country, opened in 1988. It's located in the Sangre de Cristo Mountains, an hour east of Sante Fe and 10 miles north of Las Vegas, NM and has a municipal airport. Charming cottages nestle on 195 private acres surrounded by tranquil ponderosa pines. Each is fully equipped with a small fireplace, porch, handcrafted furniture and unique decorations. At 7,500 feet, this is one of the best dark-sky locations with a limiting visual magnitude of 6.5 and average winter darkness from 7:30pm to 5:30am. The latitude of 35" 44' N means New Year's Eve champagne with Canopus just sneaking over the horizon and Betelgeuse 60 degrees high! Guest facilities include a library with extensive book and video collection, astronomical viewing deck, ten rental telescopes from 7-24", outdoor gas grill, meadow and mountain hiking trails, mountain meadow labyrinth and meditation garden. There are powered piers for your own scope and the 24" is an impressive Ritchey-Chretien originally built for the University of Denver. You won't want to spend all your time observing and sleeping because there's lots to do and visit. Bird watching, hiking, Native American pueblos, historic Sante Fe and Taos with its art community are all accessible. Rates are $95 to $145 a night, 10% less for six nights or more. Website: www.starhillinn.com/ and phone (505) 425-5605. You can join hosts Phil and

Exterior of Aster Cottage at the Star Hill Inn, northern NM Rocky Mountains

The Observatory B & B overlooking Lake Osoyoos

Rae Ann for their weekly "Dessert on the Deck," scrumptious goodies served prior to observing. Now that's my idea of heaven! When photon starvation reaches critical mass around Jan/Feb, a trip south is medically necessary—if not tax deductible. Is there any interest among members for a group trip to the Star Hill Inn? "Sunrise House" is their newest and most luxurious cottage at 1800 square feet with soaring, 20-foot ceilings and spectacular views over the Great Plains. It can sleep up to 8 in comfort. Very tempting!

Getting down south by road would be almost a three-day trip and with the price of gas, flying is a possibility. Nov. to Feb. return airfare per person to Tucson or Albuquerque is almost $600 from Vancouver, unless there's a seat sale. Baggage allowance is 42kg. Albuquerque is the recommended arrival point for the Star Hill Inn and has all the major car rental companies for the two-hour drive to the mountains. Travel information courtesy of Joadey Caldwell, Bell Travel, 535-2587. My friend Joadey has been RASCalized by me and will cater to your every need, travel wise! She saved our travel budget $100 last year.

Upon his retirement, Jack and Alice Newton created their ideal lifestyle. They spend November to April at their Florida Imaging Centre and May to October in Osoyoos, Canada's only true desert, receiving a mere 9 inches of precipitation annually. Their Observatory B & B, at 1600 feet, overlooks Lake Osoyoos and has a 16" scope with CCD cameras housed in a rooftop observatory. $50 per person gives you a three-hour hands-on tutorial with Jack using his state-of-the-art instrumentation. Rental scopes are available for $35 a night. All guestrooms have private baths and sliding doors to patio areas. There is an in-home theatre with surround sound, 800-plus videos, laser discs and DVDs! Rates are reasonable: Moon room $100; Saturn suite $125; Eclipse (family) suite $135 (based on single/double occupancy) plus $10 each extra person and of course includes your breakfast. Website: www.jacknewton.com/ and phone: (250) 495-6745. Mount Kobau Star Party fans will find the Newton's B & B very tempting for a couple of nights in comfort and stargazing in the mild air. It's located on Anarchist Mountain, off Highway 3 East, with a real road up too! ✸

Jack and Alice enjoying their Winter quarters, the Florida Imaging Center in Chiefland, where the skies are very dark, the air stable and evenings tropically warm.

SKYWATCHER'S INN

5655 N Via Umbrosa, Tucson, Arizona, USA, 85750-1357
Tel/Fax: (520) 615-3886
www.communiverse.com/skywatcher/
E-mail: vegasky@azstarnet.com

STAR HILL INN

P.O. Box 707, Sapello, NM 87745
Tel: (505) 425-5605
www.starhillinn.com
Email: stay@starhillinn.com

OBSERVATORY B & B

#3 Observatory Road, Osoyoos BC V0H 1V0
Tel: (250) 495-6745
www.jacknewton.com
Email: jack@jacknewton.com

Deepsky Hunting

by Steve Whitehouse

Apart from death, taxes, and cloudy new moon weekends, there are not too many certainties in life these days. However there is one thing you can always count on.

July and August always brings us the magic of the summer Milky Way.

Stretching across the sky from Perseus in the northeast to Sagittarius in the southwest, the Milky Way is home to many visual treats. A very dark sky, a pair of binoculars or a small rich-field telescope that gives a view of 2 or 3 degrees is all that is needed to search out the best that the Milky way has to offer.

Starting in the northwest, Perseus and Cassiopeia are home to dozens of open star clusters that are easily visible in binoculars. The most famous cluster in Perseus would have to be NGC884 and NGC869, better known as the Double Cluster. This bright, rich open cluster never fails to mesmerize me. Glowing at mag. 6.1 and 5.3 they are easily seen with the naked eye from a dark site. Through binoculars they come alive like diamonds on black velvet. I have never seen a photograph of these objects that compares to the real thing. They just have to be seen with your own eyes. Two degrees north of the Double Cluster lies a lesser-known open cluster called Stock 2. This looser, odd-shaped cluster glows at mag. 4.4 and always reminds me of a stick man.

Scanning north into Cassiopeia, we must take a peek at M103. This mag. 7.4 open cluster contains about 40 stars. The late, famed observer John Mallas, observing with his 4-inch refractor, said that many of the fainter stars appear to show colour. Cassiopeia is also home to M52, a richer and more condensed cluster that shines at mag. 6.9 and will be an easy target for any pair of binoculars. Also in Cassiopeia is NGC281, a 7.4-magnitude emission nebula. Although it is 35 x 30 seconds of arc, it might be a real challenge in binoculars. This type of object will be easier to spot using a nebula filter.

Moving into Cygnus we approach M39, another loose open cluster of magnitude 4.6.

Heading into the heart of Cygnus we approach NGC 7000 .It is better known as the North American nebula. At 120 x 100 minutes of arc, you will need a scope with a very large field of view. I have seen it with binoculars from very dark sites. A telescope with a three-degree field and a high contrast nebula filter works the best. NGC 7000 glows softly at mag. 5.9. Can you see it with the naked eye? Give it a try—many people have. Also look for the Pelican nebula just to the southwest. Still moving south through Cygnus, we reach Gamma Cygni, the center star in the Northern Cross. Still equipped with your nebula filter, you will see faint streams of emission nebulosity surrounding Gamma Cygni.

Still south of this you should find M29, a loose and sparse open cluster of magnitude 6.6. There are about 20 stars in this star-poor cluster. Heading southeast to the constellation Vulpecula you will find Collinder 399. Nicknamed the Coat hanger, this is a must-see open cluster. This 3.6-magnitude cluster really looks like a coat hanger. The best view will be through binoculars or a finder scope. Vulpecula also contains M27, the famous Dumbbell nebula. This mag. 7.3 object will look best through a telescope, but it can easily be seen with binoculars as well. The constellation Scutum contains many rich-field objects. M11, the Wild Duck cluster, is an easy target for your binoculars. M11 contains about 500 stars in this mag. 5.8 densely populated cluster. Look for B111, a dark Barnard nebula just north of M11. Scutum is full of dark matter. Thick dense regions of dust and gas that are not illuminated by hot stars.

M26 is another Scutum open cluster that contains 70 or more stars, and shines at magnitude 8.

Moving south into Sagittarius, M24 was listed as a large nebulosity by Messier, but is in fact a detached part of the Milky Way. It is about mag. 4.5 and can be seen with the naked eye. NGC6603 is an open cluster in the centre of this detached portion of the Milky Way.

Sagittarius contains many more celestial treats; M16 the Eagle, M20 the Trifid Nebula and M8 the Lagoon Nebula to name a few. All are spectacular sights even in binoculars. M22, near the top of the Sagittarius teapot, is an easily seen large globular cluster that is one of many globular clusters in Sagittarius, all easily visible in binoculars.

Binocular observing of the summer Milky Way can be a very rewarding way to spend an evening. You don't have to own a large telescope to enjoy astronomy in the summer Milky Way.

Clear skies… ✸

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Joan Cosar has kindly volunteered to greet new members and guests to our meetings. She will be wearing a nametag and will address the members at the monthly meetings. I want to extend my thanks and appreciation to Joan for her help.

Please read Dan Collier's account of the proceedings at the AGM that took place over the Canada Day weekend in Winnipeg. This has some information that is relevant to all of us. The cost increase was approved, at this time we are not certain as to how much this will impact our costs. We will keep you informed and let everyone know at a future meeting.

For those who might want to come to the next Council meeting, be advised that it has been moved to July 25th. This is because on the regular meeting date of Aug. 1st most of the council members will be at Mt. Kobau.

Thanks, and Clear Skies

Bob Parry ✸

FOR SALE

For Sale
Vista 805
80 mm F-5 SHORTUBE
REFRACTOR
COMES WITH 30 MM FINDER
TUBE RINGS/90 DEGREE MIR-
ROR STAR DIAGONAL
17 MM PLOSSL EYEPIECE
GREAT SCOPE FOR TRAVEL
STEVE-DAYS 294-2244
EVENINGS 526-9212
$225

FOR SALE:

a/ 80mm f/7 Rich Field Refractor with 1.25" Rack&Pinion Focuser and Mirror Diagonal. Neither mount nor eyepiece included. Field of View 3.0 degrees at 14 power. Makes a great giant finder for a big scope or could be used as a portable scope for wide-field low power views of the Milky Way. At 14x with an OIII filter all three parts of the Veil Nebula are visible simultaneously, including the delta-shaped section between the two main arcs! Stars are sharp to the edge of the field. However, this low-resolution achromat is NOT suitable for planetary and lunar observing. Price $190 firm.

b/ The Jim Kendrick Dew Remover System 14"/16" Heater. (DC Power required.) As advertised in Sky&Telescope. Never used. Price $110.00 firm.

c/ Beautifully machined DAR 1.25" Helical Focuser. Has fast focus threads and fine focus threads. Superb craftsmanship. Won as door prize and not needed. Price $80 firm.

Save shipping charges by picking the items up at the Mount Kobau Star Party. (Or having a friend do so.)

Alan Whitman

awhitman@vip.net

250-497-6759

ASTROCOMPUTING

SpaceBase™ (473-9357). 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.home.net/ronaldwp/rasc_vc/index.html

H.R. MACMILLAN SPACE CENTRE

The Pacific Space Centre Society is a non-profit organization which operates the H.R. MacMillan Planetarium 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 Pacific 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 738-7827, local 237 for information. You can also reach them on the Internet at http://www.pacific-space-centre.bc.ca/

MEMBERSHIP HAS ITS PRIVILEGES!

New members, did you know? The Vancouver Centre has 6 telescopes available for loan free of charge! We have telescopes ranging from 3" to 10" diameter. For more information call Phil Morris, Director of Telescopes at 734-8708, or see him in the lobby of the GSO after the members meeting. The loaner period is for one month only. All telescopes are to be picked up and returned after the members meeting. No telescope will be allowed to circulate outside of these meetings!

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 Penndelton at 888-1505 or Howard Morgan at 856-9186.

The Universe is Not Flat

by Marc Verschueren

The universe is flat. That was the conclusion in an article in one of the national newspapers a few weeks ago. The article was an interesting one. It reported on the results of measurements of the cosmic background radiation performed with a radio telescope attached to a balloon launched from a base in the Antarctic. There is a Canadian connection here. Two of the authors of the original paper published in *Nature* are Canadian. I must mention that there were a total of 37 names under the title. This is typical now for this kind of research. These projects are so complex and involved that they require the collective effort of a very large team of scientists. I always appreciate it when a newspaper that basically writes for the general public pays attention to this kind of subject. Most of us cannot have continuous contact with the literature in astronomy, even at the amateur level. A reference in the general press can point to important developments. We should not be too critical when some of the conclusions presented are not always accurate. These new results are very interesting and important. Let us discuss this a little bit further. I think that one can make a safe statement that the universe is not flat, but such a statement demands some qualifications.

First, a quick review of what the experiment was all about. What is called the "cosmic background radiation" was discovered in 1964 by Arnio Penzias and Robert Wilson. We seem to be surrounded by a background of radio waves with a wavelength of the order of centimetres. At first sight this radiation seems to be uniform in all directions. It is very weak and it takes very sensitive instruments to detect it, but it is clearly present. It was quickly realized that this radiation was a remnant of the Big Bang of cosmology. Several people had pointed out earlier that the Big Bang should have produced a background radiation with this kind of wavelength. This radiation comes to us from the origin of the universe and this very large distance causes it to be red-shifted all the way to the centimetre range. This was a momentous discovery in astronomy since it supported the Big Bang theory and made this theory much more plausible. One problem was though to be that if the beginning of the universe was so uniform, how was it that we see today so many structures around us, from stars to galaxies to clusters of galaxies? Then, in 1992, it was announced by George Smoot—and his very large team—that one can measure density fluctuations in this background radiation. This would than make it more consistent with the non-uniform density of the mass that we see in our neighbourhood of the universe today. The fluctuations were seen as variations of the power of the radiation over large angles (more than 10 degrees). Their existence introduced the possibility of a non-uniformity which was already present very early in the evolution of the universe, even if the large angles do not really allow for much structure as such.

The new measurements show that there are density fluctuations over angles smaller than two degrees. This is important because the fluctuations over such a small angle are caused by vibrations in the substance of the universe at the moment of the emission of the radiation. This is fascinating. This means that we can look at some aspect of the universe, some dynamics of the universe, during its very early life. How can we draw this conclusion? One can calculate these density fluctuations if one accepts a theory about the early universe. One can make reasonable assumptions about the early universe on the basis of what we know about the universe at the present moment. The model used in this case is known as the *inflation theory*. Inflation theory proposes that in the very early stages the universe expanded very fast, exponentially fast, for a short while. This theory solved a number of problems of the traditional Big Bang. And, for one thing, it predicts that the universe today is basically flat. The inflationary universe is fairly widely accepted today, but it is certainly not beyond discussion.

The term "flat" refers here to the theory of gravitation as proposed by Einstein's General Theory of Relativity. Einstein describes gravitation as a manifestation of the true geometry of space. If there were no gravitation the geometry of the universe would be one where parallel lines remain parallel no matter how far one extends them, the sum of the angles of a triangle would be 180 degrees, and other aspects of the Euclidian geometry we all learned at school years ago would hold true. But if there is gravitation, space becomes curved. The orbits of the planets, for example, are a manifestation of this curvature. In this sense one can clearly say that the universe is not flat, otherwise all masses would move in straight lines—straight in the sense of our old school geometry. Since space is curved (measurably so in the neighbourhood of large masses) one cannot really say that the universe is flat without any further specifications. What one means in the preceding paragraph is that the universe is flat on a very large scale. Suppose one considers the universe on a scale so large that all structures in space, even those as large as galaxies, can be considered to basically be points when compared with the total size of the universe. On that scale, the theory of inflation says that the universe is flat. And the measurements of the density fluctuations in the background radiation behave as predicted by the inflation theory. There are some problems with the agreement, but they are not serious enough to spoil the basic conclusions. This is indeed very important. Theories like the inflation theory cannot be taken seriously except when confirmed by some experimental facts. Experiments about the early universe are of course extremely difficult to come by. It is very important to note that the inflation theory made predictions about density fluc-

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tuations before it was known that they existed. This is always a strong point in favor of a theory. Trying to fit facts into a theory afterwards is always easier and sometimes even a bit suspect. When the theory of inflation says that space is flat, that also means that the universe will keep expanding forever. It will not reverse to go into a Big Crunch. So, the inflation theory has received a strong boost from this experiment. The flatness of the universe on a large scale has gained considerable support. This cannot be ignored when one builds models of the very early universe.

In another way, one can say that the universe is not flat at all. Let us look at that a little bit closer, too. Space is sometimes very curved—near and inside neutron stars, for example, because of their enormous density. Neutron stars were also proposed before any astronomer had ever identified objects like them. A few months ago, Prof. George Volkoff passed away in Vancouver. Professor Volkoff was, for many years, professor of Physics at UBC and, later, head of the Department of Physics. In 1939, he was a graduate student of Robert Oppenheimer of nuclear bomb fame. Oppenheimer and Volkoff together described the physics of stars that would consist only of neutrons. In such a star, the electrical forces do not play a role. The particles making up the star can come very close together—electrical repulsion does not keep them apart. Because of this, the star can be very small yet have a large mass and very high density. It is a very typical example where relativistic effects (effects according to Einstein's relativity) play an important role because gravitation is so strong there. In the neighbourhood of such a star, the universe is certainly not flat. It is strongly curved. For decades, Oppenheimer's and Volkoff's neutron star was only a theoretical discovery. Then pulsars were discovered and were quickly identified as neutron stars. We know now that they are the remnants of supernova explosions of stars. The centre of the Crab Nebula is still the most classical example. And of course there are the black holes, the next step of concentration of matter. Their gravitation is so strong that space folds onto itself and from the outside we cannot observe anything anymore. For a long time black holes were only a theoretical game, but now many astronomers are convinced that black holes are rather common, especially at the centres of galaxies.

When I look through my small telescope, I should be able to see the Crab Nebula. A more experienced observer can do so without difficulty in a good location. Here is an object with a violent past that leads to an area of the universe that is very curved and yet visible in an ordinary telescope. Most of these exotic objects are not accessible to the amateur astronomer. Phenomena that relate directly to the very beginning of the universe are not directly observable by us. But whenever I look at the sky I have to make the connection with the magnificent reality that sits behind whatever I see. All it takes is some imagination. ✸

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at millimetre and sub-millimetre wavelengths where young and yet-to-be-born stars radiate the strongest. For more information, see http://www.mma.nrao.edu/science.

2) *The Next Generation Space Telescope* is Hubble's follow up. Optimized for IR wavelengths, it will see the first galaxies formed after the big bang and the beginnings of star and planet formation in our galaxy. The Canadian Space Agency has committed $50 million, with exact Canadian participation to be announced once the telescope is designed. For a Canadian perspective, see the NGST Canadian Scientist's web site at http://astro.utoronto.ca/~lilly/NGST/index.html.

   In a report released by the National Academy of Science only weeks before the CASCA report, the above two projects were also rated one and two in importance as the next major astronomical projects the American government should fund.

3) *The Square Kilometre Array* is in the planning stage. It strives to build an array of radio telescopes with a collecting area of one square kilometre. As a point of comparison, the Arecibo dish is one-thirtieth the size. One of its major goals is to study the era of the universe in-between when the cosmic microwave background was created and the first galaxies formed. See http://www.ras.ucalgary.ca/SKA/science/science.html.

4) *The Very Large Optical Telescope* is an attempt to build a 25-metre or larger ground-based telescope by following up on the experience gained with Keck and other telescopes with segmented primaries. Astronomers hope this telescope will do for the Next Generation Space Telescope what Keck does for Hubble, an instrument that can be used for follow up observations of individual objects. It is hoped that a 25-metre instrument will be operational in 2010, with a 100-metre follow up instrument about 10 years later.

All these projects are arrayed around a theme: the study of the origins of galaxies, stars and planets in addition to charting the distribution of and understanding the nature of dark matter. Astronomers believe they are on the cusp of understanding how all these objects formed, evolved and make the universe appear as it does today.

The plan proposes additional funding of $254 million above the $100 million planned to be spent on Canadian astronomy in the years 2000-2015. Even if this increase is granted, it points out that this will still put Canada near the bottom in astronomy funding by the major industrial nations. In the words of one Canadian astronomer, given the size of federal government surpluses over the next five years, it is a very affordable plan. ✸

National Council Report

by Dan Collier

Highlights:

- Fees Increase September 1st
- Life Memberships on sale, act soon!
- New Centres: Moncton and Charlottetown
- Bob Garrison becomes National President
- Rajiv Gupta (Vancouver) now National 1st VP
- 2001 Observer's Calendar available

The Winnipeg General Assembly, the RASC's collective annual meeting, took place on July 2nd at the University of Manitoba. Attendees voted strongly in favour of raising the Society's fees by four dollars. The margin of approval was reported by outgoing National President Randy Attwood as 257-23. I asked Randy twice to repeat these figures but I still believe them to be erroneous even with all the proxies thrown in. In any event the vote was not close. Most Centres were represented and the attendance was much better than at last year's G.A. in Toronto.

As of the first of September, new applicants over the age of 21 are to pay $49 for twelve months of membership in Vancouver Centre (those under 21 will pay the new youth rate of $25). Members with expiry dates in September and afterwards will be invoiced for $49 per year. If you are one of the latter, you can no longer beat the fee hike by renewing early. Unattached members pay only $40, but receive NO Vancouver Centre privileges or services.

IMPORTANT: If you have ever thought about becoming a life member of the Society, DO IT NOW! The fee is only $720 until September 1st when it increases to $800. You can convert your membership to "life" by paying the life-member fee (instead of the regular annual dues) any time before your membership expiry date.

The fee increase helps Vancouver Centre directly. Of the old $45 fee, $23.40 was paid into Vancouver's accounts and the remainder was retained by National to pay for the Handbook, the Journal, Sky News, and administration. When the new fee comes into effect, the Centre's portion increases to $25 (Centre will collect $10 from the $25 youth-member fee, up from $9). Centre's portion pays for NOVA, meetings, loaner scopes and so on. National will additionally pay our Centre $16 per annum for each of our 13 Life Members, up from $14.40.

You should not be surprised to see another fee increase in the 2001-2002 time frame. National's portion of your fee, or $24, isn't enough to pay for your entitlements even when the (large) subsidies from Handbook and Calendar sales are factored in. Furthermore, the special fund which is supposed to support our life members is too small. Because interest rates have been low, general revenue has been subsidizing the lifers.

A motion from one Centre to reduce the Youth fee to $20 was defeated. The only other fiscal business was the appointment of Tinkham & Associates as the Society's auditors, against whom a solitary proxy was pledged.

Peter Jedicke defeated May Lou Whitehorne in the election for the position of Second National VP. Peter was proposed for nomination on short notice but accepted the challenge, citing a desire to tighten the management of the Society's assets (he was the only member present who voted against the fee increase). Mary Lou is highly regarded for her committee work, especially in the education-outreach field. That this affair ended in smiles and mutual support is an indication that we have persons of stellar quality on National Council.

Two brand new Centres, Moncton and Charlottetown, were officially inducted, bringing the total number to 25.

National Council and Vancouver Centre will reimburse me each 50% for my airfare and lodging, an amount totalling about $460, to which the Centre will add a further $125 for registration, meals, and bus fare. I have one more trip to Toronto before the end of my 3-year term as National Rep, for which 25% of the airfare and lodging will be paid by Vancouver Centre. By year-end, I will have spent an estimated $570 of Vancouver Centre funds, or roughly $2 per member, for travel. Duncan Munro, who has accompanied me on several trips, has been reimbursed for similar amounts.

More of the 2000 G.A. proceedings will appear in the next issue of NOVA. ✸

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food service—evening meals Wednesday to Saturday and breakfast Saturday morning. Pre-order to guarantee your feast. The set meals are $7-10 and sound delicious. His "Martian Van" serving fast-food stays open at night as long as there is business. See the website at: www.tmspa.com/ for family rates; the individual fee is $20US. Deadline July 8th. $10 extra for late registration, possibly negotiable as requested brochures to RASCVC were mailed late by TMSP. ✸

Battle for the Stars in Langley

by Angela Squires

The Searchlight Bylaw was passed and Famous Players (FP) was given 30 days to comply. They instead filed suit in BC Supreme Court challenging the Bylaw. I sent out a comprehensive press release as a result of which *The Vancouver Sun* published "Searchlights 'vandalism'" June 15th and *The Globe and Mail* published "Langley residents call searchlights sky pollution" on the 16th, a longer, excellent article by Jane Armstrong. Rob Dick, Chair of LPAC for RASC is writing a brief for Township Council. I am investigating the Vaughn, Toronto timeline and there will be further press releases. A Colossus is proposed for Laval, Quebec, and I am asking the Montreal Centre to pass on my release to Laval Council. I have obtained useful advice from a Provincial Government senior planner. I will be advising the Union of BC Municipalities directly on the situation in Langley. Bob Mizon of the Campaign for Dark Skies with the British Astronomical Association (BAA) has given valuable help. Canadian Law is based on British Common Law and a favourable judgment ruling that skybeams come under the Advertising Act is of interest. Europeans must wonder if Canada really is a country, what with professionals needing a licence for each province, interprovincial smuggling and provinces forever squabbling! Municipal Bylaws are relatively simple to accomplish compared with Provincial Acts. However, I feel province-wide regulation would be worth pursuing. If politically conservative Texas can do it, so can we! I am also contacting the responsible environmental organizations here for their policies on light pollution, if any. Email me at esquire@vcn.bc.ca if you want a copy of my press release. ✸

Upcoming Comet and Star Gazing

by Bob Parry

At this month's council meeting, it was asked if we could take members up to Cypress Bowl to do some star watching, as many cannot make it out to Aldergrove Lake. So I called up the people at Cypress and was told that there were no restrictions to our members going up for a Star Party. Angela suggested Saturday July 22nd; this will allow us to view Comet Linear. This comet is the first visual comet since comet Hale-Bopp. Although the maximum magnitude is predicted to be 4 to 5, this is much dimmer than Hale-Bopp which was around -1 to -2.

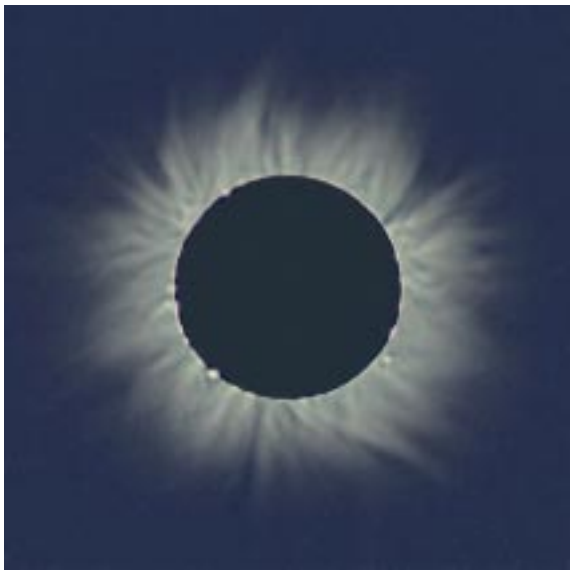
I have been up to Cypress and it is quite dark when the ski lights are turned off as they are during the summer. The Milky Way is quite evident and the horizon is reasonably good except to the north which is restricted by the mountain itself.

The thought is to meet probably at the Planetarium and go up to Cypress from there. Transportation for those who do not have cars can be arranged. To arrange transportation and get the latest details as they become finalized, please call one of the following people:

Bob Parry	215-8844
Bryan Kelso	261-8292
Angela Squires	734-9726

Hope to see you there. ✸

Members' Gallery



Bill Ronald
Corona Composite

(digital, using 12 exposures)
Photographed from the deck of the "Vistafjord"
on the centre-line in the Black Sea near the coast of Turkey.

Fuji NPH 400 print film
Vista 508 80mm f/5 telescope with 2x teleconverter
f10, (1/4000 to 1sec) on fixed tripod
2:19pm, August 11, 1999

RASC MERCHANDISE

Available for purchase after meetings:

Stickers	$1.00 & $2.00
Flashlights	$15.00
Mugs	$ 5.00
Beginners Guides	$15.00
Crests	$15.00
Lapel Pins	$ 5.00
Calendars	$ 8.00
2 for	$15.00
Shoe Pins	$ 6.00
Glow in the Dark Stars	$ 7.00