Royal Astronomical Society of Canada

1996 General Assembly

Edmonton, Alberta
June 27 to July 1, 1996

General Assembly 1996
Edmonton, Alberta

Committee

General Assembly Planning Committee Chairman . . . . . Howard Gibbins

Registrations & Accommodations . . . . . Linda Forbes
Lorraine Kirby
Maria Bals

Social Events and Refreshments. . . . . Silvia Smith

Tours and Transportation. . . . . Larry Wood

Paper Sessions. . . . . Russ Samson
Martin Conners
Krista Stefan
Janet Couch

Awards & Displays . . . . . Murray Paulson
Bruce McCurdy
Robert Martin

Treasurer . . . . . Mel Rankin

Printing. . . . . Howard Gibbins
Randy Pakan
Joan Hube

Observing. . . . . Paul Campbell
Larry Wood

Members and Assistants:

ShirLee Adamson, Harris Christian, Lisa Gibbins, Doug Hube, Valerie Ling, Franklin Loehde, Betty Rankin, Hank Tweedy, Richard Vanderberg.

Acknowledgments

The General Assembly Planning Committee wishes to thank:

Department of Physics - University of Alberta
Delta Edmonton Centre Suite Hotel
Lister Hall Conference Services
The Province of Alberta
The City of Edmonton
Fort Edmonton Park
Edmonton Tourism

for their assistance and co-operation in
putting on the 1996 General Assembly.

Contents

Welcome to Edmonton and the 1996 Royal Astronomical Society of Canada's General Assembly.

The Edmonton Centre is proud to be hosting what is our fifth General Assembly. We have planned a full weekend of enjoyable activities for you. If, during the Assembly, you have any inquiries concerning the events any of the Planning Committee members listed below will be glad to help you. In addition we have an operations room open 24 hours located next to the Displays' Room on the first floor of Lister Hall.

Edmonton Centre Members can be distinguished by their Blue or anodized aluminum name tags, as opposed to the white name tags everyone else will be wearing.

This program guide is intended to be a handy reference to any questions we think you might need help with. In addition it will, we hope become a memento of your visit to Edmonton, and a memorable General Assembly.

Enjoy your stay in Edmonton

THE PREMIER OF ALBERTA

MESSAGE FROM PREMIER RALPH KLEIN

As Premier, I am pleased to welcome delegates to Edmonton, Alberta, for the National Conference of the Royal Astronomical Society of Canada.

We extend our warm western hospitality to all of our out-of-province guests. Alberta is legendary for its beauty and diversity, and is renowned for its cosmopolitan centres offering sophisticated dining, shopping, arts and recreation. Alberta is big city entertainment and small town hospitality blended with a rich mosaic of culture and history.

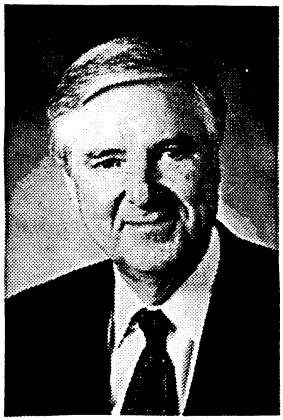
Best wishes for a productive conference and for an enjoyable visit to Edmonton.

Ralph Klein

June 1996

Legislature Building, Edmonton, Alberta, Canada T5K 2B7 Telephone (403) 427-2251 Fax (403) 427-1349

Edmonton Welcomes You



Welcome to Edmonton, where the night skies offer intriguing views.

For the first time in more than a decade, our city offers the backdrop for the Royal Astronomical Society of Canada's National Conference -- and it's a challenge we're pleased to accept. Many thanks to members of the Society's Edmonton Centre, whose hard work has made this gathering a reality. Once again, you're proving our city's claim as a epicentre for the volunteering spirit.

This General Assembly promises a full range of opportunities for the exchange of insights that's so crucial to the advancement of astronomy. Education sessions, top keynote speakers and great events, combined with those important hallway chats, will send you home with ideas to share, and to spare.

Between sessions, relax and enjoy the cultural riches of a city on the move. With gold-medal chefs in our restaurants, visionaries leading our arts community and world-renowned shopping facilities, we offer unforgettable experiences, each a golden opportunity in itself.

Enjoy your time with us, and do come back soon!

Yours truly,

Bill Smith
Mayor

THE CITY OF Edmonton

University of Alberta
Edmonton
Canada T6G 2J9

Dr. Roderick D. Fraser
President and Vice-Chancellor
3-1 University Hall,

June 7, 1996

Royal Astronomical Society of Canada,

Welcome to the University of Alberta!

We are delighted to be the host site for the 1996 annual Royal Astronomical Society of Canada national conference.

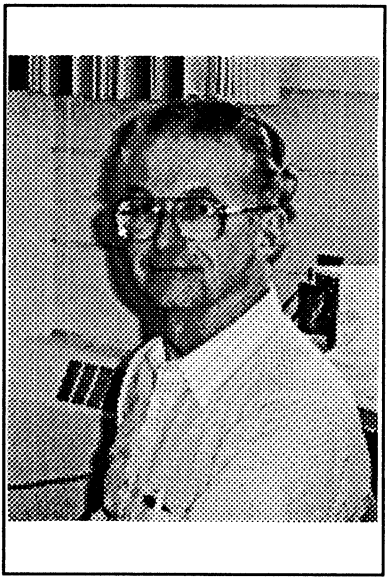
This national conference brings together delegates from Canada and many other countries. The opportunity to share knowledge and explore ideas will be invaluable. Given the University of Alberta's committment to being indisputably recognized as one of Canada's finest universities, we are especially proud to be a link in this learning process.

Please enjoy your stay on our beautiful campus and have a successful, rewarding conference.

Sincerely,

Roderick D. Fraser
President and Vice-Chancellor

Welcome Delegates



I take double pleasure in being able to welcome delegates to General Assembly 1996 as both National President and as a member of the host Centre. This is the third General Assembly hosted by Edmonton Centre since I became a member.

The membership in this Centre and, more particularly, the membership on the General Assembly organizing committees, have included different individuals for each of those gatherings. However, they have shared several characteristics: enthusiasm, pride and pleasure in being members of The Royal Astronomical Society of Canada, and a sincere desire to treat delegates to a memorable sojourn in our beautiful City and Province. We hope that you will take full advantage of this opportunity to meet with fellow RASCals, to share past astronomical experiences, and to plan future adventures under the stars. Take advantage, too, of the many special cultural, commercial, and geographic features of Edmonton and its neighbouring communities.

At this General Assembly you will be expected to share in making decisions which, more so than most decisions made in recent years, will be critical to the future structure and operation of The Society. May the clean, clear prairie air help you make the right decisions. Above all else, enjoy your visit with us.

Doug Hube
National President.

Dear GA Delegate

On behalf of the Edmonton Centre and myself, may I extend warm smiles of welcome to the 1996 General Assembly

When I realized this General Assembly would be held in my term of office as President, I uttered a strangled cry of "help!" But with all the efforts of members of our Centre and the executive - and Howard Gibbins in particular - the preparations have sailed along smoothly and efficiently.

While you are here, we hope you take advantage of some of the sights offered in the Edmonton area. Don't miss the Challenger Space Module at the Edmonton Space and Sciences Centre ... it's a blast!

For those of you who are attending a General Assembly for the first time, I think you will find, as I did at my first General Assembly, that meeting so many people you have only known by word of mouth or in print, suddenly makes the National RASC become a group of vital interesting people instead of a vague term or reference.

Let's make this General Assembly a time of great fun, learning, business cordially conducted, renewing of old friendships, and the making of many new ones.

If you have any questions, or need help in any way, our members will be more than happy to accommodate you.

ShirLee Adamson
President, Edmonton Centre

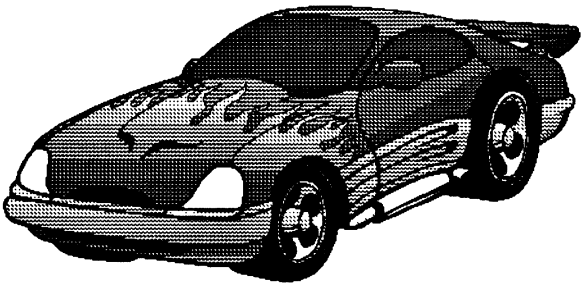
Emergency Contact Numbers

In the event of an emergency, you may phone one of the following as the situation dictates:

Campus Security	492-5050
Edmonton Police, Fire, Ambulance, & Poison Control	911
General Assembly Chair, Howard Gibbins	469-9765
Doug and Joan Hube	433-6749

List of Services in Area

Parking



If you have driven to Edmonton for the General Assembly and are staying in Residence, you may purchase a Parking Permit at Lister Hall when registering, if you haven't received one already. This costs $13.00 for the duration of the General Assembly, and you may park your vehicle in the parking lot behind Lister Hall. Unfortunately, on-street parking is not available for some distance from the University Campus.

Edmonton Transit System

The fare on any Edmonton Transit bus is $1.60 for adults, and 60¢ for children (between 5 and 15), and senior citizens. Exact fare is required as drivers do not carry any change. Transfers are available from drivers when you get on the bus, or, in the case of the Light Rail Transit (LRT) stations, from a machine as you enter. Transfers are good for any number of transfers in any direction, including return trips for a period of one and one half (1 1/2) hours from the time of issue.

The LRT is Edmonton's subway system; there are four stations downtown and the line extends North-East to the Coliseum and beyond. For route information, consult the Transit Guide included in your registration folder, or phone Transit Information at 496-1611. For your convenience we have

included a copy of the Edmonton Transit System's (ETS) Light Rail Transit schedule in your registration package as the southern terminus of the LRT is the University Campus.

Bus Schedules near University

The University's Bus Transfer Points are located on 89th Avenue between 112th and 114 Streets.

If you wish to get to the Edmonton Space and Sciences Centre the best way is to take bus #37, which will take you to Westmount Shopping Centre. This bus runs on 15, 30, and 60 minute schedules throughout the day. To get back to the University you take the same bus.

To get to Fort Edmonton Park, Bus #39 will take you to the corner of Fox Drive and Keillor Road. The first bus leaves at 7:05 AM. After getting off the bus, walk approximately 600 metres West along the river from Fox Drive to Fort Edmonton Park (follow Fort Edmonton Road under the Quesnel bridge).

An alternate return to the University is to board Bus #123 right at the parking lot. First bus is at 11:49 AM.

Liquor Stores

The list below gives a selection of liquor outlets near campus as well as a delivery service.

Dial-A-Brew Liquor Delivery:		448-2739
Varsity Liquor:	11120 - 82 Avenue	439-9461
Dennis Miller Beer Wine Spirits	10421 - 82 Avenue	433-2337

Banks

The following banks near the campus have automated teller machines for after hours money access.

Royal Bank, North end HUB Mall	9103 - 112 Street
CIBC, College Plaza	8207 - 112 Street
Toronto Dominion Bank	10864 - 82 Avenue
Bank of Nova Scotia	10537 - 82 Avenue
Bank of Montreal	116__ - 87 Avenue

$5.00 OFF BUCKET BY GEORGE

The only gift for the serious cookie eater - - 18 cookies in a shiny red bucket with a special label as "My Personal -Keep Out"

VALID ONLY AT HUB MALL, U of A

Not valid with any other promotional offers or coupons. One coupon per customer.
No cash value. Please present coupon at time of purchase.
Coupon valid June 1 - August 31/96.

BACON N' EGGER® COMBO

ONLY

$ 2.99

PRESENT THIS COUPON TO ENJOY A BACON N' EGGER, HASHBROWNS AND A COFFEE FOR ONLY $ 2.99.

A&W®

VALID ONLY AT THE HUB MALL A & W LOCATION.

TEEN BURGER® COMBO

ONLY

$ 4.99

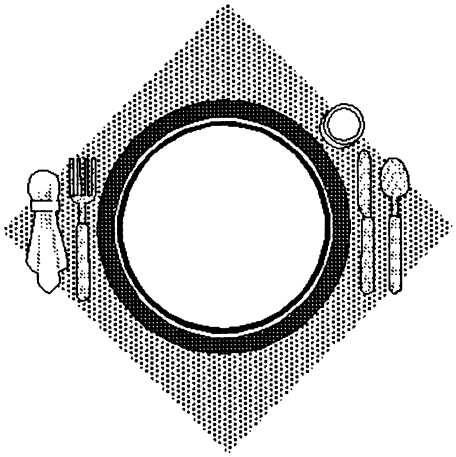
PRESENT THIS COUPON TO ENJOY A TEEN BURGER, REGULAR FRIES, AND A REGULAR ROOTBEER FOR ONLY $ 4.99.

A&W®

VALID ONLY AT THE HUB MALL A & W LOCATION.

Restaurants within the University Area

Within 20 minutes walk of Lister Hall there are over 40 eating establishments. The first set offer regular table service, some with outside patios; and the second (those in Hub Mall) are of the fast food variety.



Restaurants - Table Service

Banana Planet	107, 8215 - 112 Street	439-4414
Chianti's	10501 - 82 Avenue	439-9829
Duke's Donair, Sub. & Pizza	11636 - 87 Avenue	431-0380
Earls' on Campus	8629 - 112 Street	439-4848
High Level Diner	10912 - 88 Avenue	433-0993
Joey's Only Seafood	8409 - 112 Street	439-1122
La Casa Ticino	8327 - 112 Street;	432-7275
Library Restaurant	11113 - 87 Avenue;	439-4981
Mandarin Restaurant	11044 - 82 Avenue	433-8494
Matthew's Old Fashioned Deli	11712 - 87 Avenue	433-7800

Housing Union Building (HUB) Food Outlets - Fast Food

A&W	439-7406
Academy Pizza	433-1302
All Season's Donair	434-8410
Bar Tica	439-4428
Bottleneck Restaurant	432-7907
Cookies by George	433-2390
Delicious Donuts	439-2404
Dewey's Restaurant & Pub	492-4516
Edo Japan	431-1744
Ho Ho Chinese	433-1616
Java Jive	433-5573
Java Jive Deli	433-7617
Juciery and Dim Sum Hut	433-7027

Kathy's Greek Delicatessen	433-5249
La Pasta	439-5370
Louie's Submarine	439-1137
Motherly Home	430-6317
Patria Restaurant	439-1386
Sweets & Treats	433-4929
Taco Time	439-2971
The Jacket Potato Man	433-4464
The New Pantry	433-5484

Edmonton's Finer Restaurants

This third set of restaurants are for those of you who wish a more complete and formal meal. Delegates wishing to try the various restaurants in and around Edmonton, should easily be able to find Edmonton members to accompany them. Reservations are recommended at the following establishments.

Between Friends	8615 - 51 Avenue	468-1919
Carvery at the Westin Hotel	10135 - 100 Street	426-3636
Cocoa's Restaurant & Lounge	10222 - 102 Street	423-9650
Harvest Room - Hotel MacDonald	10065 - 100 Street	429-6424
La Ronde	10111 Belamy Hill	428-6611
Ritchie Mill	10171 Sask. Drive	431-1717

Map of Lister Hall Complex

Helen Sawyer Hogg Memorial Lecturer

Dr. Werner Israel

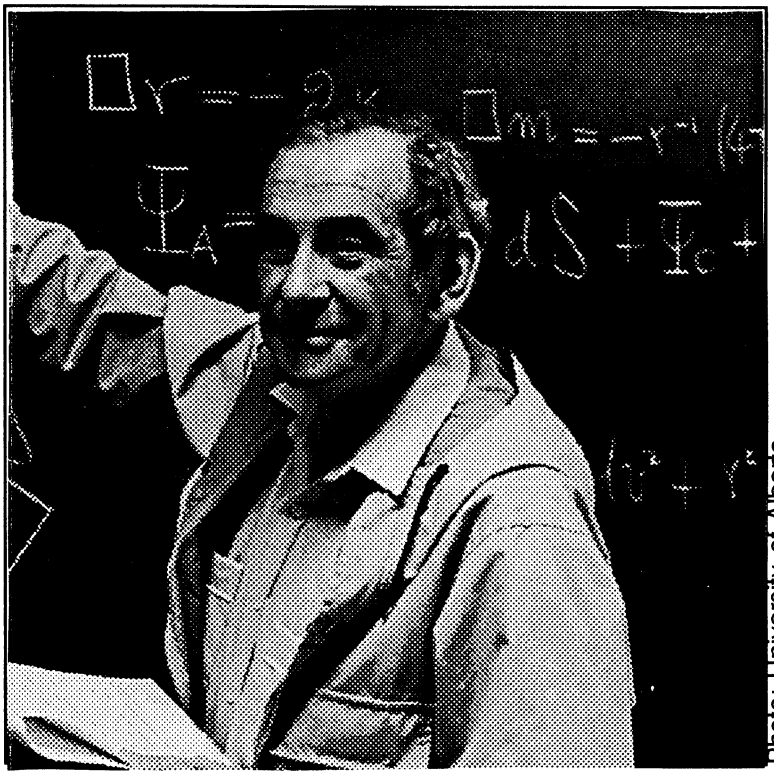


Photo: University of Alberta

Dr. Werner Israel was born in 1932 in Germany, but raised and educated in South Africa. He received a Bachelor of Science and Master of Science from the University of Capetown, and a PhD from Trinity College, Dublin. He joined the University of Alberta's Department of Mathematics, in 1958, and in 1972 transferred to the Department of Physics.

Dr Israel was appointed University Professor in 1985, was made an Officer of the Order of Canada in 1994, and was honoured with a Docteur Honoris Causa by the Universite Francois Rabelais, France, in 1994. A symposium held in Banff in 1992 in honour of his 60th birthday, was the occasion for the visit of Dr. Stephen Hawking to Edmonton. Dr. Israel is an Alberta Fellow of the Cosmology Program in the Canadian Institute for Advanced Research.

Werner Israel's research has been in the area of General Relativity and, in particular, the external properties and internal structure of black holes. He was one of those who, independently in the late-1960's, identified pulsars with rotating neutron stars. He provided the first proof of the "black holes have no hair" theorem. With his students he has recently probed theoretically the internal structures of black holes and has, in particular, developed the concept of mass inflation. His research interests and contributions extend beyond black holes and stars to the fundamental structure of the Universe itself, and other structures that require very little maintenance.

Dr. Israel is recognized as the leading relativist and gravitational theorist in Canada. His contributions to scientific research have attracted many outstanding scientists to the University of Alberta, resulting in the establishment of the Canadian Institute for Advanced Research's Cosmology Group which includes Drs. Campbell, Frolov (the Killam Professor) and Page, 11 graduate students, 3 post-doctoral fellows and 2 research fellows. Many of his former graduate students occupy senior academic positions in Canada, the United States, and elsewhere.

Dr. Israel is renowned for his skill at making complex topics exciting and comprehensible to both professional audiences and to the general public.

Helen Sawyer Hogg Memorial Lecture Abstract

Black Holes

The Hubble Space Telescope is currently identifying super-massive black holes in active galactic nuclei at the rate of about one per month. Black Holes are no longer just a plaything for theorists, but must be considered real and even fairly commonplace objects.

The Helen Sawyer Hogg Memorial Lecture will review current ideas about Black Holes, with some account of how these ideas evolved. Like continental drift, the idea that a star could collapse and disappear into a black hole encountered fierce emotional resistance in our century. Both these concepts threatened our instinctive belief in the rigidity of rock and the hardness of atoms.

Professor J. E. Kennedy

Ed Kennedy, is a Professor Emeritus of Physics at the University of Saskatchewan; is a former President of The Royal Astronomical Society of Canada; and presently, Honourary President of the Saskatoon Centre.

In the early 1950's, the Late Dr. Peter M. Millman persuaded Ed to concentrate his research on the history of 19th-century Canadian astronomy. On occasion, he has been known to wander outside this area: his recent publication in the United Kingdom on "The Moon Hoax" is 19th-century astronomy but it is definitely not Canadian! His philosophy on the history of astronomy is expressed most clearly in a firm belief that all members of this society, including Doug Hube, your retiring President, should be subjected to at least one paper on the history of astronomy at each General Assembly.

Title: "Then" and "Now"

Astronomy, one of the most ancient of the physical sciences, and Surveying, the science of measurement of distances, angles and time, have been associated intricately throughout recorded history. Just as astronomers have applied the principles of surveying in their measurements, surveyors have needed to understand the fundamentals of astronomy in their field work. During the past century, rapid advances in technology have diminished considerably this lengthy and close association of astronomy and surveying.

In 1843, the Astronomer Royal, Sir G. B. Airy, drafted "Instructions to Officers acting as Principal Astronomers" in the British Commission for defining the Boundary Line in North America under the Treaty of Washington. The "Then" part of this paper will consist of an examination of these lengthy and unusual Instructions. In the "Now" part of this paper, it is assumed that a field party equipped with a GPS (Global Positioning System) could define this same Boundary Line with much greater precision and fewer impediments. Principal Astronomers would not even be required -- an approach consistent with modern business practises in which down-sizing, cut-backs, and job losses appear essential to survival.

Peter Broughton

Peter Broughton has been a mathematics teacher in Toronto for over thirty years, and has been on the RASC National Council for nearly as long - as

Librarian, Secretary, Treasurer, and finally as President from 1992-1994. He always looks forward to GA's as an incentive and an opportunity to share with others his fascination with the history of astronomy.

Title: Untitled

Philip Turner, the first surveyor to be employed by the Hudson's Bay Company, trained' two outstanding explorers, David Thompson and Peter Fidler in the art of practical astronomy. The role of these three men will be mentioned but the main emphasis will be on the astronomical methods used and the results obtained by Peter Fidler in Alberta in the 1790's

David G. Turner

David Turner was born and raised in Leaside, a suburb of Toronto. He earned his university degrees from the University of Waterloo (B. Sc., 1968) and from the University of Western Ontario (M. Sc., 1970; Ph. D., 1974), spent two years as a postdoctoral fellow at the David Dunlap Observatory (1974-1976) and later two more years on the faculty of the University of Toronto (1978-1980), spent six years on the faculty of Laurentian University (1976-1978), 1980-1984), where he also directed the Doran Planetarium, and has been at Saint Mary's University since 1984 (not 1983 as indicated in Astronomy Canada). He is currently professor and chairrnan of the Department of Astronomy and Physics at Stain Mary's, is a life member of the RASC and an honourary life member of the Sudbury Astronomy Club, and is a member of the IAU, CASCA, AAS, ASP, AAVSO, IPS, IAPPP, and the Planetary Society. He was a member of the London Centre for many years, and was awarded a Service Award by the Centre for his efforts at editing the London RASC News between 1970 and 1972. His professional interests include open clusters, Cepheid variables, and the Star of Bethlehem. In his spare time he enjoys vegetable gardening, amateur magic and juggling, listening to a collection of tapes covering 13 years of music from the Nova Scotia International Tattoo, and occasionally producing sounds from his grandmother's piano that bear some similarity to music. He is also the overworked Editor of the JRASC.

Title: The Joy of Watching Stars Evolve

The light variations of classical Cepheid variables are remarkably periodic, and yet they do exhibit subtle changes in period that reflect the evolution of the stars from one side of the Cepheid instability strip to the other and that can be traced to small changes in their dimensions. Stellar evolutionary models can predict the rates of such period changes, but it is necessary to rely upon observational data in order to test whether or not such model

predictions are realistic.

Described here are the results of a compilation of known period changes for Cepheid variables. They demonstrate quite good agreement with model predictions and can be used to identify likely instability strip crossing modes for individual objects, such as Polaris. The addition of new data to the compilations is a goal that is within the range of feasibility for CCD observations with amateur telescopes.

One such project using the 0.4 metre Burke-Gaffney telescope at Saint Mary's University is described here."

Leo Enright

Leo Enright is a Secondary School teacher, long-time amateur astronomer, former National Recorder of the Society and currently the editor of the Beginner's Observing Guide.

Title: Astronomy Helps To Unravel an Age Old Mystery

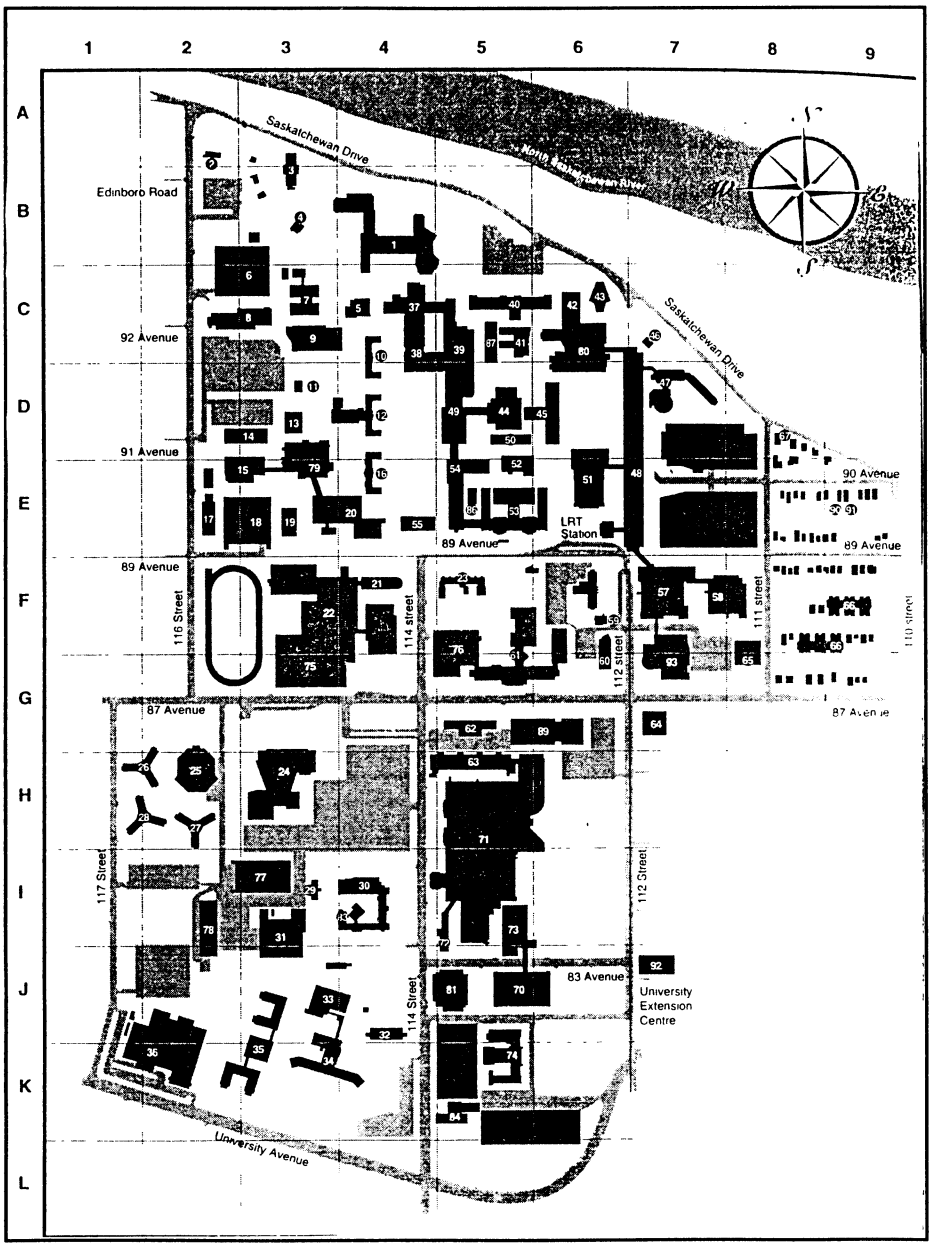
The Ancient Roman 'mystery-religion' known as Mithraism has remained a profound mystery to classical scholars for many centuries, since its tenets were never recorded, its existence virtually unmentioned by classical writers, and its practice, though widespread, was that of a secret cult. Only in the past couple of decades, when this mystery-religion's primary motif, known from numerous archaeological discoveries, has been studied by scholars with a knowledge of practical observational astronomy, have we been able to gain profound new insights and solve centuries-old puzzles relating to a religion that flourished throughout the western civilized world for the first three centuries of our era.

J. Randy Attwood

Title: Watching Canadians go into Space

During the past seven months, three Canadians have travelled into space aboard the Space Shuttle. As a photographer for the Canadian Space Agency, Randy Attwood attended the launch preparations and launches of Chris Hadfield, Marc Garneau and Robert Thirsk. The photographs taken will serve as a historic record of the events. The talk will consist of a photo-summary of his experiences.

University of Alberta Campus Map



University Map Legend

Building	Building Name	Grid
1	Biological Sciences Centre	B4
2	University House	A2
3	Faculty Club	B3
4	Ring House Gallery	B3
5	Centre for Subatomic Res.	C4
6	Windsor Carpark	C3
7	Temporary Laboratiores	C3
8	Chemical/Mineral Engineering	C3
9	Mechanical Engineering	C3
10	Assiniboia Hall	C4
12	Athabasca Annex	D4
12	Athabasca Hall	D4
13	Structural Engineering Lab.	D3
14	Blench Hydraulics Lab.	D3
15	General Services Bldg (GSB)	E3
16	Pembina Hall	E4
17	Printing Services	E2
18	Stadium Carpark	E3
19	Industrial Design Studio	E3
20	Student's Union Building	E4
21	University Hall	F4
22	Van Vliet Physical Education	F3
22	Ice Arena	F3
23	Saint Joseph's College	F5
24	Jubilee Auditorium	H3
25	Lister Hall	H2
26	Kelsey Hall	H2
27	Henday Hall	H2
28	Mackenzie Hall	H2
29	University Hospital Day Care	I3
30	Education Development Centre	I4
31	University Heating Plant	I3
32	Aberhart Nurses' Residence	J4
33	Aberhart Services Building	J3
34	Aberhart Centre	K3
35	Mewburn Veterans Centre	K3
36	W. W. Cross Cancer Institute	K2
37	Avadh Bhatia Physics Lab.	C4
38	V Wing	C4
39	Chemistry Centre East & West	C5
40	Earth Sciences Building	C5
41	Greenhouse	C5
42	H. M. Tory Building	C6
43	H. M. Tory Lecture Theatres	C6
44	D. E. Cameron Library	D5
45	Arts Building	D6
46	Rutherford House	C7
47	Humanities Centre	D7
48	HUB International	E7
49	Central Academic Bldg (CAB)	D5
50	South Laboratory	D5
51	Rutherford Library	E6
52	Old Power Plant	E5
54	Civil/Electrical Engineering	E5
55	Administration Building	E4
57	Fine Arts Centre	F7
58	Law Centre	F7
59	Saint Stephen's College	F6
60	Home Economics Centre	G6
61	Education Centre, N. & S.	G5
62	Newton Research Building	G5
63	Medical Sciences Building	H5
64	Campus Tower	G7
65	Health Service Building	G8
66	Garneau Student Housing	F9
67	Religious Studies	D8
70	University Hospitals Parkade	J5
71	Health Sciences Centre	H5
72	University Hospital Hostel	I5
73	Clinical Sciences	I5
74	E. A. Corbett Hall	K5
75	Butterdome/ Univ. Pavilion	G3
76	Campus Security	G5
77	Materials Management	I3
78	R. E. Phillips Services Building	I2
79	Agriculture/Forestry Centre	E3
80	Business / Stollery Centre	C6
81	Canadian Red Cross	J5
83	Nuclear Magnetic Resonance	I4
86	Trailer Complex 2	E5
87	Trailer Complex 1	C5
89	Heritage Med. Research Bldg.	G6
90	School of Native studies	E9
91	Women's Research Centre	E9
92	Faculty of Extension	J7
93	Timms Centre	G7

Russell Sampson

Russ has been interested in astronomy since childhood, and became a member of the Edmonton Centre of the R.A.S.C. in 1984. He is presently working on an interdisciplinary Ph. D. at the University of Alberta in the departments of Earth and Atmospheric Sciences, and Civil Engineering. My astronomical interests include: atmospheric optics, the aurora borealis, planetary astronomy, variable stars, lunar occultations, meteors, astronomical history, archaeoastronomy, astronomy education and popularization.

Title: Simple Methods to Estimate Fundamental Cosmic Distances

The first three steps in determining the scale of the Universe are the radius of the Earth, the distance to the Moon and the distance to the Sun (the Astronomical Unit or A.U.) Each one of these distances can be estimated (to within an order of magnitude) with very simple equipment and without the need for extensive travel. The radius of the Earth is found by measuring the physical distance to a flat horizon from an elevated observing site. From this value, the distance to the Moon can then be estimated by measuring the angular size of the Earth's shadow during a partial or total lunar eclipse. Finally, the distance to the Sun can be estimated (with some basic assumptions) by first determining how bright Mercury would be if it were placed one Astronomical Unit from the Sun during quadrature and then calculating the distance the Moo would need to be if it were as bright as this substitute Mercury.

Mark Zalcik

Mark Zalcik has been co-ordinator of the NLC CAN AM North American noctilucent cloud observing network since its formation in 1987. The network archives sightings from both amateur observers and those made from Canadian weather and flight service stations. Zalcik has authored or co-authored several papers on climatological results gleaned from NLC CAN AM observations. His other interests include meteoritics, photography, and backpacking.

Title: High Clouds, High Season

Delegates at the 1996 RASC General Assembly are in a favourable position to observe noctilucent clouds (NLC), the rare mesospheric phenomenon only visible in the late Spring and Summer from the upper mid-latitudes. The combination of ideal geographic situation with respect to the cloud fields and

a fairly high percentage of clear nights make the northern Canadian prairies well-placed for NLC watching.

Observations of NLC by the North American network NLC CAN AM, with whom many RASC members contribute data on NLC sightings, have enabled a mapping out of frequencies of NLC sightings in various parts of Western Canada; from this exercise one can determine the best and worst areas in the nation to sight NLC.

The nature of NLC with respect to appearance, evolution, and possible relation to global climate changes will be discussed.

Alister Ling

Alister Ling has been an amateur astronomer for 20 years, and from the time he was introduced to deep-sky observing at the Montreal Centre of the RASC, the deep-sky has captivated his interest. He has built both 25 cm and 32 cm scope.

Once he got past the first couple of hundred bright NGC objects, he realised that there were errors in the catalogue, and fixing these is an interesting field of study in itself. This is the topic of the talk.

Title: Repairing the NGC and IC: A project and an example

Errors in the New General Catalogue stem from a number of paths, from typographical errors in the original manuscript to incorrect identification by present day researchers. A group of mostly amateur astronomers is co-operating to produce a complete historical correction to the NGC. A couple of examples of catalogue errors are presented along with the path taken to correct them in modern catalogues. Many errors are resolvable only by taking visual observations in order to duplicate the
original discovery.

Peter Ceravolo, Douglas George & Paul Boltwood

Peter Ceravolo: The RASC's 2nd VP and a professional optician runs his own optics manufacturing company building big toys for rich people. At the urging of his wife Darlene, Peter spends most of his money on extensive

astrophotography trips in southern Arizona.

Douglas George: The RASC's 1st VP is a systems engineer running his own company who is easily sidetracked by Peter Ceravolo's crazy ideas for making money in astronomy.

Paul Boltwood: The smart one of the group, Paul has no connection to RASC National politics. Instead Paul spends most of his free time accumulating data on blazars for destitute European astronomers. Paul, yet another freelance engineer, is renowned for his retentive methods of building excellent astronomical equipment.

Title: Hyakutake: The Motion Picture

The close approach of comet Hyakutake provided an excellent opportunity to shoot a time-lapsed motion sequence showing the development of the tail with wide field photography and reveal the jets in the inner coma with high resolution CCD imaging. Peter Ceravolo spent two weeks in Arizona photographing the comet with a custom made wide-field astrographic telescope. Douglas George wrote sophisticated image processing software to convert the 850 digitized negatives into a motion picture sequence that was transferred to video. Paul Boltwood used his 7" refractor and scientific grade CCD camera to track and image the comet at a resolution of 0.7 arc seconds per pixel. Thousands of images taken over several nights were combined to reveal the rotating jets (extending well outside the field of view) spewing material into the inner coma.

Martin Conners

Martin Conners is Assistant Professor of Mathematics and Physics at Athabasca University, with research interests in impacts and asteroids. He is in his last year of doctoral studies at the University of Alberta, and also studies electrical aspects of the aurora. He is also very involved with science teaching through distance education techniques, particularly Astronomy and Physics using home computers and home lab apparatus. A long-time member of the RASC, he was secretary and president of London Centre not long after the extinction of the dinosaurs.

Title: Chicxulub Crater on Maps

Chicxulub Crater, associated with the Cretaceous-Tertiary geologic boundary, was recently identified. It appeared in the Observer's Handbook only in the 1994 edition, marked as 'buried', with a 'ring of sinkholes'. The burial made identification difficult and has led to surface features being very subtle. Nevertheless, standard Mexican government maps contain information about the size and structure of the crater. Examination of these, with analysis done on a horne computer, has helped to confirm that the crater has a diameter of about 180 km. Collaboration with Mexican and other Canadian researchers has shown a close relation of the ring of sinkholes to geophysical signatures, and that there are subtle elevation changes near the crater rim. The structure of the crater will be discussed with an emphasis on its analysis using readily available maps.

Michael Watson

Michael Watson is a lawyer who earned his B. A. and LL. B. in 1976 from the University of Toronto, and who was called to the Bar of the Province of Ontario, in 1978. He has been a member of the RASC since 1970, a life rnember since 1987, and was a member of Toronto Centre for many years.

Michael is a frequent contributor to the Bulletin, and a presenter of papers at General Assemblies. He is the creator of the multi-media astronomy shows *South of Capricorn* and *Moonshadow Over Mindanao*. He is an experienced solar eclipse observer, and has travelled to see two total and annular eclipses. He is a long time astrophotographer, with photographs published in Sky & Telescope, Discover, Maclean's, Equinox, and Australian Geographic, as well as in astronomy books and texts.

Title: The Space Shuttle - A Decade and a Half in Orbit.

From the first launch of the orbiter Columbia in the early 1980's to the three most recent docking missions with the Russian space station Mir, NASA's space shuttle program has given the world unforgettable images of the surface of our planet and of life in orbit. This paper is a photographic retrospective of some of the most famous images from the past 15 years, together with less-known but equally spectacular photos to emerge from the space shuttle program. It is a companion to the author's General Assembly photographic display on the same subject.

Don Haladiuk

Don has been a member of the RASC since 1973. Don is a former president of the Calgary Centre and has been a big supporter of public education activities in the community. Don is regularly heard on the first Tuesday of every month as the CBC Starman in Calgary. In addition to giving public lectures on astronomical topics, Don has been working with teachers over the last decade in bringing the universe into their classrooms.

Title: Comet Hale-Bopp and Your Centre

Whether Comet Hale-Bopp is a great comet or not, almost every astronomy magazine will feature the passage of this intriguing object. The news media (print, radio, and television) will also mention Hale-Bopp's arrival adding to the exciternent. RASC Centres across Canada can use the free publicity to their advantage. This paper will list various activities Centres can implement to become more visible in your community and promote your Centre. Even if the Comet is not that spectacular, the opportunity to increase your membership is worth the effort. A handbook will be available for Centre National Representatives to take back to their Centre Councils for discussion.

Gordon Sarty

Gordon Sarty has been an amateur astronomer since I was ten years old. He began with a department store 2 inch refractor which I used for many years. It was difficult to do deep sky observing with a 2 inch refractor, but he found the view of Saturn spectacular. A few years ago he finally completed a 8 inch Newtonian, and within a year of building it found all the Messier objects as well as some comets, asteroids, and NGC objects. Soon thereafter, he went nuts over variable stars for a while because they were easy to observe from the city. Gordon was born in 1960 in Montreal, received a B. Sc. E. in mechanical engineering in 1982 and a Ph. D. in math in 1995.

Title: Using Visual Fireball Data to Compute Trajectories and Orbits.

With the end of the Meteor Observation and Recovery Project (MOP) there have been no accurate means available for computing the trajectory and orbit of an observed fireball. The reason for this is twofold. Without the cameras of the MOP network we have to rely on visual reports of fireball sightings from the general public which tend to be very approximate. As well, any attempt to compute the trajectory of the fireball from visual data using pairs of

intersecting planes (as was done with the MOP data) leads to unreliable results. An alternate method of computing fireball trajectories from visual data using intersecting great circles on the Earth has been developed and leads to more reliable results. Using great circles to compute the ground track from azimuth observations independently of the more unreliable altitude observations gives this method its advantage over the intersecting planes method. The great circle method has been applied to several fireball sightings between 1993 and 1996 with success. Preliminary software for computing fireball trajectories is available on the web at http://erato.usask.ca/~sarty/.

Roland G Dechesne

Roland is 1st Vice President of the Calgary Centre of the Royal Astronomical Society of Canada where he first became a member in 1977-78. He has B. Sc. and M. Sc. degrees in geology from the University of Calgary, and is currently finishing his Ph. D. in structural geology at McGill University, Montréal. A neophyte astrophotographer, he is public event co-ordinator for the Centre, his interests run from deep-sky to sunspots, light pollution abatement, galactic dynamics and the role of very small telescopes in amateur astronomy.

Title: So you Want Your Centre to Grow? Analysis of Club Population Dynamics - Lessons Being Learned in Calgary.

Most local astronomical societies in North America have fewer than about 200 bodies. In Calgary, our adult membership is over 170, and our youth group has about 60 members. High year-to-year drop-out, particularly amongst first and second year members, is the major barrier to membership growth. A big problem is the jargon and techno-babble that confronts new amateurs. In the past, our club has not always done its best in introducing newcomers to the hobby. The population influx in the mid-80's that is still apparent in our club's membership hints that the media's focus on Comet Halley may have had a bigger effect than any efforts of our club. This suggests that Comet Hale-Bopp will present a similar opportunity; properly anticipated, this event will be a "club maker" for many centres. Recent initiatives to retain new Calgary recruits include our telescope-for-lend program, redoing our membership form to provide more practical stargazing information, the creation of a beginner's info pack, beginner-orientated binocular observing certificate, "Nightcrawlers" beginners' workshops, a July family and beginner oriented star party, and restructuring our monthly general meetings to have a coffee-cookie social in the middle instead of at the end of the meeting. The disadvantage of a large club is that administration is trickier and volunteer burnout is possible if a serious attempt in not made at including new members in events.

In Special Recognition

Rosemary Freeman

Rosemary Freeman was hired as Executive Secretary of the Royal Astronomical Society of Canada in 1972 following the marriage of Marie Fidler to Sam Litchinsky and her subsequent move to Calgary. Prior to joining the Society Rosemary had been working for Canadian Pacific, and in the years since has kept up friendships she made there.

During her twenty-four years with the Society, Rosemary has made many more friends in the Centres from coast to coast and seems to know everyone by name. She adopted the unattached members as her own special responsibility; many write to her each year with friendly greetings and news of their activities.

One of the Executive Secretary's biggest chores is the handling of orders for over 10,000 Observer's Handbooks each year. More than the orders had to be handled and Rosemary soon learned why, at the interview which led to her appointment it is rumoured that Dr. Heard asked if she had a strong back!

Summer was the time to get "geared up" for the new season and sometimes when the Ontario government helped to finance summer jobs, Rosemary had some assistance. Once again, her friendship has kept her in close contact with some of the young people whom she has seen grow up, graduate and get married.

While we all love special events like eclipses and comets, Rosemary may not have such fond feelings. At times, the phone seemed to ring continually with people asking when, where and how to view whatever it was. In the evening or on weekends, when the office finally was quiet, or even at home if necessary, Rosemary would turn to book-keeping - a task she never enjoyed but never shirked.

Rosemary has been on the front line of innumerable changes in the operation of National Office. She has managed moving National Office twice - first from 252 College Street to 142 Merton, and then to 136 Dupont Street. The upheavals were not easy and Rosemary's "strong back" got quite a workout. But wherever the office was, Rosemary always made it feel like home - offering a cup of tea to visitors or tending plants indoors and in the garden. By the time Rosemary left for the day, the office would be immaculate with everything put neatly away.

Undoubtedly, Rosemary learned her no-nonsense approach in the rigorous education she received as a girl in Sydney. But she also learned to be completely selfless and kind to those who really needed her help. Any friend of Rosemary's is a friend for life.

Rosemary didn't always take the vacations which were due to her, but when she did, she took some marvellous trips. In her retirement, she will surely be planning some more great holidays and will look forward to spending more time with her two sisters in Australia.

May the Sun and stars shine brightly wherever you go.

Annual Awards and Presentations

Five awards are scheduled to be given at the Annual Banquet, in order that the delegates are aware of accomplishments of the recipients the following is presented.

Chant Medal - David Lane

Several years ago David Lane developed a computer program which has had a significant impact upon amateur astronomy in North America. *The Earth Centred Universe* (ECU) is a sophisticated sky visualization program which runs on PC-compatible computers. ECU is a masterpiece of its kind. It is no small undertaking to research and develop such a computer program.

The program in not only accurate, sophisticated and versatile, it is also "user friendly." Anyone can sit down and within minutes they can explore the universe easily with the intuitive command protocol that Dave has built into his program. ECU is a beautiful sky simulation program, a desktop planetarium, an information goldmine, and a telescope command and control system. Dave has left nothing out in his effort to produce one of the best pieces of astronomy software available in the world today.

The Earth Centred Universe has been upgraded several times. The current version can include the 19 million objects of the *Hubble Guide Star Catalogue* and may be used to control computerized telescopes. Many amateur astronomers throughout North America and the world use ECU and it has been adopted by universities as an instructional aid in introductory astronomy courses. The successful supernova search being carried out by David Lane, and Paul Gray at the Burke-Gaffney Observatory at Saint Mary's University uses ECU to drive the telescope and target candidate galaxies.

David Lane is an active and valued member of the Halifax Centre of the Society. His Earth Centred Universe has brought international recognition to himself, the Halifax Centre, the Royal Astronomical Society of Canada, and to Canadian amateur astronomy in general.

Ken Chilton Prize - Raymond R. Thompson

Raymond Thompson is being awarded the Ken Chilton Prize for his work in the photoelectric photometry of variable stars. Raymond joined the American Association of Variable Star Observers (AAVSO) photoelectric photometry program in 1990, and soon became one of the most active observers, even though his living near Toronto poses some challenges.

The AAVSO photoelectric photometry program consists of a permanent program and special requests, one special request was to observe small-amplitude red variable stars (SARVS) whose variability was poorly understood. Ray contributed significantly to this project, and is co-author of the resulting publication. Ray has also contributed to the permanent program, which consists mainly of better-understood SARVS. The results of ten years of AAVSO observations of these stars was presented at an international conference in South Africa in 1995, and a full report has been accepted for publication in "Publications of the Astronomical Society of the Pacific"

The quality of Ray's work is right up to professional standards. In winter he uses a unique "polar axis refractor". The small size of this telescope limits him to bright stars, but it enables him to keep warm and remain productive when other observers have given up.

"Ray has worked harder than any observer in the AAVSO Photoelectric Photometry group. He has produced 2,927 observations since 1990, which is way ahead of any other observer, even though some started seven years before he did. His weather can be bad for weeks at a time, yet he maintains his interest in gathering PEP data for the AAVSO. He is curious about any unusual results he may see in his data, and does produce high-quality data."

Howard J. Landis
chairman - AAVSO Photoelectric Photometry Committee

Service Award - Sidney G. Lee

Sid Lee joined the Calgary Centre in 1985 as a person who wanted to learn more about this fascinating subject of astronomy. In the last eleven years he has served on the Centre's Council for several terms, as well as on the Constitution and Public Education Committees. In the summer he has

assumed the role of Observatory Site Director, he is always present at New Member's Night, and his friendly personality has many many new members feel more comfortable.

From the beginning he has been an astounding volunteer who can always be counted on in assisting with the numerous events, he is extremely dependable yet never seeks special recognition. He has been an instructor for various courses offered by Calgary Centre at the Alberta Science Centre through the Calgary Board of Education.

Sid is a tremendous asset to the Calgary Centre. It is wonderful to see a member who a decade ago was a new member looking for tips on how to observe deep sky objects , and is now helping new members.

Service Award - Robert Venor

Robert Venor first joined the Montreal Centre in 1934-35 and, for fifty-eight years of his sixty-one years of service has been the chartered accountant auditing our books at no cost whatever to the Centre. During the difficult period the Centre underwent in the 1970's, his professional advice and diligent supervision of the Centre's financial management were vital factors in its surviving those troubled times.

Bob's contributions go far beyond his professional services; he also funded from his own pocket the excavation of our observatory's basement when the building was first acquired by the Centre; down through the years, he made numerous donations to various activities at the Centre. In recent years, he has been a repeat donor to our Out-of-Town Observatory Fund..

Bob Venor's contributions to the Centre's astronomical activities are equally impressive. He served as Chairman of the Naked-eye Sunspot Committee throughout the 40's and 50's. He participated in many of the Centre's observational activities, its special events and has observed 78 of the Messier objects. he is also responsible for starting the telescope-making classes which he taught on and off for twenty years, thereby attracting many people to the Centre.

Service Award - Abbe A. Tardiff

A service award is also being presented to Abbe A. Tardiff, however no information was available on the award itself prior to publication.

A Guide to the Display Competition

The 1996 General Assembly will feature a competition for displays by members. Members may create a display for one or more of the following categories (maximum of three categories, with one entry per category). A group of members may enter in only one category (one award will be given for the group), but members of the group may enter their own exhibits. In the event members don't wish to compete they are still welcome to display their projects.

Entries must be original ideas, and if entered in the competition can not have been previously exhibited at a General Assembly. In addition the display must have been completed within the last two years.

The following is a list of the exhibit categories for the 1996 General Assembly. The exhibits may be viewed in the Alberta Room of the Lister Hall Complex from 1400 to 1700 on Thursday, from 0800 to 1600 on Friday, from 0800 to 1700 on Saturday, and from 1300 to 1700 on Sunday. The displays may be taken down and removed anytime during opening on Sunday, or by other arrangements. The displays will be judged on Sunday and prizes will be awarded at the Banquet Sunday night.

Astrophotography: This category will contain photographs using the techniques of Prime Focus, Eyepiece Projection, Piggyback, or CCD Imagery.

Observational Astronomy: This category will contain projects in Atmospheric (Near Sky) work, Solar System, Deep Sky, and Sketching.

Construction & Instrumentation: This category will contain projects dealing with Observatories and Telescopes. A photo display of the construction process is quite acceptable.

Accessories & Observing Aids: Consisting of equipment designed and/or built by members to assist them in their observing pursuits.

Original Computer Programs: Computer programs for use in all aspects of astronomy, including: Guiding, Computations, digitization, etc.

Centre Displays: Displays considered to be completed by a group of members or associated from one Centre.

Youth Member Display: Display from those members under 18. This category will be judged as a separate group.

Open Category: This category is essentially a catch all for everything else that never seems to fit into the pre-selected categories..

Detailed Schedules

As with all things planned in excruciating detail well in advance, little things happen. It is hoped that this schedule will represent some semblance of reality between June 27th and July 1st. In the event of changes the organizing committee will do their very best to let all delegates know well in advance. Here's wishing us luck!

Thursday, June 27, 1996

Time:	Function:	Location / Room:
1400 - 1700	Registration Open	Alberta Room - Lister Hall
1400 - 1700	Display Area Open	Alberta Room - Lister Hall
2000 - ?	Observing @ Physics	Physic's Roof

Friday, June 28, 1996

Schedule for Events on Campus

Time:	Function:	Location / Room:
0800 - 1600	Registration Open	Alberta Room - Lister Hall
0800 - 1600	Display Area Open	Alberta Room - Lister Hall
0900 - 1100	Campus Tours	Lister Hall Foyer
0900 - 1100	National Council #1a	General Faculties Council Boardroom
1100 - 1230	Free Time / Lunch	
1230 - 1600	National Council #1b	General Faculties Council Boardroom
1230	Departure for Edmonton Space & Sciences Centre	Lister Hall Foyer
1430 - 1445	Coffee Break	Students Union Building Food Court
1615	Departure for Edmonton Space & Sciences Centre	Lister Hall Foyer

Schedule for Events at Edmonton Space & Sciences Centre

Delegates may see as many Star Theatre shows as they wish, but are limited to seeing one IMAX presentation. Challenger Mission Teams can be sign-up for at the registration desk.

Time:	Function:	Location / Room:
1245:	Arrival	
1300:	IMAX - Destiny in Space	Devonian IMAX Theatre
1300 - 1900	Access to the display galleries.	
1400:	IMAX - Beavers	Devonian IMAX Theatre
1500:	Star Theatre - Rocky Mountain Skies	Margaret Zeidler Star Theatre
1500:		IMAX - Stormchasers

Devonian IMAX Theatre		
1600:	IMAX - Living Seas	Devonian IMAX Theatre
1645±	National Council Attendees arrive	
1700	Star Theatre Show -	Margaret Zeidler Star Theatre
1900 - 2030:	Wine and Cheese	Rotunda
2030 - 2130:	Slide Show and Song Competition	Rotunda
2130	Laser Show - Pink Floyd, Vision Bell	Margaret Zeidler Star Theatre
2130	Transportation to Lister (if desired)	ES&SC Foyer
2130	Observing @ Deck	
2230	Trans. to Lister	ES&SC Foyer

Saturday, June 29, 1996

Time:	Function:	Location / Room:
0800 - 1400	Registration Open	Alberta Room
0800 - 1700	Display Area Open	Alberta Room
0900 - 1040	Paper Session 1a	V-Wing-129
1040 - 1100	Coffee Break	V-Wing Corridor
1100 - 1200	Paper Session 1b	V-Wing-129
1200 - 1230	Group Photo	Outside
1230 - 1400	Free Time / Lunch	
1400 - 1540	Paper Session 2a	V-Wing-129
1540 - 1600	Coffee Break	V-Wing Corridor
1600 - 1640	Paper Session 2b	V-Wing-129
1640 - 1700	Kingston GA '97 Presentation	Physics 129
1700 - 1730	Free Time	
1730 - 1900	Barbecue	Lister Patio
1900 - 2000	Free Time	
2100 - 2120	H. S. Hogg Lecture	Timms Centre for the Arts
2120 - 2220	Reception	Timms Centre Foyer

Sunday, June 30, 1996

Time:	Function:	Location / Room:
0645	Wake-up Call	Lister
0715	Departure for Fort Edmonton	Lister Foyer
0730	Arrive at Fort Edmonton	Fort Parking Lot 14
0745 - 0900	Breakfast	Fort Courtyard
0900 - 1000	Guided Tours	Fort Edmonton
1000 - 1130	Unguided Tours	Fort Edmonton
1130	Departure for University	Train Station
1200 - 1300	Light Lunch	Lister Patio
1300 - 1700	Display Area Open	Alberta Room
1300 - 1515	General Assembly	GFC Boardroom
1515 - 1530	Coffee Break	GFC Foyer
1530 - 1700	National Council #2	GFC Boardroom
1800	LRT to Banquet	University Station
1830 - 1930	Cocktails	Delta Centre

1930 - 2100	Banquet	Delta Centre
2100 - 2300	Awards, etc.	Delta Centre
2330 ±	Departure for University	Hotel Entrance

Monday, July 1, 1996

Tour:	Departs:	Returns:
West Edmonton Mall AM (Shopping & Attractions):	0930	
West Edmonton Mall PM (Shopping only):	1300	
Reynold's Museum, Aviation Hall of Fame, & Alberta Central Railway Museum:	0800	1600
Elk Island National Park:	TBA	
Devonian Botanical Gardens:	TBA	

Sponsors / Contributors

The organizers of the 1996 General Assembly wish to thank the following companies and individuals for their generous contribution of prizes. We would urge R.A.S.C. members to return their favour and support them with your business.

Donor:	Prize:
Astronomy Magazine	One years Subscription
Comet Rapid Announcement Service	6 month Subscription
Cookies by George	Gift Certificate
Edmonton Space & Sciences Centre	Two Zeiss Portfolios
Gem Port	Tektite ornament
Jim Mobile Inc (JMI)	Gift Certificate and Videotape
Lumicon	Gift Certificate
Michael Casper Meteors Inc.	Giben Meteorite
Murray Paulson	LED Flashlight
Orion Telescopes	EZFinder
Orion Telescopes & RASC Edmonton	Ultrablock Filter
Perceptor	2 Door Prizes
Quazar Optics	Two Colour Astrophotographs
Science Magic	Doorprize
Sirius Science and Magic	Telrad
Sky Publishing Co.	Venus Globe (Magellan Images)

1996 General Assembly Delegates List

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