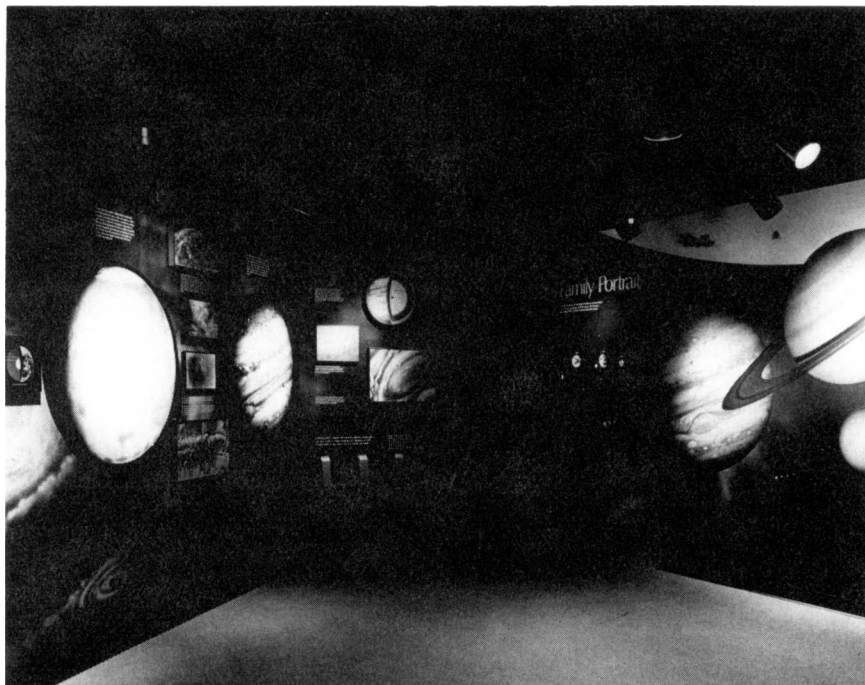

NATIONAL NEWSLETTER

Royal Astronomical Society of Canada

Supplement to the *Journal*

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The McLaughlin Planetarium's new astronomy gallery, the Astrocentre, officially opened in December. Visitors will experience a special treat seeing this interactive and attractive introduction to the universe.

Photo courtesy of McLaughlin Planetarium

NATIONAL NEWSLETTER

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Deadline for June issue is April 1.

Editorial

by Ian G. McGregor

One of the great frustrations experienced by all newsletter editors takes place when talking to a potential reader about a past issue and discovering that even a month after they had received the newsletter, they couldn't remember reading it, or they couldn't remember that skillfully edited article which the editor thought would be of special interest to readers. In this regard, it was encouraging to have several readers tell me just after the Christmas season with all its confusion and activity that they had missed seeing an editorial from me in the December issue.

The past year had its triumphs (the Voyager flyby of Uranus), its tragedies (the Challenger disaster), its special events (Mars at a favourable opposition, or comet hunting in the southern hemisphere), and its frustrations (Comet Halley) but it was interesting to note that almost all New Year's Eve reports only mentioned the Challenger briefly and then moved to other topics. I wonder what the children of today will be telling their grandchildren 76 years from now when asked about the famous Comet Halley?

For Canadians, the predictable events in space for 1987 that will be of special interest are somewhat limited. However, Comet Wilson discovered by Canadian Catherine Wilson last summer may provide a bright comet for more southerly observer in the spring. Federal government budget cuts to the National Research Council have resulted in the closing of the Algonquin Radio Observatory this year and the short-sighted approach of the town council of Richmond Hill to urban planning will result in brighter skies for the David Dunlap Observatory. Canadian research programs in astronomy are being badly crippled by a lack of long term planning by governments.

Despite these problems, I am sure that 1987 will be a good year for amateur astronomy because the focus will be less on one object and more on the great variety of projects possible in our hobby.

Change in Deadlines

To improve the production time for the National Newsletter, it has been necessary to change the deadlines for the receipt of material by the editor. The new deadline for submission of material to the Newsletter is now two months prior to the month of issue rather than the six weeks which has been in effect for sometime. Please keep this in mind when submitting material.

Observing at Mount Lemmon

by Neil Rowlands
Edmonton Centre

During my four undergraduate years at the University of Alberta I unfortunately did not have much time for astronomy. But now, much to my delight, that is changing because I am very fortunate to be attending Cornell University as a graduate student in astronomy. Having to assist in teaching a first year astronomy course, I rediscovered my love for simply standing under the stars, picking out the “landmarks” with binoculars or small telescope. Equally gratifying is showing these often amazing sights to others who have never seen them before. Their expressions of awe (not to mention one’s own) certainly make the efforts worthwhile, as I am sure most R.A.S.C. members have experienced at star parties.

Early last summer I was able to make what I hope to be the first of many observing trips to a large telescope. My destination was Mount Lemmon which overlooks Tucson, Arizona from the Catalina Mountains. While not as large or as well-known a site as its cousin, Kitt Peak, across the valley, the Catalina Mountains are a veritable forest of “smaller” telescopes. There are two 1.5 m telescopes and a 1 m telescope operated by the University of Arizona’s Steward Observatory as well as another 1.5 m telescope operated by the University of California (San Diego) and the University of Minnesota. Our destination was the 1.5 m Cassegrain f/16 telescope operated by the University of Arizona. Although not as well-equipped as its twin on Mt. Bigelow, the Mt. Lemmon instrument could be called the fastest slewing (movement from source to source) large telescope in the world, since it is done by unlocking the drive and physically pushing the telescope. At least I had some exercise from the experience.

The observing program was to collect the spectra of some planetary nebulae. While I never had much opportunity to observe deep-sky objects when I was actively observing, I could certainly appreciate seeing sights like the Ring Nebula (M57) and the Saturn Nebula (NGC 7009) filling the field of view of the eyepiece. I was also surprised by the image of NGC 6445: it was shaped like a box rather than a sphere! In contrast, NGC 6826 was exactly what I had expected a planetary nebula to look like: a star in the centre of a diffuse spherical halo of luminous gas. Most of the planetaries were however, star-like or very small greenish disks.

Observations were made using a 28 mm RKE eyepiece with a flip mirror to place the nebula in the telescope beam before taking a spectrum on the central region of the nebula. The taking of a spectrum involved simply tilting an interference filter with a narrow passband in the near ultraviolet (the region of the spectrum being studied in the program). With the filter tilted relative to the incoming beam, the wavelength it passed shifted to shorter wavelengths. After passing through the filter, the nebula emission was monitored by a photomultiplier tube. Fortunately, the recording of the phototube output and the tilting of the filter, were controlled by computer. Once we found a nebula, the computer did all the rest.

Even finding the nebulae was not too difficult. We simply pushed the telescope until the correct right ascension and declination appeared on a telescope monitor. There was even a television camera on a side-mounted telescope used for guiding from the control room! In some cases though, when the planetary nebula was only one faint star amongst many others, we had to use finder charts. At other observatories of similar size, the 1.5 m on Mt. Palomar for instance, the pointing system is much more accurate and one merely types the object’s coordinates into a computer and the telescope automatically slews to a position within an arcsecond of the object. In fact, this operation is performed by a telescope operator, not the astronomer. I am rather glad that the Mt. Lemmon telescope was “primitive”, at least I felt that I was actually doing the observing, finding the objects was more rewarding since we had to search a little for them.

The observing run was for seven nights, more than enough to complete our observations which only needed two clear nights. However, the weather is not always cooperative even in the relatively clear skies of southern Arizona. I slept only a few hours the night before we left for the observatory. Then after travelling all day, renting a car in Tucson and buying groceries for the next 10 days (we were staying in a dormitory on the mountain) we arrived at the observatory to find we unexpectedly had an extra night that night! Since the sky was clearing, we set up the equipment and started observing, as we could not waste a possible clear night. Unfortunately, we fought clouds all night and ended up being

rather frustrated as well as exhausted. The rush on that first night did however get us settled and into a routine immediately. One thing that made me feel at home right away was the fact the Steward Observatory provides copies of the *Observer's Handbook* for each of its telescopes. That first night turned out to be the best night as we watched thunderstorms from our 2700 m mountain top site every night for the next four days until the sky cleared for good on the fifth day.

Much of the observing time was spent either looking at blank sky or calibrator stars since there is much scattering at ultraviolet wavelengths by the atmosphere that must be determined. This scattering varies from night to night and with position in the sky. Despite this, the observations of about 30 planetary nebulae were completed in the two nights. Then we were in the rather enviable position of having a 1.5 m telescope at our disposal for two more clear nights! We decided to place a small slit over our phototube to make our beam on the sky smaller and to then scan across the planetary nebula to determine the size of the region emitting the spectral line in which we were interested. In this way we observed a few of the promising candidates from the previous two nights. In order to calibrate the size of our new beam with the slit in place, we scanned Mars and Saturn, whose angular sizes we knew. Surprisingly, Mars and Saturn were relatively disappointing in the eyepiece. While larger than I have seen them, the images were not that clear and for example, the bands on Saturn did not show up very well at all. I have seen sharper, though smaller, images in amateur size Schmidt-Cassegrain telescopes and much better images in a very old 30 cm refractor at Cornell.

On the last night, Pluto was occulting its moon Charon. This is not as fortuitous as it first seems, since Pluto is either eclipsed by Charon or Charon occulted by Pluto every three days, (the orbital period is approximately six days). These occultations and eclipses started in 1985 and will probably continue for six years. By observing the light fluctuations from the Pluto system during this time it is hoped that a better understanding of both Pluto and Charon can be obtained. If the observations are extremely accurate, an albedo (brightness) map of Pluto and Charon might eventually be made. Thus many observatories around the world will be observing these events over the next few years.

However, since the opportunity arose we decided to try and observe the occultation for fun. Actually, it turned out to be extremely tedious. Using our instrument without the filter in place we recorded the total magnitude of Pluto and Charon (they are not resolved in even the largest telescopes) and that of a nearby calibrator star every three minutes for over four hours. Long enough, in fact, that we saw Pluto move with respect to the background stars. Still, to actually watch as the light from Pluto and Charon dimmed as Pluto passed in front of Charon was one of the most fascinating things I have ever seen. The change in brightness was not very large, about 8 percent, or 8/100th of a magnitude. I can understand why people trying to find albedo variations on Pluto and Charon would not have an easy task since they are looking for small deviations on top of this shallow light curve. In many ways I found the observations of Pluto to be more exciting than those of the planetary nebulae, since I could visualize Charon moving in behind Pluto far out on the edge of the solar system.

Once back at Cornell, I started the task of reducing the data for the planetary nebulae. The whole purpose of making these observations is to combine them with infrared observations made by the Kuiper Airborne Observatory. In this manner, a better idea of the conditions of these young astronomical objects can be found. While I was not involved with the airborne observations, the group that I have joined at Cornell does make such flights regularly and with luck, I will be able to report on an observing run onboard the Kuiper Airborne Observatory in the future.

Reprinted from *Stardust*

Star Dome In Mississauga

The city of Mississauga just west of Toronto officially opened its new city hall on January 5 and topping its circular council chamber is a flat dome resembling in size the giant star theatres of Canada's largest planetariums. Of special interest is the inside of the dome itself for it depicts with fibreoptics the stars and constellations of the spring season with gold trim outlining the great bear and hunters of the Mississauga Indian story of the Great Bear and the Hunters.

While from outside the \$65 million building has been described as "different" and a cross between a farmhouse, a windmill, and a barn, the interior is very beautiful. It will be interesting to see if an astronomical ceiling will provide inspiration to the city's leaders.

Across the R.A.S.C.

CALGARY: Brian St. Goddard reports in *Starseeker* that the annual banquet was quite a success with over 100 people present. Brian Tkachyk received the "Best Astrophoto of the Year" award, Bob Seleski received the "Best *Starseeker* Article" award, and Otto Hofmann was presented with a special award for his work at the Centre's observatory. Don Hladiuk presented an audiovisual show at an autumn Centre meeting on his trip to Australia last spring.

QUEBEC: Cet automne le Centre de Québec a choisi de présenter des causeries à ses membres plutôt que les traditionnelles conférences. Ce changement répond mieux aux attentes des membres puisque la participation est très bonne et semble même augmenter. Les quelques causeries déjà présentées ont traité des planètes, de l'expérience de deux (2) amateurs en astrophoto chacun avec un équipement différent, et enfin de l'histoire d'un club d'astronomie (S.A.R.E.L.) dans la région. Nos causeries ont lieu un mercredi une fois par mois.

VICTORIA: Most Centres now use computers for some aspect of their operations and in a recent issue of *Skynews Victoria*, Muriel Enock reported on the software she uses. Among her Apple Macintosh programs are: ReadySetGo and MacWrite for the newsletter, MacPaint for newsletter header, MacStromy for sky charts, First Base for membership lists and labels, Multiplan for program and schedules, and MacDraw for sketching.

VANCOUVER: The Centre's participation in the autumn "Celebration of Nature" program at a local park was a great success. An estimated 10,000 people were present. A giant 7 by 10m tent with a prominent sign drew attention to the R.A.S.C. presence and allowed telescopes, slide shows, and computers to be run and demonstrated for the visitors on a rainy Saturday. Solar observing and a daytime Venus were the big hits on a much better Sunday. The 40cm mirror is finished and a temporary mounting will be built until a permanent observatory is completed.

EDMONTON: Congratulations to Centre Treasurer Mel Rankin who has completed his observing program of observing all 110 Messier objects. Karen Finstad and John Savard have donated some books to the Centre library. Eight carloads of members attended a late October observing party at a site south of Elk Island National Park where a possible permanent Centre observatory may be located. Despite a prominent aurora display, everyone was able to observe Comet Wilson in the sky.

HALIFAX: New members of the Centre's Executive for 1987 are: President, Kathy Oakley; Secretary, Doug Pitcairn; Librarian, Mary Lou Whitehorne; and Observing Chairman, Glenn Roberts. Editor Patrick Kelly is now doing *Nova Notes* on a laser printer. The Centre is exploring increased contacts with the Saint John Astronomy Club of Saint John, New Brunswick.

MONTREAL: At the Centre's Annual Meeting, Ron Pow succeeded Mario Caluori as President. The Library has copies of the R.A.S.C. *Journal* back to 1918 and is planning to bind all of the copies since the early 1970's but is missing the April 1980 *Journal* and the February 1980 *National Newsletter*. Members are looking forward to a visit by the National President, Mrs. Mary Grey in the spring. Bill Strople organized the Christmas party in December. Two field trips to the Montreal Seismographic Station were organized in the autumn.

TORONTO: Ralph Chou, the Society's National Treasurer, is doing double duty because he succeeded Randy Attwood as Centre President at the Centre's Annual Meeting in November. Randy completed an extremely successful four-year term as president and implemented many new initiatives and programs. Other Council changes are: First Vice-President, Kim Rowe; Second Vice-President, John Percy; Recorder, Mary Anne Harrington. Cliff Hand has succeeded Betty Robinson as Editor of *'Scope*. During early 1987, the Centre is doing monthly public displays at the Royal Ontario Museum.

OTTAWA: The annual Deep Sky Weekend was clouded out this past autumn. Sandra Ferguson has succeeded Doug George as Chairman of the Observer's Group. In the December *Astronotes*, Editor

Rolf Meier announced that after 13 years of editing the newsletter, he was stepping down. Now in its 25th volume, *Astronotes* continues to be an informative and perhaps the most observationally minded newsletter in the Society. Rolf's lengthy term as editor is worthy of great praise for the time and effort involved. OK, Rolf, now you have time to find your fifth comet!

SASKATOON: Richard Huziak is the new editor of *Saskatoon Skies*, succeeding Gordon Patterson and Walter Fernets. Richard is an active variable star observer and recent newsletters have featured reports on his observations.

KINGSTON: Ruth Hicks has succeeded David Stokes as Centre President. David has been president for several years and has served the Centre very well during his term. Congratulations to Larry Manuel who is the second recipient of the Kingston Centre's Dr. A. Vibert Douglas Award for service to the Centre and astronomical achievement. He successfully undertook the project of restoring the Centre's 25 cm telescope and has demonstrated his skill in telescope building by constructing an 8 cm refractor with plans to go to larger sizes. In particular, Larry has been very willing to share his knowledge and experience with other members

NIAGARA: Ron Gasbarini, Editor of *Niagara Whirlpool*, has finally shelved his electric typewriter and is now using a computer. The site for the new Centre observatory is still undecided but plans are going ahead for fundraising. John Dekker of the Building Committee has proposed several ideas including selling jacjets with the R.A.S.C. Niagara Centre logo on them and draws at meetings.

ST. JOHN'S: At long last, not one but two newsletters arrived from our most easterly Centre just before Christmas. Unfortunately, the newsletters *All About Stars* contained the sad news that well-known member, Dora Russell, had passed away last winter (see obituary notice in *Newsletter*, Ed.). In memory of Dora Russell, the newsletter has been renamed after her astronomy column which appeared in the local newspaper and the Library is now called the Dora Russell Memorial Library. The Centre's 1986-1987 Executive is as follows: President, Peter Allston; Vice-President, Randy Dodge; Secretary, David Bourgeois; and Treasurer, Gary Dymond. Peter is also serving as newsletter editor.

Across the R.A.S.C. is a regular feature of the *Newsletter*. Centre editors or secretaries should send newsletters and reports of their Centre activities to the Newsletter editor. Deadline for the June issue is April 1.

Nouvelles de l'A.G.A.A.

par Damien Lemay

Stage d'astronomie de Port-au-Saumon

Pendant la première moitié d'août 1986 avait lieu la 16^{ième} édition de ce stage. Il est généralement offert aux garçons et filles de la fin du secondaire et du CEGEP, quoique cette année il était aussi offert aux familles. Port-au-Saumon est loin de la pollution lumineuse sur le côté nord du St-Laurent approximativement en face de Rivière du Loup.

En plus des moniteurs de l'A.G.A.A. (Association des Groupes d'Astronomes Amateurs) cette année on a aussi profité de la présence de trois amateurs français. La température n'a pas collaboré pleinement, seulement trois belles soirées d'observation et du froid. Néanmoins, cela fut suffisant pour réaliser plusieurs projets et entre autres l'observation inattendue d'une spirale active créée par une fusée japonaise. Cette dernière a engendré tout un émoi dans le camp et plusieurs photos furent prises. Une cinquantaine de personnes, animateurs et stagiaires, ont participé à ce camp.

Congrès Annuel Des Astronomes Amateurs 1986

St-Marc des Carrières recevait plus de 65 astronomes amateurs pendant la fin de semaine du 20-22 juin. L'évènement se déroulait à la Polyvalente de 1 endroit et les congressistes qui le voulaient avaient la

possibilité de camper au site de l'observatoire du club. Une nouvelle formule cette année, on pouvait loger dans des familles ou le déjeuner était aussi disponible; l'hospitalité chaleureuse des gens de St-Marc a été très appréciée. La Comète de Halley a évidemment occupé une grande place dans les causeries, entre autres ceux qui sont allés en Amérique du Sud nous ont fait faire par la photo un voyage touristique et astronomique. L'enthousiasme soulevé a suggéré d'organiser un voyage dans l'hémisphère sud d'ici 2 ou 3 ans pour explorer et photographier le ciel du sud, on n'a pas la patience d'attendre le retour de la Comète. Le trophée mérité de l'A.G.A.A. a été décerné à Huberte Palardi de la Société d'astronomie de Montréal qui est bien connue pour ses nombreuses années consacrées à la promotion de l'astronomie. Enfin le conférencier invité le samedi soir était l'astronome canadien Robert Thirsk qui a su tenir son audience en haleine. Pour cette activité le public était admis et l'amphithéâtre était rempli avec environ 200 personnes. À la satisfaction de plusieurs, monsieur Thirsk parle très bien le français. Sa présence parmi les congressistes lors d'une soirée sociale au chalet voisin de l'observatoire fut également une occasion pour parler à souhait avec lui et lui poser chacun notre question. Merci Robert, tu as démystifié plusieurs aspects des voyages dans l'espace et nous nous y sentons plus près malgré les déboires de la Navette.

Algonquin Radio Observatory to Close

The largest radio telescope in North America will be closed this year as a result of federal cutbacks to the National Research Council. The 46 m dish was completed in 1960 and has been responsible for a number of exciting accomplishments including:

- 1967: First successful linking of two radio telescopes so that they operated as one instrument (long-baseline interferometry)
- 1968: First detection of radio emission from an X-ray star, Scorpius X-1
- 1973: First detection of nearby magnetic "bubbles" in our Milky Way galaxy
- 1976-81: Discovery of the largest and heaviest interstellar molecules
- 1977: First demonstration that a ground-based instrument and an orbiting instrument could be linked to form a super long-baseline interferometer

As well, the Algonquin Observatory has done important work in the study of the movements of the Earth's crust and plate tectonics. As it is located in Algonquin Park west of Ottawa, it is located in the ancient landform known as the Canadian Shield whose stability is important when making extremely precise Earth measurements amounting to only 1-2 cm per year.

Cuts in the budget of the National Research Council announced in 1986 amounted to over \$20 million with the closing of the Algonquin Observatory saving about \$1 million. What concerns scientists most are the cutbacks in basic research and facilities such as the observatory in favour of programs such as Canadian participation in the U.S. Space Station project.

In Memoriam: Dora Russell

The *Newsletter* learned just before Christmas of the death of a member known to many Society members across Canada. Dora Russell, one of the founding members of the St. John's Centre, passed away on February 9, 1986. Her interest in astronomy became apparent in the 1960s when she started a column in *The Evening Telegram* titled "All About Stars." She helped to create an Astronomy Badge for the Girl Guides and in 1977, Dora received a Service Medal from the Society for her contributions to astronomy.

In memory of Dora Russell, the St. John's Centre has named its newsletter *All About Stars*, the name of her newspaper column, and the Centre's library will now be known as The Dora Russell Astronomy Library. Dora's own library of astronomy books amounting to over 80 titles has been donated to the St. John's Centre.

The Observer's Cage

by David H. Levy
Assistant Editor

Of all the reasons people give for becoming astronomers, the one I like best is that the sky teaches us to look beyond our everyday lives. For children and the rest of us, the sky offers us a chance to see beyond today, to look forward in life by looking backward into time and space. In a sense, the fantastic pictures of objects such as the Andromeda Galaxy taken by the largest telescopes do us a disservice, for they result in raising expectations and the often disappointing first look through a small telescope. I know of people who have given up their right to the stars because they felt their 8 cm telescope was incapable of performing to some mythical standard they remembered from their introductory books – a picture taken by some monstrous telescope whose views their own instrument could never hope to match. Astronomy must be introduced by the stars themselves, first with the unaided eye, later with the optics of binoculars and telescope, if the effect is to be a lasting one.

The sky is the best teacher for another reason – it allows you to learn at your own rate. Each night the stars rise only four minutes earlier than the night before, so the sky gives you time to digest what you have learned. Even though the sky is a busy place, its motions appear slow enough to encounter easily.

Some of the sky's teachers are not very far away. The meteors that we may see each night are primitive bits of rock that have not changed very much since the formation of the solar system. Observations of them can teach us something about the comets from which they come. For some of us, however, meteors have taught us in a personal way, for the surprise of their appearance may have turned our childish eyes skyward for the first time.

Occasionally, the earth passes through the path of an old comet and a meteor shower occurs. Two well-known showers, the Eta Aquarids of May and the Orionids of October are associated with Comet Halley while the prominent Geminids of December come from a strange and recently-discovered asteroid named Phaeton which must have been a comet long ago.

As people have recognized for millenia, comets are especially good teachers, only at first, their lessons were misunderstood. In earlier times the apparition of a comet provoked terror and wonder. In the famous Bayeux Tapestry depicting the 1066 A.D. appearance of Comet Halley, the terror is visible in the observers as they point skywards and several centuries later the wonder was so great that the Italian artist Giotto di Bondone substituted Comet Halley's appearance in 1301 for the Christmas Star in his famous work painted in 1304. Giotto's wonder returned in our time as a space probe which laid to rest any doubts that comets can instruct. Comet Halley's 16 by 8 km avocado-shaped nucleus is covered with primordial material that offers us vital clues to our origins.

Soon we will be receiving in-person lessons from comets as a "Comet Rendezvous and Asteroid Flyby" (CRAF) mission has been proposed. If this NASA mission receives funding, we will get a look at a comet such as Comet Tempel 2 as it enters the inner solar system and begins its delicate process of sublimation. For the first time, a comet will be surprised by a guest as it awakens. For the first time, a comet would be our teacher in person.

Brighter Skies for D.D.O.

In late October the town of Richmond Hill just north of Toronto revised its official plan for building densities and approved the building of two 16 to 20 storey condominium apartment buildings 800 m from the David Dunlap Observatory, the largest optical observatory in eastern North America.

The David Dunlap Observatory (D.D.O.) celebrated its 50th birthday in 1985 but the rapid population growth of Richmond Hill (45,000 in 1986; 120,000 by 2010) and the unwillingness of local officials to provide some degree of protection to the observatory from increasing light pollution threatens the long-term future of this highly-recognized facility.

Staff of the David Dunlap Observatory, area residents, and several regional councillors vigorously opposed the changes in the town's official plan which concentrates population growth in the town to one small area adjacent to the observatory.

GA '87

May 15–18, 1987
Victoria Day Weekend

The Toronto Centre extends a special invitation to all members of the R.A.S.C. and other interested astronomy enthusiasts to participate in the annual General Assembly in Toronto this May.

GA. '87 is a four-day event over the Victoria Day long weekend. The program features events of interest to members of all backgrounds whether you are a beginner or knowledgeable amateur, a new member or long-time member, an armchair amateur or an active observer.

The program includes:

The program includes:

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| Friday | Evening Reception Murphy Slide Show & Contest Song Contest |
| Saturday | Paper Sessions Display Competition Evening boat cruise of Toronto Harbour and the Islands |
| Sunday | Visit to the Star Theatre and the new Astrocentre of the McLaughlin Planetarium Annual Meeting Annual Banquet |
| Monday | Visit to the David Dunlap Observatory |

Special Ways to Participate

- Compose a song on an astronomical theme for the song contest (open to individuals, groups, and Centres)
- Select your favourite astronomical slide(s) which turned out different from what you had expected (Murphy's Law) for the Murphy Slide Show
- Prepare a display for the Display Competition (see December 1986 *Newsletter* for details)
- Present a 10-minute paper on a research or observational topic (see December 1986 *Newsletter*)

For Additional Information

An information package was sent to all Centre Secretaries in January. Further details can be obtained by writing to: 1987 R.A.S.C. General Assembly c/o Steven Spinney, 154 John Tabor Trail, Scarborough, Ontario M1B 2P8.

Earlier Start to Daylight Time

Ontario was the first province to move to an earlier start to Daylight Savings Time. In November, a private member's bill amending the provincial Time Act called for the start of daylight time on the first Sunday in April rather than the last Sunday in April, was approved by all parties in the provincial legislature.

Daylight time was first introduced in Canada during the First World War in order to conserve electricity and is used today across Canada except in Saskatchewan which remains on standard time year-round except in the Alberta-border city of Lloydminster.

The earlier start to daylight time will reduce demands on electricity and give an extra hour of sunshine after work and after school rather than in the morning when an extra hour of darkness will not be noticed.

At the time of writing, Manitoba has also decided to start daylight time on the first Sunday in April. The federal Science Minister, Frank Oberle, has asked all provinces to make the switch.

The Montagnais Impact Structure

by Roy Bishop
Halifax Centre

In 1970, seismic records taken in connection with the exploration for oil and gas off the coast of Nova Scotia revealed a strange structure in the floor of the Scotian Shelf. It is centred at 42 degrees 53 minutes North and 64 degrees 13 minutes West, about 210 km from Halifax at a bearing of 194 degrees true. The closest community is Lockeport, 120 km from the centre. A single drill hole was run into the centre of the structure in 1974 but it was only recently that information came to the attention of planetary geologists that the structure was confirmed as an impact crater. Dr. L. Jansa of the Atlantic Geoscience Centre and Dr. G. Pe-Piper of the Department of Geology at Saint Mary's University in Halifax were the first to realize the nature and significance of the structure and additional studies have been made by Dr. Blyth Robertson of Energy, Mines and Resources in Ottawa. I first became aware of the crater while attending the annual meeting of the Associate Committee on Meteorites of the National Research Council in Ottawa.

The crater lies under 115 m of water and another 540 m of undisturbed sediments. Thus there is no hint of it from the sea-bottom topography. Below the sediments, the drill core revealed about 500 m of mixed breccia, and below this shocked and uplifted "basement" rock of the Cambrian-Ordovician age. Abundant evidence for shock metamorphism has been found. Potassium-argon dating indicates an age of 50 to 55 million years for the impact event, consistent with the biostratigraphic age. Away from the structure, the sedimentary record is essentially continuous from the mid-Jurassic (about 140 million years ago) to the present. Thus the impact apparently occurred in an environment similar to where the structure is located today i.e. under 100 to 200 m of water. If so, this is the first discovery of a submarine impact crater.

The crater is large – at least 30km in diameter (about the size of the Minas Basin), and there are indications that additional data may prove it to be somewhat larger. Assuming that the impacting body had a diameter of about 6% of this figure, a 2 km diameter object would have been involved. Thus, a few hundred metres of sea water would have been of little consequence to the impact itself. The incoming body, probably either a cometary nucleus or a small asteroid, would have been melted and vaporized by the extreme pressures and temperatures associated with the collision. A rough estimate of the violence of the collision is possible. Assuming a typical impact speed of 20 km/s and a density of 1000 kg/m³ (for a comet-like object), the kinetic energy involved would have been some 8×10^{20} J, or the equivalent of some 200 000 megatons of TNT, many times greater than the world's entire stockpile of nuclear weapons! The date of the impact appears to be a bit too late for the "Cretaceous-Tertiary boundary event" associated with the extinction of much of the life on the Earth, including the dinosaurs about 65 million years ago, but this unimaginable impact off our coast may have completed the job!

Reprinted from *Nova Notes*

Lost Asteroids Recovered

Two long lost asteroids were reported last December by the Smithsonian Astrophysical Observatory to have been recovered. The two objects (1026) Ingrid and (1179) Mally were originally discovered in the 1920s but had not been observed at later predicted oppositions when they should have been observed.

The first asteroid Ceres was discovered in 1801 and by 1986 there were over 3,500 numbered asteroids. To receive a number, an asteroid must be observed at three or more oppositions thus hopefully ensuring that its orbit is known well-enough that it will not become lost. Apart from the numbered asteroids, there are about 6,000 others whose orbits are not known well-enough to receive a number.

With the recovery of these two asteroids there are only four numbered asteroids (out of a total of 3,516) that are considered lost.

Make Your Own Nagler

by Clive Gibbons
Hamilton Centre

While the objective lens or primary mirror is often called the “heart” of a telescope as it serves the main light collector, the eyepiece does the job of magnifying the image produced by the objective. While amateur telescopes have only one objective lens or mirror, several eyepieces are used to give different magnifications and qualities to the image of the sky seen by the observer through the telescope.

Eyepieces are a hot topic of discussion among telescope owners. It is not uncommon to hear of names such as Orthoscopic, Plossl, Super Plossl, Wide-Angle Plossl, Erfle, Konig, and other types mentioned as good designs.

But the king of oculars is generally regarded to be the Nagler, or its recent clone, the Meade Ultra Wide-Angle. Both designs boast of seven or eight element lens systems with 82 to 84 degree angles of view, and both types deliver pinpoint star images across the entire field. They are spectacular to look through and never fail to impress the senses with their “space-walk” perspective. They also cost a pretty penny – in the \$200 to \$400 range. However, it seems worthwhile when you consider that no other eyepieces can match their performance – or can they?

Just what is a Nagler eyepiece anyway? Most people are boggled at the thought of a seven element eyepiece. After all, it is a patented design and probably resembles the inside of an expensive camera lens. Surprise! It is a lot simpler than you imagined.

A Nagler can be thought of as actually two systems in one. Two lenses serve as a Barlow (an accessory that doubles or triples the power of all eyepieces) and the remaining five are an Erfle-like eyepiece combination which acts as a separate eyepiece. Thus, a Nagler eyepiece is a combination Barlow and wide-field ocular. This explains why Naglers give such wide, sharp fields of view.

The Barlow elements increase the focal length of a telescope which makes it easier for the Erfle-like lenses to deliver high image quality across a broad field.

No conventional eyepiece design works well with a “fast” mirror or lens. Even a top quality Plossl used with an $f/4$ to $f/5$ mirror will give mushy images at the edge of the field. Drop in a 2x Barlow and what happens? The $f/5$ instrument increases to $f/10$ and *voilà*, good sharpness at the edge!

As a test, Barry Sherman and I used the Hamilton Centre’s 44cm $f/4.5$ reflector with a surplus 8 x 40 binocular eyepiece. The ocular was a wide-field four-element design with a 20 mm focal length and 80 degree apparent field of view. Without a Barlow, the images were good on-axis, but quite poor off-axis. Next, we inserted a Meade 2–3x Barlow set at 2x. We now had an ocular of 10 mm effective focus with the same incredible 80 degree field. This time however, the stars were pinpoints to the edge — nothing short of awesome. When other members came over to look through the telescope, the reaction was the same. We did not tell them what eyepiece we were using, but one observer did ask where we got the Nagler!

The nicest thing about our improvised “Nagler” was the price. The surplus binocular eyepiece was about \$10 and the Barlow about \$90. If you already own a 2x Barlow, it will probably work just fine with any wide-field eyepiece to give the “Nagler effect.”

But don’t get me wrong, now! Naglers are top quality oculars. They do what they claim and are a pleasure to use. They do give slightly better performance than our homegrown combination because they are designed with the “Barlow” elements and the “Erfle” elements precisely matched. But considering their high cost and the fact that their performance can be closely matched by other designs, they are a poor value to purchase commercially.

I suppose that the moral of the story is that if a product claims to be innovative and revolutionary, it is best to approach with a skeptical eye. More often than not, you will pay through the nose for old principles in a fancy package.

Reprinted from *Orbit*

McLaughlin Planetarium's New Astrocentre

by Ian G. McGregor

Visitors to Toronto's McLaughlin Planetarium are in for a treat as they can now experience the wonder and excitement of the planetarium's new astronomy gallery, the Astrocentre.

Eight years ago the planetarium lost its original gallery with the major renovations taking place to the Royal Ontario Museum of which the McLaughlin Planetarium is a part. Thus with no exhibit area the planetarium had to rely almost solely on its giant 340-seat Star Theatre for public programs but this enabled the planetarium to keep open while the main museum building closed for almost two years. Then, as the museum gradually reopened and each year two or three galleries were renovated and reopened, the time approached for the planetarium to also get its new gallery.

Finally, after two years work, the new Astrocentre opened on December 6, 1986. Covering over 600 square metres of floor space, the Astrocentre was designed to be self-explanatory with a minimum of copy for visitors to read but with wall-size models, special exhibits, and several interactive systems allowing visitors to do a personal exploration of the wonders of the universe.

Several special features highlight the gallery:

Solar Telescope: One of the most popular exhibits on a sunny day is this instrument which is one of only three in Canada. However, while the other two telescopes only show "white light" views of the Sun, the Astrocentre's instrument also reveals the Sun in the red light of hydrogen alpha and shows the chromosphere layer and the real-time eruptions taking place along the Sun's limb.

Stellarium: Centrally located in the gallery is a minitheatre that provides an audiovisual show describing the local system of stars out to a distance of 50 light years. Heavy curtains automatically cover the door, the theatre becomes dark, and an enormous three-dimensional rotating starfield containing 787 pinpoint stars lights up. A narrator describes the nearby stars from bright Arcturus to faint, barely-visible red dwarfs while stars are highlighted and soft music plays in the background. The Stellarium leaves a lasting impression of our local region of space impossible to visualize otherwise.

Interactive Systems: Three visitor-activated systems allow visitors to study the 15 largest bodies in the solar system in front of a six metre wide model depicting the orbits and motions of the planets, study selected objects in the Milky Way Galaxy, or use two computer terminals to provide in-depth information and visuals on a wide-variety of astronomical topics.

There is much beauty and wonder for the visitor to experience. Enormous wall-size photomurals of planets and stars surround the visitor but do not overwhelm. A 50-seat minitheatre presents a show giving a behind-the-scenes description of the activities of one of North America's largest planetariums. A large model depicts the principles behind the operation of a sundial while a large meteorite sample invites contact with an extraterrestrial visitor.

Compared to many other galleries, the Astrocentre is a delight for both children and adults and provides the long-awaited complement to the audiovisual shows in the Star Theatre. Canadians can be very proud of this new addition to the astronomical facilities of our country.

Auroral Secrets Revealed

Until mid-December, the Swedish satellite Viking had been sending back to Earth spectacular pictures of the Northern Lights, or Aurora Borealis. Launched in February 1986 by an Ariane rocket from French Guiana, Viking is Sweden's first satellite. Among its four instrument packages is an advanced camera system developed by Canada that takes images every 20 seconds. Prior to the Viking mission and the Canadian camera system, the fastest spaceborne pictures could only be taken once every six minutes while photos from the Earth only showed 300 km stretches of auroral activity.

Auroral activity is greatest in the polar regions of the Earth where charged particles from the Sun spiral into the magnetic poles and have complex and not fully understood interactions with the magnetosphere and the atmosphere.

The intensity of auroral activity in the northern hemisphere is greatest over northern Canada where dazzling displays of dancing coloured lights can also scramble radio communications and overload power grids. The aurora can also discharge over 50 times the annual Canadian consumption of electrical energy into the atmosphere in a mere three hours!

While analysis of the over 20,000 images received will continue for several years, it appears several old theories and ideas must be discarded. For example, it is now known that an auroral display originates at one spot and spreads both east and west like a spreading blob. Before it had been thought it only showed westward motion from a starting point.

The Viking satellite stopped sending images on December 15 due to a change in the satellite's orbit. It is thought the satellite will stop functioning early in 1987.

Visiting Montreal's Seismographic Station

by **Brenda Leonard**
Montreal Centre

Last autumn members of the Montreal Centre had the opportunity to visit the Montreal Seismographic Station located at Brebeuf College. Our host was Father Pierre Gouin who acted as our guide throughout the tour. He had recently returned from 39 years of seismographic work in Africa and has written a book chronicling his first-hand experience of a major earthquake and other seismic activity in Ethiopia.

The first stop was to a remote plotter situated in one of the college's hallways. This equipment records movement and tremors in the earth's crust and was monitoring a sensor located in the college's underground vault. The sensitivity of the equipment is such that a construction blast in the Montreal area was clearly recorded on the unit's drum graph.

We then proceeded to Father Gouin's office where he explained the theory and techniques of seismographic study and in particular, how observations are made using two horizontal and one vertical pendulums.

The horizontal pendulums, positioned at 90 degrees to each other, are used to determine the direction of a shock wave. The vertical pendulum detects any upheaval or sinking of the Earth's crust. Movement of the pendulums is detected by magnetic and electrical currents and is measured in microns. Data from the three pendulums is used to calculate the direction of shock waves and by timing the interval between primary and secondary shock waves, the exact location of the earthquake or disturbance is found.

Father Gouin illustrated the progress made over the years in performing these calculations by showing a large globe with graduated metal bands which had been used in the past and a personal computer which is currently in use. He spoke briefly about topics such as the makeup of the earth, the crustal movements which cause earthquakes, and how the resulting shock waves travel through and around the earth. Different kinds of earth movements have different "signatures" so that a natural earthquake can be distinguished from an atomic bomb blast.

The final stop on the tour was the underground vault containing the sensing equipment. The instruments were mounted on concrete piers similar to those used for telescopes and performing the same function of isolating the equipment from artificial vibrations. We were once again reminded of the sensitivity of the sensors when Father Gouin mentioned that touching the piers, which are resting on bedrock over two metres below the floor of the vault, with one's finger would register on the plotters.

The tour of the Montreal Seismographic Station proved to be highly informative and interesting and was greatly appreciated by the participants. Special thanks go to Father Gouin for his time and effort.

Reprinted from Skyward

300th Anniversary of Principia

Three hundred years ago Sir Isaac Newton (1642–1727) published his greatest work, the *Philosophiæ Naturalis Principia Mathematica* (*The Mathematical Principle of Natural Philosophy*), more popularly known as the *Principia*.

In the mid-seventeenth century one of the major problems facing the members of the Royal Society in London, England was “What force keeps the planets moving around the Sun?” Several theories were popular and Newton had been interested in the subject for many years. Edmond Halley had become friends with Newton in 1678 and he encouraged Newton to write and publish a book on his theories. In March 1686, work on what was to become the *Principia* began but to get it published Halley had to use his own money. Finally, in the summer of 1687, the great work was published. Contained within its pages were the mathematical tools to describe the motions of the planets, the tides and the motions of objects on the Earth. The *Principia* would dominate science for over 200 years until the appearance of the theories of relativity and would still be seen as valid in everyday situations where weak gravitational fields and low speeds are dominant.

The first application of Newton’s laws of motion was done by Edmond Halley who used them to calculate the orbit of the comet of 1682 and correctly predict its return 76 years later in 1758.

Halley was never financially reimbursed by Newton or the Royal Society for his expenses in publishing Newton’s *Principia*. However, the financially troubled Royal Society did eventually give Halley 75 copies of the book *Historica Piscium* (*History of Fishes*) – a slow moving book which had caused the Society’s financial problems in the first place.

To mark the 300th anniversary of the publishing of the *Principia*, Queen’s University and Royal Military College in Kingston and the Royal Society of Canada are jointly celebrating 1987 as a Canadian Newton year. During the year, distinguished international visitors will deliver public talks on the impact of Newtonian human thought. A two-day scientific symposium will be held October 29–30, 1987 in Kingston to highlight the year’s events.

International Astronomy Day May 9, 1987

by Leo Enright

Astronomy Day Coordinator for R.A.S.C.

Background: This year, with the celebration of its eleventh anniversary in Canada, International Astronomy Day moves into its second decade. There may not be the visible presence of Comet Halley in our skies as there was in 1986, but we again have the opportunity to promote an interest in astronomy that was begun in many people because of it.

Since its inception over a decade ago, International Astronomy Day has grown considerably with more Centres becoming involved each year. At the same time many more countries around the world have joined in making the Day a truly international event. Three countries that have recently been added to the growing list are Sweden, Argentina, and the Philippines. In North America, in 1985 and 1986, twelve astronomical organisations joined in sponsoring the event and in issuing a joint news release for the occasion. In some places an Astronomy Weekend was held. In Britain, an Astronomy Week held in 1985, was an enormous success.

Many Centres of our Society will surely take advantage of this year’s event to present correct and realistic information about the celestial objects viewed by the astronomer, as well as information about light pollution and other topics.

Suggestions for Centre Activities: In recent years many kinds of activities have been undertaken by Centres, both large and small. If those efforts can provide any indication about 1987, there will be many new ventures attempted, along with the ones that have repeatedly been successful in “Taking Astronomy to the People,” for that is the aim of this enterprise. There are no required activities, rather

events should be chosen according to the facilities, resources, expertise, and particular interests of the local group.

During the day, many Centres will be organising displays at one or more shopping malls, hosting “open houses” at observatories and planetaria, and organising public observing sessions where, weather permitting, people will safely observe the solar disk. For some Centres, mall displays have become very extensive – covering current topics in astronomy, exhibits of equipment and observing projects, presentations of information that teachers could use in astronomy courses, exhibits of astronomical art or stamps, presentations of astronomy via games (such as a popular astronomical version of the game Trivial Pursuit), and demonstrations of relevant computer programs. Most important of all, the displays are accompanied by the astronomers themselves who can, or at least try to, answer the many questions about their equipment, projects, or the latest astronomical discovery.

Suggested Major Themes: In planning their displays and other activities, all Centres are urged to consider some form of presentation on the two main themes being stressed this year:

Astronomy Is For Everyone

and

Light Pollution: A Very Serious Problem

A 1975 book by our former National President, Dr. Helen Hogg, proclaimed in its title the message “The Stars Belong To Everyone”. Amateur astronomers are young and old and from every walk of life.

The pollution of the night sky by artificial lighting is a matter of very serious concern to many of our Centres and individual members of our Society. Various kinds of materials are available to inform the public about the problem of light pollution. Centre members are urged to prepare materials appropriate to the kinds of light pollution that threaten their area and observing sites. One person who has taken a considerable time to prepare useful materials on light pollution is Mr. Daniel Kahrman, R.R. #3, Wheatley, Ontario N0P 2P0. He is willing to share a great deal of information about light pollution, and should be contacted at the above address for copies of the information pages that may be distributed.

Suggestions For A Public Star Night—May 9–10: As in the past, weather permitting, many Centres will organise a public star night which may be held at a city or provincial park, or other observing site which does not have too much light pollution. Before such an event is held, Centres should decide whether they wish to have alternative arrangements in the event of bad weather; in that case, some groups may wish to have an observing session the following night, and such plans should be made known in the announcements of the events planned.

In the early evening the moon, past first quarter phase and in the constellation Virgo, will be a favourite target as many members of the public have their first glimpse of lunar craters.

For those who wish to view the planets, especially the outer planets of the solar system, this is a good evening. Mars, in the constellation Taurus, may be seen in the west after sunset. For those who can linger at the observing site for an hour or so after sunset, the rewards may be worthwhile. Three planets may shortly be seen rising in the east. Saturn, a perennial favourite at public star parties, is in southern Ophiuchus just two degrees south of the globular star cluster M9. Its rings are very favourably tilted (25 degrees) and the planet, now near opposition, will be a treat for many observers. Uranus, the planet about which we learned so much a year ago because of the Voyager flyby, is only about six degrees east from Saturn, right on the border between Ophiuchus and Sagittarius. It is also about two degrees south of the star 58 Ophiuchi and three degrees west of the Triffid Nebula. Slightly further east, in fact only about five degrees east of the Triffid Nebula, is the outermost of the gas giant planets, Neptune. It will be found two degrees north of the great globular star cluster, M22.

Those who will be pointing out these planets should follow them in the days and weeks prior to May 9 in order to be able to point them out readily under a sky that will be brightened somewhat because of the moonlight.

There are many other objects that can be pointed out in the spring sky – famous double stars and numerous star clusters. Members will have their own favourites.

Last Thoughts: Careful preparation is the key to a successful International Astronomy Day. There are many things to consider in the various planning stages – deciding on the sites and equipment to be used, the displays to be mounted, the kinds of projects to be exhibited, the times for the observing sessions, and so on.

At all of the displays and observing sessions, there should be “handout” information available about our Society and the many benefits of membership. An excellent printed brochure about the Society is available from the National Office and planning committees should be sure to have sufficient copies on hand for the occasion. Similar brochures should be produced for the local Centre. Sales of the *Observer’s Handbook* should also be promoted.

Some Centres acquire more new members on Astronomy Day than at any other time of the year. It is most important to have sufficient “written information” available for prospective members. Introductory materials need not be lengthy but should at least give information about upcoming meetings including the topics of some of the talks, hints about some future activities of the Centre, and a phone number to handle additional questions about membership.

As soon as possible after May 9, the Secretary or Astronomy Day Chairman of each Centre is asked to send a report of all activities to the National Office; so that these reports may be summarized, possibly published in the *National Newsletter*, and retained in the Astronomy Day files for future reference.

Let us continue the fine traditions established over the past decade and make International Astronomy Day the best one ever held – a memorable event for our centres and for the enthusiastic supporters who cooperate to make it possible.

I trust that for your centre, it will be an exciting way of sharing our interest in the wonders of the sky. Good luck!

Thirty-Nine Cents and No Staples!

Many Centre newsletters are currently mailed in a “non-standard” format (ie. folded with a staple and no envelope). An example is the Victoria Centre which experienced in December the Victoria Post Office’s decision to enforce Canada Post regulations and not accept the Centre’s newsletter for mailing.

A newsletter which is “standard” fits a #9 or #10 envelope and can be mailed for 34 cents. If no envelope is used, it costs 39 cents – but staples are forbidden! These rates become 36 cents and 39 cents on April 1.

Newsletter editors keep the Victoria Centre’s experience in mind when doing your next mailing.