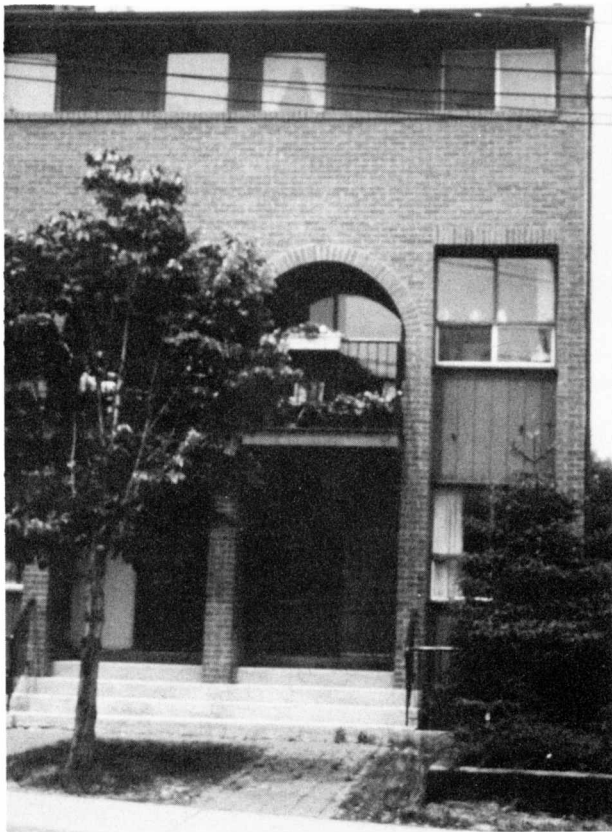


NATIONAL NEWSLETTER

October, 1983

Supplement to the JOURNAL OF THE ROYAL ASTRONOMICAL SOCIETY
OF CANADA

Vol. 77, No. 5



The new National Office of our Society in Toronto. The basement and main floor will be occupied by the library and general office while the second and third floor is a residential apartment unit. The official opening ceremony was held at the Society's National Council meeting on September 24.

NATIONAL NEWSLETTER

October, 1983

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The Society's New Home

by Ian G. McGregor
Associate Editor

Almost three decades ago the title of this editorial featured prominently in the front pages of an issue of our Journal (see *J.R.A.S.C. Vol. 50 No. 3* May–June 1956) as our Society moved into its first “permanent” home on College Street in Toronto. Twenty years later this property was sold and, while a search for a suitable replacement was conducted, the Society’s National Office rented space in a modern office building on Merton Street in midtown Toronto. Time passed and despite the efforts of the Society’s Property Committee a suitable building for the Society could not be found. In the meantime the proceeds from the sale of the College Street building enabled the Society to establish a Special Projects Fund (for grants and loans to Centres) and a Building Fund (for the rental or purchase of a building).

At the Annual General Meeting held in Quebec City last May it was announced that the Property Committee under the chairmanship of Peter Broughton had finally located a building suitable for the Society’s needs. Since last January about twenty properties had been looked at which for one reason or the other were not suitable. Finally last April an agreement had been reached to purchase a building on Dupont Street in Toronto. This decision was ratified by the members and our Society now has its second “permanent” home. The new address of our Society’s National Office is 136 Dupont Street, Toronto, Ontario M5R 1V2 and the new phone number is (416) 924–7973.

The building is a four year old four-storey brick building. It has a poured concrete basement which will serve as a meeting room for the National Council, a forty square metre main floor which will serve as the general office for the Executive Secretary and hold the Society’s Library, and a two bedroom apartment on the second and third floors which will serve as a residential apartment and provide rental income. Unfortunately the space is much more limited compared with the previous location and whether this will be a problem only time will tell. The National Office is within easy walking distance of

the Dupont or St. George subway stations, or the Avenue Road bus but parking will be more difficult than for the Merton Street office.

The Society's Executive Secretary, Miss Rosemary Freeman, and the Society's records, Library, and furniture moved into the new National Office on July 25. On September 24, the first meeting of the Society's National Council in the new building was held and the official opening ceremonies took place.

Special thanks go to the Property Committee consisting of Peter Broughton (Committee Chairman and National Secretary), Marie Fidler (National Treasurer), Cyril Clark, Kulli Milles, and Rosemary Freeman for their efforts in obtaining our Society's new home.

L'Assemblée générale 1983 à Québec

**par Damien Lemay
Membre du Comité organisateur
Centre de Québec**

Les 20, 21, 22 et 23 mai 1983 vont sûrement occuper une place importante dans les annales du Centre de Québec de la SRAC. En effet, le rassemblement d'amateurs en provenance de trois sociétés (soit la SRAC, l'AAVSO et l'AGAA) a amené une participation atteignant plus de 300 personnes (178 du Québec, 93 des autres provinces, 31 des U.S.A. et 4 de la France).

Durant les jours qui ont précédé l'Assemblée générale (A.G.), plusieurs membres ont travaillé fébrilement aux derniers préparatifs. Déjà assurés d'une participation d'environ 250 personnes, le moral était bon et les taquineries fusaient. Le mercredi, 18 mai, en soirée, nous avions l'impression d'être pratiquement prêts à accueillir les premiers délégués dont l'arrivée était prévue pour le lendemain en fin d'avant-midi.

Effectivement, le jeudi, pendant que Mario Lapointe aidé de quelques volontaires préparaient la salle des exhibits, Gilles Caisse et moi-même mettions le Comité de transport à l'épreuve en accueillant le premier arrivant à l'aéroport. Un peu plus tard, nous arrivions aux résidences (Pavillon Parent) où une surprise nous attendait. Contrairement à ce qui avait été entendu, à cet endroit, on semblait tout ignorer de notre venue. Heureusement, après quelques minutes de recherches, on nous avisait que c'était le Pavillon Lemieux qui nous avait été assigné. À part un oubli malencontreux, il ne semble pas y avoir eu d'autres problèmes associés au Comité de transport. Jeudi soir, nous avions quelque dizaines de visiteurs de l'extérieur d'arrivés, dont le président de la SRAC, monsieur Frank Loehde et son épouse, Audrey. Mentionnons qu'en plus de la paperasse habituelle, au moment de l'inscription, une copie du magnifique "Galaxie Calendar 1983", une courtoisie de Perceptor de Toronto, était remise à chaque participant.

Puis, il semble que tout s'est accéléré comme si le temps se comprimait, et il en fut de même jusqu'au lendemain du Congrès. La première activité officielle consistait en la dégustation de vin et fromage le vendredi soir, suivie de présentations de diapositives et du concours de chanson.

Certains rouages de l'organisation ont été vérifiés sur le champ, ce qui fut la cause de quelques incon vénients supplémentaires. C'est ainsi que la salle de projection de l'amphithéâtre s'est avérée ne pas être équipée comme on le supposait. Néanmoins, après quelques minutes d'énervement, nous pouvions continuer la projection. Nous remercions l'assistance qui a été tolérante pour cette pause impromptue.

Quant au concours de chanson, peut-être est-ce parce que le long printemps froid et pluvieux a gâté la voix de bien des chanteurs, il n'y eu qu'une participation mitigée. Merci quand même aux braves qui ont relevé le défi, plus particulièrement les gagnants, soit messieurs Jean-Paul Lame de la SAM et Peter Jedicke de London qui se sont mérité chacun un MLST (Multi Life Saver Telescope).

La soirée se terminait là pour certains, alors que plusieurs petites réunions informelles prenaient place ici et là pour fêter cette retrouvaille annuelle.

Le samedi avant-midi avait lieu la première séance de communiqués. Le système de traduction simultanée était en place, quelques minutes suffirent à ceux qui le désiraient de se procurer un récepteur et les premières conférences se déroulèrent sans encombre. Mais, au beau milieu de la troisième, un

changement de projecteurs causa de l'émoi aux organisateurs. Après avoir flambé les deux lampes (la régulière + celle de secours) du projecteur à acétates, ou a dû devancer la pause-café afin d'avoir le temps nécessaire pour tout remettre en fonction. Encore une fois, l'assistance a été très tolérante. Malgré le proverbe qui dit jamais deux sans trois, il me semble que c'est là le dernier problème technique que nous ayons eu.

Dans l'après-midi, deux autobus remplis ont effectué une visite dans le Vieux Québec. D'après les commentaires entendus, cela aurait été très intéressant; il faudra que je fasse moi-même ce tour un bon jour. Simultanément à cette visite, avait lieu l'Assemblée Générale de l'AGAA qui fut d'une durée fort raisonnable. Les intéressés à l'histoire de l'astronomie ont pu en outre visiter entre 16 h et 18 h la section astronomique du Centre muséographique de l'Université Laval où, entre autres, ils ont pu admirer le télescope de Foucault de 16 po. de diamètre ainsi qu'une lunette de 8 po. fabriquée par le réputé Alvan Clark. Cette dernière avait été acquise en 1864 par E.D. Ashe pour l'Observatoire de Québec.

En guise de souper, c'était évidemment le Banquet, avec une supertable d'honneur de plus de 40 convives. L'année 1983 étant aussi le dixième anniversaire de l'AGAA, son président, monsieur Michel Rebetez, a fait un discours de circonstance, suivi du président de la SRAC, monsieur Frank Loehde. Nous n'énumérerons pas ici tous les autres qui ont parlé, mais mentionnons qu'il y a eu la remise de décorations honorifiques:

CE. Spratt, Centre de Victoria, Ken Chilton Prize
 Dr L.A. Higgs, Centre d'Ottawa, Service Award
 J.P. Bernier, Centre de Québec, Plaque souvenir par le Centre de Québec
 Dr R. Dutil, Centre de Québec, Plaque souvenir par le Centre de Québec

Le Banquet fut suivi de la conférence Ruth Northcott par monsieur Hubert Reeves, dont l'exposé s'intitulait: "La flèche du temps en astronomie". Là aussi, il y avait traduction simultanée, et les deux versions de cette conférence furent enregistrées. Vous pouvez en commander une copie en vous adressant à:

Documentation Multimedia
 Service de l'audiovisuelle
 Pavillon de Koninck, porte 0252
 Université Laval
 Ste-Foy, Québec
 G1K 7P4

Prière d'indiquer si vous désirez la version française ou anglaise et joindre 15\$ pour les frais de reproduction et de poste.

Malgré un amphithéâtre surchauffé (on nous a expliqué que le système de chauffage était encore programmé pour la saison froide), monsieur Reeves a démontré une fois de plus qu'il sait intéresser son auditoire qui a même contribué à prolonger la soirée par une longue période de questions. En tout, nous avons profité de notre invité pour environ deux heures. À la fin, plusieurs ont saisi l'occasion pour un autographe et/ou une question supplémentaire, ou pour une photo de groupe. Puis, la soirée se continua comme le veille avec des réunionnettes ici et là.

Le dimanche dans l'avant-midi se continuaient les conférences et dans l'après-midi se déroulait dans deux salles séparées, l'Assemblée Générale de la SRAC et de l'AAVSO. Il semble que le hall d'exposition qui était alors ouvert fut un concurrent sérieux; néanmoins, il y avait suffisamment de monde pour une Assemblée Générale de la SRAC intéressante et active. Un résumé de celle-ci sera publié ailleurs dans ces pages. En soirée avait lieu la dernière séance de conférences. Il y en a eu 27 au total, une 28ième ayant été annulée. De tout pour tous les goûts: histoire, instrumentation, observation, ordinateur, etc. Puis l'Assemblée Générale se termina officiellement par la remise des prix pour le concours de travaux astronomiques. Les trois juges, soit le Dr John Percy, Jean Vallière et Jean-Paul Boudreault ont dû délibérer pendant quelque deux heures afin de choisir les gagnants. Nous les remercions pour cette tâche. La liste des récipiendaires ainsi que l'origine de chaque prix furent publiées dans le NNL du mois d'août dernier. Nous profitons de l'occasion pour remercier à nouveau

tous les individus ou entreprises qui ont contribué à cette liste de prix. Enfin, le trophée Méritas de l'AGAA est allé à monsieur Lucien Coallier de la SAM et en son absence, il fut remis à son ami de longue date, monsieur Adélaré Rousseau. On se rappellera que monsieur Coallier avait été honoré de la "Service Award Medal" en 1981.

Le lundi, deux autobus ont amené quelque 80 personnes visiter l'Observatoire du Mont-Mégantic. Cette randonnée impliquait beaucoup de temps de voyage comparativement au séjour proprement dit au site de l'Observatoire. Heureusement, les autobus étaient confortables et les passagers, pour la plupart de l'extérieur du Québec, ont aimé admirer le paysage verdoyant de la Beauce jusqu'à Mont-Mégantic. Rendus sur le site, une forte brise poussant des nuages nous enveloppait, il n'était donc pas question d'un pique-nique extérieur. Néanmoins, quelques minutes suffirent pour une installation de fortune au rez-de-chaussée de l'Observatoire. Pendant qu'un groupe était reçu par le personnel de l'Observatoire, les autres visiteurs commençaient à déguster un buffet froid et en attendant que le café réchauffe, ils pouvaient consommer de la bonne bière, une gracieuseté de la Brasserie O'Keefe. Nous remercions le personnel de l'Observatoire, dont monsieur Robin Arseneault, pour n'en nommer qu'un, pour sa courtoisie et l'attention portée à nos visiteurs. Nous en sommes tous revenus avec le sentiment que ceux qui y travaillent sont fiers de leurs instruments et des travaux qu'ils effectuent.

En terminant, nous désirons ajouter un remerciement spécial au Secrétariat d'État du Canada pour une généreuse subvention qui a permis de fournir le service de traduction simultanée, ainsi que l'Université Laval qui a accepté d'être l'hôte de cette Assemblée Générale.

P.S.: Pour ceux que cela pourrait intéresser, nous profitons de l'occasion pour vous signaler que lors de son passage à Québec, monsieur Reeves a aussi prononcé une conférence plus spécialisée au département de physique. Intitulée "Cosmologie et particules élémentaires", celle-ci est également disponible (en français seulement) au même coût et même adresse que mentionnés précédemment.

Papers Presented at the 1983 General Assembly

The following schedule of papers was presented at the joint conference of the Royal Astronomical Society of Canada (RASC), the Association des Groupes d'Astronomes Amateurs (AGAA), and the American Association of Variable Star Observers (AAVSO). Abstracts have not been included because of the length of the original material.

- 1 *Projet de surveillance photographique du ciel*
by Denis Bergeron, AGAA/Drummondville
- 2 *The First Predicted Return of Comet Halley*
by Peter Broughton, RASC/Toronto Centre
- 3 *Micro-ordinateur et astronomie*
by Jean Vallières, AGAA/Société d'Astronomie de Montréal
- 4 *Analysis of Photometric Data on Asteroids*
by Clifford Cunningham, AAVSO/Kitchener, Ontario
- 5 *L'effet Schroeter*
by Marc Gélinas, AGAA/Société d'Astronomie de Montréal
- 6 *2001: A Space Odyssey*
by C.A. Rutter, RASC/Montreal Centre
- 7 *Astronomy in Senior High School*
by Peter Ryback, RASC/Ottawa Centre
- 8 *On the French Publication "Nouveau traité de la sphere d'après le système de Copernic par demandes et réponses"*
by J.E. Kennedy, RASC/Saskatoon Centre
- 9 *Etude densitométrique de films activés*
by Mario Lapointe, AGAA, SRAC/Centre de Québec

- 10 *Solar Spectral Observations at Sackville, New Brunswick*
by R.S. Iyengar, RASC
- 11 *Some Constellations Featuring the Sun*
by William Webb, AAVSO/Akron, Ohio
- 12 *The AAVSO – Observing and Data Bank*
by Janet Mattei, AAVSO/Littleton, Massachusetts
- 13 *Les Instruments scientifiques du temps passé*
by Real Manseau, AGAA/Drummondville
- 14 *O–C Magic*
by Lee Anne Wilson, AAVSO/Ames, Iowa
- 15 *Le contrôle sensitométrique des hypersensibilisations*
by Alain Maury, Association nationale des sciences techniques jeunesse/France
- 16 *2ième Festival d'astronomie populaire du Mt.-Mégantic*
by Bernard Malenfant, Observatoire du Mont-Mégantic, Quebec
- 17 *The Chemistry and Physics of Comet Halley Fragments*
by Peter Millman, RASC/Ottawa Centre
- 18 *The Amateur Astronomer and the International Halley Watch*
by Charles Morris, AAVSO/Harvard, Massachusetts
- 19 *Taches solaires et planètes: étranges coïncidences*
by Roger Gagnon, AGAA, SRAC/Société d'astronomie de Montréal
- 20 *About a new observatory and a new 50 cm. Newtonian telescope*
by Jack Newton, RASC/Victoria Centre
- 21 *Establishment and Operation of the Tardis Observatory*
by David Schwartz, RASC/Kitchener-Waterloo Centre
- 22 *Reportage photographique du soleil*
by Sylvain Veilleux, AGAA/Drummondville
- 23 *The Islamic Lunar Calendar*
by David Stokes, RASC/Kingston Centre
- 24 *Antonia Maury's Over-corrected Mass-ratio for Beta Lyrae*
by Barbara Welther, Harvard-Smithsonian Center for Astrophysics/Cambridge, Massachusetts
- 25 *Le rôle de l'ordinateur dans l'analyse des images astronomiques*
by Jean-François Lallier, AGAA, SRAC/Centre de Québec
- 26 *Sliding to the Stars at Jarnac Observatory*
by David Levy, RASC/Kingston Centre, AAVSO
- 27 *Applications of the Out-Of-Focus Method*
by Ernst Mayer, AAVSO/Ohio
- 28 *Observatoires de Québec*
by Paul Darisse, AGAA, SRAC/Centre de Québec

Heard Any Good Satellites Lately?

by Ken Nelson
Vancouver Centre

Would you like to hear telemetry and/or voice communications being relayed through satellites? Read on, and you will find out how! The mechanism which makes this possible is the orbiting Amateur Radio satellites, called OSCARs (for Orbiting Satellites Carrying Amateur Radio).

The Amateur Radio satellite story began in 1961, when the world's first non-governmental satellite, OSCAR 1, was launched. This "bird" was followed by almost identical OSCAR 2. These satellites, although primitive by modern standards, served as useful pioneers.

The first active amateur communications satellite (and the world's first free-access satellite) was OSCAR 3. Launched in 1965, it was joined later the same year by OSCAR 4. Both these satellites

received signals sent to them on the amateur two-meter band, and retransmitted them on the amateur 10-meter band. This is still the most common mode of satellite communications.

In 1970, the non-profit Amateur Satellite Corporation, AMSAT, was formed. The first satellite to be launched by this group was OSCAR 5. This was similar to OSCARs 3 and 4, and lasted six weeks. OSCAR 6 was launched later.

OSCAR 7 had the same purpose as the previous OSCARs – to stimulate interest in satellite communications among hams and the general public – but was the first international amateur satellite in the sense that it was built by hams in the U.S., Canada, West Germany and Australia. This satellite, launched in 1974, operated continuously using two different transponders – devices which relay signals sent up to the satellite back to earth on a different frequency. On ground command, either one or other of the transponders was switched on. This satellite was active until 1981.

OSCAR 8, launched in 1978, is still in operation. Telemetry and Morse and/or voice signals of those operating through the satellite can be heard on the ten-meter amateur band between 29.400 and 29.500 MHz, depending on the time of day and operating mode of the satellite. More about receiving equipment later.

The Soviet Union entered the Amateur Satellite game with the launch of RS 1 and RS 2 in 1978. However, these amateur satellites are no longer operating.

Although all the amateur satellites mentioned so far (except for OSCAR 8) are now silent, some useful communications experiments were carried out with them. Tests were conducted in the location of ELTs (transmitters in downed aircraft), relaying medical information via satellite, and even connecting computers via a space radio link.

We now turn to the presently operating amateur satellites. The most numerous of these are a spectacular series of Soviet RS satellites, designated as RS 3 through RS 8. These were all launched on December 17, 1981 into orbits with a two-hour period. The average orbital apogee is 1,600 km, with an inclination of 82.9 degrees. The average orbital increment is 30 degrees per orbit. One of the unusual features of the RS satellites is that three of the satellites (RS 3, 5 and 7) have automatic equipment aboard which simulates a human sending Morse Code, in a structured sort of way. Called ROBOTS, these orbiting operators can have a limited exchange with operators on the ground. The telemetry of the RS satellites, along with Morse and voice communications through them, can be heard between 29.300 and 29.500MHz.

Britain, on October 6, 1981 staged a real coup with the launch of its first OSCAR satellite. Dubbed UoSAT-OSCAR 9, this satellite is different from some of the other satellites. Instead of carrying transponders for communications, it has a number of beacons for propagation studies on the short-wave bands, as well as beacons in the two-meter, 70 cm, 13 cm, and higher ham bands. The shortwave beacons can be programmed by ground controllers using the onboard computer to send telemetry in Morse Code. The general beacon, operating on the two-meter band, can send data in Morse Code, Baudot (a standard radioteletype code), ASCII (a standard computer communications code) – or in a synthesized “male” voice. The engineering beacon at 70 cm can do these things as well, but usually has different data than the general beacon. The 13 cm beacon can send data in these modes as well, while the highest beacon is a steady carrier for propagation studies. The exact frequency for each beacon is:

Shortwave – 7.050, 14.002, 21.002, and 29.510 MHz.

2-meter (FM) – 145.825 MHz.

70-cm (FM) – 435.025 MHz.

13-cm (FM) – 1401.0 MHz.

And finally, the 10.470 GHz steady carrier.

All I have heard from this satellite so far is the 2-m beacon; the SW beacons have not been activated yet, and the higher frequency ones are difficult to receive without specialized equipment.

The data sent by the 2-m beacon can be decoded by computer, if the satellite is sending ASCII and one has the appropriate interface. The usual practice seems to be to record the audio from the beacon on a tape recorder, and feed the taped signals into the computer. I cannot say if it works, as I do not have the appropriate interface, but it would be interesting to see the results of this if it does. The synthesized voice is easy to hear, and rattles off three digits representing the data values of sixty data channels.

Since the British satellite is designed to promote interest in space science, let's take a closer look at it. Physically, the satellite is rectangular, with solar cells on all four sides. These charge two NiCad batteries in the bottom half of the satellite; the top half contains twelve electronics modules. Protruding from the bottom of the satellite, some horizontally, some vertically, are the various antennas for the different beacons. In the centre of the underside is a TV camera lens.

The various experiments being done with the satellite are:

- The HF (shortwave) beacon propagation studies.
- A charge-coupled-device Earth-pointing TV camera, the images from which are “dumped” to the General data beacon, and take 3.5 minutes for one complete video frame – the images are of higher resolution than standard home TV.
- The synthesized-speech telemetry experiment.
- A gravity-gradient stabilization experiment.
- A particle radiation counter.
- A three-axis, multi-range, flux-gate magnetometer. The magnetometer is deployed after launch at the end of a fifty-foot boom which also acts as an antenna for the HF beacons.

The orbit of OSCAR 9 is such that it passes over the same point on the earth twice daily. For example, for Vancouver, this occurs around 2 pm and 3 am PST. These times are not absolute. I have heard the satellite as early as 1:40 pm (PST). What seems to work is to “guesstimate” a period of 23h 40m for one pass; this seems to work for the afternoon passes. The orbital parameters are the following: Period = 95.45 m, altitude = 540km, inclination = 97.46 degrees, and orbital increment = 23.89 degrees per orbit. Because of the satellite's low altitude, long-range predictions are not possible.

Receiving signals from all these different satellites is not difficult, provided one has access to the proper equipment. To receive the signals from the Soviet RS satellites, and from the U.S. OSCAR 8, requires a good-quality shortwave receiver capable of tuning the 29,300–29,500 MHz range. With such receivers, coverage up to 30 MHz is the usual case. In addition to this, the receiver should be equipped with a device called a BFO (beat-frequency oscillator), which will make Morse signals and speech intelligible. Without this, the Morse signals will sound like intermittent hissing, and the speech will be garbled. Antennas for the receiver can be of any type, but half-wave-length dipoles seem to work best. This type of antenna is simply a piece of wire cut to the suitable length, with a feedline to the receiver in the middle. The antenna can be strung between two trees, and tied to them with nylon fish line.

For receiving the signals from UoSAT-OSCAR 9, the same type of equipment can be used to receive the various shortwave beacons, once they are activated. For receiving the two-meter VHF beacon, any of the “scanning monitors” which receive police and fire calls will work, if they also receive the 2-m amateur band (144–148 MHz). Simply program one of the memories (channels) with the beacon frequency, and listen at the appropriate time. The small “whip” antennas sold with these units seem to work adequately – the signal fades out from time to time, but is definitely there. More elaborate antennas can be tried (such as Yagi beams) if the radio is fitted with an external jack or connector. Given a suitable location, it may be possible to receive the 70-cm Engineering beacon as well.

Given this background information, it should be possible for some readers to listen to the present satellites.

Last June 16, the OSCAR 10 was launched by the European Space Agency's Ariane 6 rocket. Unlike the earlier circular-low-Earth orbit OSCARS, the new satellite was to be put into a highly elliptical, “Molniya”-type orbit with an apogee of 35,000 km and a perigee of 1,600 km. It was intended that the apogee would be over the Northern Hemisphere and visible for up to 16 hours while only briefly passing over the Southern Hemisphere. Unfortunately the satellite was struck from behind by the Ariane's third stage when in orbit and was not only damaged but also kicked into an orbit very different from the one originally planned. Despite these problems OSCAR 10 is working.

Future plans call for the orbiting of a PACSAT, a satellite devoted to computer digital communications, message storage and retrieval, and the like. The Japanese are planning on building on OSCAR of their own, and three small, short-lived satellites have been “launched” (by being passed through an airlock) by cosmonauts of Salyut 6. Overall despite the unexpected accident with OSCAR 10, the future of the amateur radio satellite programme looks promising as new and more advanced satellites become available.

Information for this article came from *QST*, an amateur radio publication, March 1981 through May 1983 issues. The *1980 Radio Amateur's Handbook* was also utilized. Both are published by the American Radio Relay League, Inc., Newington, Connecticut. For further information contact the author, or send a letter to the League at AARL HQ, 225 Main St., Newington, Connecticut 06111. Although the League is primarily for radio amateurs, they may be of assistance to non-hams. For Canada, there is a Canadian Radio Relay League office at Box 7009, Station E, London, Ontario, N5Y 4J9.

Reprinted from *Nova*.

Due\$ Due

Yes, once again, it's renewal time: the 1984 membership fees are payable as of October 1, 1983. National fees are \$20.00 for regular membership, and \$12.50 for youth members under the age of 18 years, payable to your Centre. Unattached members should remit their fees directly to the National Office. Certain Centres have added surcharges to the basic national fee structure. Members should consult with their Centre treasurers to check their fee. Members wishing to transfer to Life Membership in the Society should apply to the National Office, remitting the fee of \$300.00 directly to the National Office. Members who have not renewed by 15 January, 1984 will be dropped from the publications mailing list, so please send your dues now. The Society's publications are distributed on the basis of the calendar year of the membership. Don't miss your 1984 issue of the *Observer's Handbook*, or any issues of the *Journal* or *National Newsletter*.

Nominations for RASC Officers 1983–1984

The By-Laws of the Society provide for a Nominating Committee composed of the three surviving immediate Past Presidents, whose duty it is to prepare a slate of candidates for the offices of the Society.

Next year we must elect the following officers specifically: President, 1st Vice-President, 2nd Vice-President, and National Secretary. Normally there is a progression through the following offices: the 2nd Vice-President becomes 1st Vice-President; the 1st Vice-President becomes President. However, this progression is not dictated by the Constitution, and alternative nominations may be made for any of these offices.

If any member wishes to make suggestions in this regard, he should contact the Committee Chairman, Dr. Ian Halliday, c/o Herzberg Institute of Astrophysics, National Research Council of Canada, Ottawa, Ontario K1A 0R6, *as soon as possible*.

The By-Laws provide that "any five members of the Society, in good standing, may nominate additional candidates for any vacant office, provided that such nomination, accompanied by a letter of acceptance from the nominee shall be received by the National Secretary of the Society, not less than sixty days before the date of the annual meeting."

It would be appreciated if any such nominations (together with a short biography of the candidate) were submitted no later than *February 15th, 1984* in order to allow for the printing and mailing of ballots.

Full details pertaining to nominations are outlined in By-Law 1, Article 11(a), as published in the *Journal*, June 1969, pages 155–168.

Awards of the RASC for 1983–84

Awards may from time to time be conferred upon members in recognition of meritorious service or achievement. Recommendation for such awards should in most cases be made through the Council of the local Centre. Members at large may submit recommendations, if they so wish, to the National Office for consideration of the National Council. Centre Councils will, of course, submit recommendations as they see fit, to National Council for final approval.

CHANT MEDAL

The Chant Medal of the Society was established in 1940 in appreciation of the great work of the late Professor C.A. Chant in furthering the interests of astronomy in Canada. This medal is awarded, not oftener than once a year, to an amateur astronomer resident in Canada on the basis of the value of the work which he has carried out in astronomy and closely allied fields of original investigation. Nominations (including citations) should reach the National Office by *December 31*.

SERVICE AWARD MEDAL

The Service Award was established in 1959 and, on recommendation of a special committee of the National Council, this small bronze plaque is presented to members who have performed outstanding service to a Centre or to the National Society. Nominations and citations should reach the National Office by *December 31*.

KEN CHILTON PRIZE

The Chilton Prize was established in 1977 by the National Council of the Society, in remembrance of K.E. Chilton, an active member of the Hamilton Centre. The Prize is awarded annually to an amateur astronomer resident in Canada, in recognition of a significant piece of astronomical work carried out or published during the year. Nominations and citations should reach the National Office by *December 31*.

SIMON NEWCOMB AWARD

The Simon Newcomb Award was established on recommendation of the Halifax Centre, in 1978. Full details are given in the *National Newsletter* for December 1980, Vol. 74, No. 6, subject to the following additional criteria adopted by National Council in May, 1982.

The maximum length of entries has been increased to 2500 words. This limit will be strictly enforced.

Nominations should be sent to:

Awards Committee, RASC
136 Dupont Street,
Toronto, Ontario
M5R 1V2

Some Reflections on the Personal Computer for the Amateur Astronomer

by David Stokes
Kingston Centre

For several years now I have calculated astronomical events using a small programmable calculator, events like sunrise and sunset times, local noon, and lunar motion. Just lately I decided to move up to a full size computer system that would permit more extensive computational work, using the Basic language. In addition, today's personal computers offer exciting possibilities with graphic displays and word-processors to produce technical reports, tables of data, and articles like this one. All of these facilities greatly expand the horizons for the arm-chair astronomer house-bound in this alien Canadian climate. So I set off in quest of the ideal personal computer for scientific and astronomical work.

This world is full of surprises. I soon found that trigonometric functions which I could command at the touch of a button on the hand-held calculator were not so readily available in the Basic language of the computer. Most software seems to have been written for small business applications, with little regard for scientific niceties. One minor irritation is the very common requirement for all angles to be in

Radians, and no concession to degree-mode. Another blow is the need to write complex algebraic formulae to get the inverse trigonometric functions, so often required in astronomical work. True, one can get around these hurdles but we are not the slave of the software merchant; he should serve us!

Another surprise is the sudden loss in numerical accuracy that comes free with the expensive Personal Computer. One quickly takes for granted the calculator's 8 or 10 figure floating-point integer precision only to find the computer offers 5 or 7 figures, with a few offering 9 figures accuracy. Again, the machine architecture and the software merchant have conspired to ruin the scientific potential of the hardware. Let's look at an example. The most common measure of time in computational work is the Julian Day (JD), and most work is carried to at least the nearest minute, or better. Thus, 1977 February 18 at 3 h 39.6m is JD 2443 192.6525. Notice there are 7 integers before the decimal-point to get the day and there are 4 more integers after the decimal to get the hours and minutes, as a fraction of a day. Thus, $0.6525 \div 24\text{h} = 15.6600\text{ h}$, and the $0.6600\text{ h} \div 60\text{mm} = 39.6\text{m}$. (This 15h 39.6m is actually 3 h 39.6 m because the Julian Day begins at noon!) Now, if your calculator can manage all of 10 significant figures, then your final accuracy may still be degraded by the loss of that final 5 i.e.: $0.0005 \div 24\text{ h} \div 60\text{ mm} = 0.72\text{ m}$. In a long computation this sort of truncation-error may degrade the final result to ± 5 minutes. The situation is much worse than this with most personal computers.

Yet another unpleasant surprise is the inadequate internal precision of the computer compared to the pocket calculator. Internal precision refers to accuracy with which the machine does its arithmetic, which depends on how large or small a number it can manage before it cries "underflow" or "overflow", or quits altogether and screams "error". Read the machine specifications carefully for three items, viz. integer precision (usually 5 figures), floating-point precision (usually 8 or 10 integers for calculators and at best only 9, and more often only 5 or 7 figures for the PC, as discussed above), and lastly internal precision. This latter figure may be as high as 10 to the power of ± 39 in the IBM Personal Computer. This probably explains why, for example, IBM doesn't even mention these numbers in their promotional blurb. Internal precision is important in scientific work where very large or small numbers, and their differences, are encountered. It also affects how well the machine can calculate functions, too! The problem doesn't stop there because truncation errors have a way of creeping in unnoticed and degrading the results of the unwary.

Let's take a look at an example or two. When you ask for 8 cubed, do you get 8 exactly, or is it 7.99999999? Much more revealing for the astronomer is the result of $\sin(30.0)$ degrees. Do you get 0.5 exactly or is it something less? If that looks good, try $\sin(360 + 30)$ and then $\sin(10 \times 360 + 30)$ and then $(100 \times 360 + 30)$, etc. The IBM-PC returns progressively worse results, the error for large angles varying erratically, even in double-precision! The problem lies in the internal precision, and is the result of a trade-off to get faster computation for business purposes. Take a look at this comparison of some hand-held calculators and the IBM-PC using Microsoft Basic A.

1 HP-55 gives $\sin(360\ 000\ 030)$	= 0.499 481 3556
2 TI-52	= 0.499 998 1862
3 Casio fx 2200	"error"
4 HP-67 (programmable calculator)	= 0.500 000 0000
5 IBM-PC + Microsoft Basic A	= 0.498 552 6

The first three results are quoted from Jean Meus's new book *Astronomical Formulae for Calculators*, and the last two are personal test results. Notice the IBM computer returns only 7 figures, at best, and they are all wrong! (The spacing in the above table is just for ease of reading).

These are a few of the less pleasant surprises when shopping for a personal computer, but there are some pleasant surprises, too. For example, in a careful survey of most machines on the market, I found the Atari 800 with Basic could provide 9 integer precision, a choice of radian or degree modes, and they have promised with a new advanced Basic to have 16 integer precision. And Atari is among the least expensive and best supported machines available (mainly because of the Games!). The lesson is clear. Before shopping, write up a list of features you must have, and make another list of features you would like to have but would consider dropping, unless the price is right. Shop around and look first at the supporting software available for your choice of machine, most particularly at the Basic language available to see how powerful it is, and whether you could live with it. Look at integer precision, floating-point, integer precision and test the machine with a few simple programs (don't expect the

sales clerk to know anything about your needs, when it comes to science; they are mostly at a complete loss). Avoid the smart business machines; they cannot function in a scientific climate. Then examine very closely the instruction manual to see how well it teaches the use of the machine and its peripherals, or whether you are expected to invest in some books on that system to get acquainted with it! Lastly, decide whether you can live with monochrome (white, green or orange on black are all currently available) or whether you simply must have glorious technicolor and the extra cost that it entails. Next, decide whether you want to play games on cloudy evenings or test your skills in composing music. Then look at the software available for manipulating files and for word processing. Speed of action goes to the 16-bit machines just coming on the market, but look out! They may be swift but in gross error, as we have seen. First and last, consider price; these things are just becoming available and the price is falling, particularly now the Japanese are entering the market, but they are by no means inexpensive, especially if the system is fully configured.

One last thought. It may be helpful at first to follow a book of ready-made programs written especially for astronomy, like *Celestial Basic*, particularly if you are new to the field. Eventually though, the real value of this numerical approach to astronomy is the insight it gives to the way the Earth, Sun, Moon and Stars weave their way across the night sky. It gives a deeper perception of the infinite beauty of inter-relations, mutual and reciprocal reactions tied together by gravity, and the fascinating precision of it all, determined by laws that are unchanging for all time. To discover these things for yourself will mean learning and applying the universal language of mathematics. You will learn a lot of astronomy along the way. There is plenty of material available today and a new era is opening for those who are intrigued by celestial mechanics, or want to use the computer on the end of the telescope. Look before you leap, and then join in the fun.

Reprinted from *Regulus*

Summer Meetings of Canadian Societies

by Ian McGregor
Associate Editor

While our Society held its annual General Assembly in Quebec City last May two other major organizations concerned with astronomy held their conferences in June and August.

Canadian Astronomical Society (CAS)

Twelve years after its formation in 1971 at the University of Victoria, the Canadian Astronomical Society returned to Victoria on June 26–30 to hold its first meeting as an incorporated Society. First established as an organization for the professional astronomers in Canada the Society has made great progress in giving Canadian astronomers a strong and unified voice in promoting the development of new research tools to maintain our country's leadership in astronomy.

This year's meeting was held jointly with the Canadian Association of Physicists and featured both invited speakers talking on subjects such as the possibility of detecting gravity waves and the trials of a "stellar" eclipse hunter, and open meetings which featured discussion of the Canadian Long Baseline proposal, the Canadian Institute for Theoretical Astrophysics, the orbiting STARLAB telescope proposal being worked on jointly with the United States and Australia, and the Canada-France-Hawaii Telescope.

Elected at the meeting was the first Board of Directors for the incorporated Society.

PRESIDENT	Victor Gaizauskas	<i>Herzberg Institute of Astrophysics</i>
1ST VICE PRESIDENT	John M. MacLeod	<i>Herzberg Institute of Astrophysics</i>
2ND VICE PRESIDENT	Ernie Seaquist	<i>University of Toronto</i>
SECRETARY	Chris Aikman	<i>Dominion Astrophysical Observatory</i>
TREASURER	John Climenhaga	<i>University of Victoria</i>
COUNCILLORS	Alan Birdle	<i>National Radio Astronomy Observatory</i>
	Mike Marlborough	<i>University of Western Ontario</i>
	Christopher Pritchett	<i>University of Victoria</i>
EDITOR <i>Cassiopeia</i>	Cohn Scarfe	<i>University of Victoria</i>
PAST PRESIDENT	Gordon Walker	<i>University of British Columbia</i>

The 1984 Annual General Meeting will be hosted by the Herzberg Institute of Astrophysics in Ottawa and the 1985 meeting will be at the University of Toronto as part of the celebrations of the 50th birthday of the David Dunlap Observatory.

Special thanks went to Colin Scarfe and his committee for organizing a very successful joint meeting.

Planetarium Association of Canada

Winnipeg was the site of the eighteenth Annual Meeting and Conference of the Planetarium Association of Canada on August 7–8. Formed in 1966 the Association represents a planetarium community of about two dozen institutions across Canada. This year's conference was hosted by the Manitoba Planetarium, one of Canada's major planetarium facilities.

The Conference programme included a variety of events. The traditional "Show and Tell" session was highlighted by an update on the new Edmonton Space Sciences Centre scheduled to be completed in 1984 at which time it will be one of the largest planetarium facilities in North America. A luncheon was provided at the very appropriately named North Star Inn and guest lecturer for the conference was Dr. Martin Clutton-Brock who provided a humorous and thought provoking talk titled "The Next Zillion Years".

During the past year the Association has become a member organization of the Canadian Museum Association and has participated in the International Planetarium Society's conference hosted by the H.R. MacMillan Planetarium in Vancouver. Over one million people visit Canadian planetariums each year and major efforts are being made to increase government awareness of the important educational role of the planetarium community.

At the Association's Annual General Meeting the following Council was elected to office.

PRESIDENT	Robert Balhantyne	<i>Manitoba Planetarium</i>
VICE PRESIDENT	Ian McGregor	<i>McLaughlin Planetarium</i>
SECRETARY-TREASURER	Chris Sasaki	<i>McLaughlin Planetarium</i>
MEMBERSHIP SECRETARY	John Kenny	<i>McLaughlin Planetarium</i>
COUNCILLORS	Ed Barker	<i>Manitoba Planetarium</i>
	Kenneth Chalk	<i>Dow Planetarium</i>
	Robin Goldie	<i>H.R. MacMillan Planetarium</i>
EDITOR <i>North Star</i>	William Peters	<i>Manitoba Planetarium</i>
PAST PRESIDENT	Tom Clarke	<i>McLaughlin Planetarium</i>

The Association's next conference will be hosted by the McLaughlin Planetarium in Toronto in 1985.

Gerhana Matahari 1983

**by Michael Watson
Toronto Centre**

If Saturday, June 11th was anticipated to be the best day of the astronomical year for the small band of Toronto Centre members who travelled 20,000 km to observe the Gerhana Matahari (Indonesian for "solar eclipse"), then the day before was undoubtedly the worst. Dense stratus cloud blanketed the entire path of totality throughout the island of Java on Friday the 10th, cloud which periodically broke open to dump its unwanted contents upon observers, eclipse banners, telescopes, and cameras. Not even large doses of the eclipse beer specially brewed for the occasion by the Indonesian brewery Bir Binkara, could raise the flagging spirits of Ralph Chou, Bob May, Ann Waterhouse, Glenn Slover, Jim Cobban and myself as we watched the leaden skies from widely separated locations.

Ralph, Bob, Ann and Glenn had arrived at Sahatiga, in central Java, after flying west through Los Angeles and visiting Hong Kong and Singapore. Jim Cobban had travelled to China during the weeks prior to the eclipse, and observed from the north coast near the town of Paciran, on a volcanic promontory jutting out into the Java Sea. I had gone east to join a British expedition in London, and observed from the same coastal site, some 70km northwest of the city of Surabaya, which with 2 million inhabitants, is the second largest city on the most densely populated island on Earth.

From our site on the coast, where I camped out beside the United States Solar Eclipse Expedition, the skies cleared the night before to reveal the Milky Way blazing overhead (Java is at 7° S. latitude). Eclipse morning dawned generally clear, hot (39° C., 102° F.) and humid. Our site was shared by about 2,000 observers and was patrolled by many armed Indonesian soldiers! The purpose was to keep the intensely curious and very friendly local population from upsetting delicately placed equipment and ruining carefully made eclipse observation plans. Indonesian radio (for which I did two interviews, broadcast before and after the eclipse) and television covered the arrival of the Vice-President of the Republic, who made a ceremonious entrance to the site an hour before first contact.

Although Ralph, Bob, Ann and Glenn had perfectly clear skies further inland, Jim and I saw totality through a very light cirrus, insufficient to interfere with our view of the corona, but which did produce the same, ethereal, quicksilver cast over the sky which I had remembered from the mid-winter Canadian eclipse of 1979. Both the beginning and the end of the unusually long, 5 minute, 8 second totality were marked by unexpectedly numerous prominences of shocking pink, at least four at second contact and six (including a loop prominence) at third contact. Venus was observed, shining at magnitude -4 some 45° east of the sun, for 10 minutes before and 20 minutes after totality, while binoculars revealed Mars shining through the corona only 2° west of the eclipsed sun!

The most startling and awesome feature of the June 11th eclipse, however, was the dramatic structure of the corona, undoubtedly due to the increased solar activity in the months before the big day. An enormous helmet or minaret-shaped plume rising from the south pole of the sun was accompanied by separate, distinct and very bright brushes and streamers all around the dark orb hanging 60° high in the noonday sky. The brightness of the corona made it easy to read camera settings, and made this one of the least dark solar eclipses in recent years. Three distinct Bailey's beads at third contact lasted at least 8 seconds, bringing to an end the longest duration total eclipse of this decade. The temperature, which had fallen 11°C to 28°C, soon climbed to its pre-eclipse level, while we celebrated with eclipse beer and half-heartedly clicked a few partial phase photos.

As we reflected on our experiences afterward in Bali and at Alice Springs in the Australian outback, where our respective itineraries took us, coincidentally, at the same time, we all agreed that it had been a moving and memorable eclipse, the highlight of a remarkable journey.

The magnificence of the big day was tempered, for me, by the fact that the Indonesian government went to even more extraordinary lengths than did Canadian provincial governments in 1979 to prevent its citizens from observing the event directly. Innumerable banners, newspaper announcements and broadcasts played upon the superstitious fears of the population, warning of the dangers and dire consequences of direct visual observation, and encouraging all Indonesians to watch the event on television. It seems nothing less than an appalling, tragic and senseless waste, in this year 1983, to have the opportunity to have the largest built-in audience in centuries observe this most spectacular of all natural phenomena. We, as scientists and astronomers, share the responsibility for properly educating governments and citizens, and must share the blame when, as in Indonesia 1983, a Gerhana Matahari empties the streets and rice paddies, rather than filling them with multitudes to gaze heavenward in awe and wonder ...

Reprinted from 'Scope

Across the R.A.S.C.

by Ian McGregor
Associate Editor

To provide a broader view of the activities of our nation-wide organization, this regular feature reports on people and events who have been in the "news". Most items are gleaned from Centre newsletters as we do not have a staff of roving reporters. We invite brief Centre news reports to be sent to either Peter Jedicke, Assistant Editor *National Newsletter* c/o P.O. Box 842, Station B, London, Ontario N6A 4Z3 or to the Editor (see Masthead for address).

SARNIA: The mailing address of the Sarnia Centre has changed. The new address is: Sarnia Centre R.A.S.C., Box 2583, Sarnia, Ontario N7T 7V8. John Thompson travelled to Indonesia for last June's total solar eclipse, one of many Society members to do so.

KITCHENER-WATERLOO: Peter Daniel travelled to Florida last June to see the launch of the STS-7 mission with the shuttle *Challenger*.

KINGSTON: The Centre's Sky Search Programme has entered its second stage with many of the original participants now having selected a second area of the sky to study. Steve Dodson from Sudbury visited the Kingston area during the summer and displayed his home-built 22-inch f/7.3 Newtonian telescope under dark skies.

HAMILTON: A dozen members attended the 13th annual Syracuse Summer Seminar in early July. Ian Stuart has resigned as editor of the *Orbit* newsletter and a new editor is being sought. A special summer issue of *Orbit* was prepared by Barry Sherman.

OTTAWA: The Publicity and Observers Group committees organised several regional star parties between May and August. The Centre has now instituted a prize for the best *Astronomer's* Article of the Year in order to encourage contributions.

VANCOUVER: Tom Tohill has stepped down as *Nova* editor after a year in office in which major changes were made to cut down the costs of producing the newsletter. *Nova* is now a quarterly publication and members have been encouraged to pick up their newsletters at meetings to save on postage.

TORONTO: A half-dozen members visited the Holleford Meteor Crater in early July and were assisted on their tour by Kingston Centre members. Ralph Chou, Jim Cobban, Joyce Feinberg, David Foot, Jim Gall, Tony Lopes, Robert May, Glenn Slover, Ann Waterhouse, and Michael Watson travelled to Indonesia in June for the eclipse and enjoyed clear skies. Michael Watson got one of his pictures on the front cover of *Discover* magazine. Many members have been regularly setting up their telescopes on Saturday nights this past summer and autumn at the David Dunlap Observatory. Public response has been very enthusiastic. *Astronomy Toronto*, the Centre's monthly cable television programme, entered its fourth season in September. Randy Attwood, John Kenny, and Phil Mozel all have regular astronomy shows on local radio stations.

MONTREAL: Mrs Elizabeth Pride has resigned as editor of *Skyward* after four very successful years as its editor. The Centre's Cedar Crest Observatory is located west of Montreal near Alexandria, Ontario.

LONDON: During the summer members of the Centre gave talks at a children's summer camp outside London and, in cooperation with the London Regional Children's Museum, presented a number of public "Star Nights". Congratulations to Peter Jedicke who won the English category in the annual Song Contest at the General Assembly with a song on black holes.

WINDSOR: This Centre has been very active with observing activities this summer. Randy Groundwater has presented a number of talks at children's camps and attended Stellafane as well in August. Several dark sky nights were held at Wheatley Provincial Park, an hour's drive from the city.

VICTORIA: The Centre's Annual Dinner meeting was held on October 5 with Jack Newton as keynote speaker. His subject was his observations of the Indonesian solar eclipse.

EDMONTON: Despite the frustrations of cloudy nights in the early spring, the arrival of perpetual twilight in June, and torrential rains in June and July, the Centre's observers had planned several programmes for their prime observing time in August and September. The Centre's 45 cm Dobsonian provided some spectacular deep-sky observing. President Tony Whyte was another "RASCAL" who travelled to Indonesia in June. Beginning this autumn Centre meetings are now being held in the new Edmonton Space Sciences Centre scheduled to open to the public in July, 1984.

The Face of the Sky: Perseus

by Dora Russell
St. John's Centre

A truly interesting constellation arises early these autumn evenings in the northeast. Perseus the Hero, at this particular time of the year, is the most beautiful of constellations.

While Perseus will be visible throughout the months of winter and on into spring, it is during autumn and early winter that it is at its best. Later, as he climbs higher into the heavens, he loses much of his dignity, conspicuousness, and beauty seeming rather to be lolling about the heavens rather than dashing off to the rescue of the fair Andromeda, waiting so patiently nearby.

Yet Perseus, when seen at this season of the year climbing up the northeastern sky, gives an undeniable impression of hurry, truly "stirring up a dust in heaven". One leg curves behind him, giving a real effect of running. When he first comes into sight, he rises head first, and his stars tumble down in a lovely stream. In appearance, he presents two straggling streams of sparkling stars which begin near the great "W" of Cassiopeia and cascade towards the horizon where lies the lovely cluster of the Pleiades. A curved chain of stars forming part of the hero extends towards Auriga, and the rest of his stars complete a picture that looks very like a roughly shaped K figure.

Perseus, son of Jupiter and hero of countless exploits, is pictured in the old maps as a man with a pointed cap. As he rushes along the Milky Way, intent on Operation Andromeda, one hand is bent in a beckoning gesture. The other reaches out to grab the foot of Andromeda. An odd sort of lovely gesture but no doubt the 'end' justified the means.

Cassiopeia, an easy constellation to find because of its "W" shape, is high in the sky now and, once located, you will be able to find some of the stars of Perseus. These run from the end star of Cassiopeia (the downward end) eastward to the unmistakable cluster of the Pleiades.

Perseus is a compact group of stars containing no extremely bright gems. Its principal stars are second magnitude and fainter. Yet the constellation seems to have a sparkle quite lacking in many more outstanding groups, perhaps because it lies for the most part within the confines of the Milky Way. If you sweep around the constellation with binoculars or field glasses, you will see myriads of stars not visible to the naked eye. There is, for example, a particularly fine star field near Marfak, the constellation's brightest star.

The beginner might well confuse Marfak with nearby Algol, the 'demon star'. If you extend the three main stars of Andromeda which lie along a slightly curved line, the fourth star will be Marfak with Algol just below.

If you watch for a few nights, there will be no mistaking Algol, for this famous variable star performs its antics right before your eyes. Its hour by hour dimming and brightening, occurring at intervals of $2\frac{3}{4}$ days, will identify it beyond all doubt.

Algol is an eclipsing variable. In other words, it has a dark companion star revolving around it. This companion star succeeds in causing variations of the light of Algol as it passes in front of it. Algol is over three times the diameter of our sun.

Observers will look for the famed Double Cluster in Perseus, and for this, binoculars give a more satisfying view than does the telescope. Many constellations have lovely star clusters, open or globular or both, within their borders, but Perseus is unique in containing the only double star cluster. They may be found between the end star of Cassiopeia and the top star of Perseus, and may be seen with the naked eye as a misty patch of light like a blurry star. But in binoculars or small telescopes, it is just about the prettiest sight one could see. The fuzzy patch resolves into myriads of stars forming festoons, coronets, ribbons, and streams. It is well worth looking for and quite easy to find.

Near Marfak and Algol is a loose galactic cluster, M34, which may also be spotted without optical aid, given a clear moonless night. This cluster is 1700 light years distant.

Perseus has one other interesting feature, the Perseid meteor shower, which emanates from this constellation each August.

Reprinted from *St. John's Centre newsletter*