NATIONAL NEWSLETTER

April, 1977

Two views of the Arctic sun as photographed by Ken Pilon at Alert, N.W.T. Top: the midnight sun in July. Bottom: looking due south, the sun as seen at various times during a day in the first week of October, showing one of the last sunrises and sunsets for 1975.

NATIONAL NEWSLETTER

April, 1977

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McLaughlin Planetarium
100 Queen's Park
Toronto, Ontario
M5S 2C6

Deadline is two months prior to the month of issue.

Editorial

At Toronto, the General Assembly of your Society will be asked to approve a motion instructing the Council to apportion the proceeds of the sale of the old National Headquarters building between the Centres and the National Office. (The details of the motion can be found in the minutes of the last Annual Meeting of the Society.)

There has been expressed the opinion that these proceeds are a "windfall" profit which should be split between the Society and its Centres. What should be kept in mind, however, is that the sale of the property was necessitated by its physical deterioration, and the changing nature of the neighbourhood in which it was located. There was little consideration of a profit motive when the decision was made to sell.

In recent years the Society has operated in a deficit condition, and with the present state of the economy, our so-called "windfall" may well be needed to enable merely the basic services to be maintained. Already there are difficulties in purchasing books and periodicals for the library, which is one of the most extensive collections of astronomical literature in the country.

It has been said that the strength of our Society is its Centres, but we must bear in mind that the Centres are merely local clubs without a strong national organization. For over a century, your Society has been the voice of astronomy in Canada, linking professional and amateur astronomers from coast to coast. If it is to continue in this role, we must ensure that the Society has a secure future. Under instructions from your Council, Dr. John Percy has been examining the financial status of the Society to determine how the proceeds of the sale can be used best to fulfil its aims.

We urge you to consider carefully all the proposals which will be put before the General Assembly. The Society has reached a crossroads in its history; your decision may well determine whether it will continue to serve the interests of Canadian astronomy for the next century.

B. Ralph Chou, Assistant Editor

From the National President

Your editor has suggested that from time to time the President should write something for the *NATIONAL NEWSLETTER* and in this way help keep all members informed of what is going on in the Society. We hope that a message from the President will become a frequent feature of these pages. During my own term of office I hope to supplement this means of communication by visits to as many of the Centres as possible. Already I have been to London and Edmonton and have received warm welcomes in both places – despite the fact I chose the worst day of a bad winter to go to the London Centre. I am arranging visits to some of the other Centres now, and will be glad to fit in as many as possible whenever I come to Toronto for a meeting of the National Council.

I was pleased to learn at a recent meeting of the National Council that most of the Centres had made submissions to Dr. Percy's committee that is considering the long-range goals of the Society. It is clear to me from my conversations with individual members that there is a widespread interest in this committee, and many people are looking forward to its report at the next General Assembly. Naturally, many Centres have special interests that they hope to see reflected in any recommendations that may be made. Remember, however, that we must reconcile the diverse requirements of quite different Centres and that all of us must be willing to compromise. Try to think of what is best for the whole Society as well as for your own Centre.

The National Council has also heard of the plans being made for the 1977 General Assembly in Toronto. They sound exciting and we are looking forward to an enjoyable and stimulating meeting. I hope that as many members as can will come and sample Toronto's hospitality and make the Assembly a big success.

A. H. Batten, National President

Ed. Note: Further details on the General Assembly may be found on pages L17 and L18.

General Assembly Papers

The Toronto Centre has asked me to organize the paper sessions at the 1977 General Assembly in Toronto. I am therefore asking members to submit papers to these sessions.

There will be two sessions, on Friday and Saturday morning, July 1 and July 2. Original papers on all aspects of astronomy – historical, theoretical, observational and instrumental – will be considered for inclusion in the sessions. Papers should be ten minutes in length, in order to allow ample time for discussion.

Those who wish to present papers should send their name, Centre affiliation and a 150-word summary of their paper to: Dr. John R. Percy, Department of Astronomy, University of Toronto, Toronto, Ontario, M5S 1A7; preferably *before June 1, 1977*. It is customary for members who are affiliated with a Centre to notify the Council of their Centre if they plan to present a paper. This is particularly important if the member intends to apply for travel assistance to the General Assembly, because applications for travel assistance must be accompanied by a letter of support from the Council of the Centre. (See General Assembly Travel Grants in this issue.)

I hope we can have an interesting and varied programme of papers at the 1977 General Assembly, and I look forward to seeing all Centres represented.

John R. Percy

General Assembly Travel Grants

The 1977 General Assembly will be held in Toronto on the Dominion Day weekend, June 30–July 3, our hosts being the members of the Toronto Centre. The National Council hopes to see a wide representation of members from all parts of the country, and is therefore offering travel assistance grants.

Applications for these grants must be made by the delegates, with a supporting letter from the Council of the Centre, *no later than April 22*. The amount of the grant is limited to the cost of a one-way train or airfare. The grants will be allocated by a small committee of the National Council, and recipients will be notified as soon (after April 22) as is possible. It is unlikely that more than one member of each Centre will receive a grant. Grants will be allocated on the basis of (i) the total number of applications received, (ii) the delegates' roles at the General Assembly, such as participating in Council meetings, or presenting a paper or display, (iii) the distance and method of travel for the delegates, and (iv) the extent to which the delegate and the Centre can contribute to the travel expenses. The delegate should provide as much information about points (ii), (iii) and (iv) as is possible.

The 1977 General Assembly should be an exciting and rewarding meeting – make sure that YOUR Centre is represented!

D. J. Fitzgerald, National Secretary

Upcoming Conventions

Astronomical League

The Northeast Regional Convention of the Astronomical League will be held May 20–21 at the Science Building, Keene State College, Keene, New Hampshire. The theme of the meeting will be "The Sky is the Limit". Included will be paper sessions, observing programmes, an astrophoto and telescope fair, fleamarket, displays, and a banquet at which Dr. William Liller of the Harvard-Smithsonian Observatories will be the guest speaker.

Further details and registration forms are available from Walter A. Singer, Chairman, NERAL, 7 Main Street, Keene, N. H., 03431, U.S.A.

National Amateur Astronomer's Convention

The fourth National Amateur Astronomer's Convention will be held August 10–13, 1977, at the University of Colorado in Boulder.

Convention activities include field trips to the National Center for atmospheric Research, the Time and Frequency Division at the National Bureau of Standards, and the Solar Flare Patrol at the National Oceanic and Atmospheric Administration. Of special interest to observers will be a high altitude cookout and star party on the Flagstaff Mountain. Also scheduled is a planetarium show and two nights of observing at Sommers-Bausch Observatory. Informal late night star parties will be held at a favourite Denver Astronomical Society site (elevation 9395 ft.).

A telescope and astrophotography contest is being sponsored by the Astronomical League. The telescope contest will be held outdoors with an afternoon set aside for set-up, viewing, and judging the telescopes. To enter your telescope, bring it! No telescope pre-registration is necessary. Convention pre-registrants will receive entry instructions and applications forms for the astrophotography contest. Individuals who cannot attend the convention but would like to enter the photo contest may receive entry forms from Paul Thayer, 550 Webster Street, Apt. 13, Denver, Co. 80226, U.S.A.. The deadline for receiving photographs is August 1st, 1977.

The NAA Papers Chairman is Andrew Gassman, 222 East Yucca Hills Road, Castle Rock, Co. 80104, U.S.A., and abstracts of papers should be submitted to him. Clubs and individuals who wish to submit an astronomical display should contact Merill Manion, NAA Display Chairman, 1775 West Kentucky Avenue, Denver, Co. 80223, U.S.A.

For further convention information, please send a stamped self-addressed envelope to: Denise Nye, NAA Convention Registration, 5604 Bowron Place, Longmont, Co. 80501, U.S.A.

General Assembly 1977

The Toronto Centre cordially extends an invitation to all members of the RASC to attend the 1977 General Assembly from June 30 to July 3.

Dr. John Percy of the University of Toronto astronomy department is chairing the paper sessions. Please mail your abstracts, length about 150 words, before June 1, 1977* to:

Dr. John R. Percy,
Department of Astronomy,
University of Toronto, M5S 1A7

When you plan your presentation, it should be about ten minutes in length. The paper sessions themselves will be held on two successive mornings and each session will be highlighted by the presentation of a guest speaker.

The August 1976 *NEWSLETTER* outlines the rules governing the astronomical competition. if you are planning on entering an exhibit we encourage you to acquaint yourself with those rules. Prospective entrants should write for details to:

W. T. Peters,
c/o McLaughlin Planetarium,
100 Queen's Park,
Toronto, Ontario, M5S 2C6

Awards for the winners of the competition will be presented at David Dunlap Observatory on Saturday, July 2.

Our welcoming social event will be a wine and cheese party to be held on Thursday evening. It will be followed by an informal get-together at the McLaughlin Planetarium so please bring your favourite astronomical slides, films and stories and share them with the rest of us.

Our guest speaker is Terry Dickinson, presently a science writer for *Maclean's* magazine. He will give a talk entitled "Revising the Ceti Equation" which will deal with the assumption surrounding the well known predictions of the number of intelligent technological civilizations in the Galaxy and the universe. Recent work in a variety of disciplines has shown (in his opinion) that these assumptions (Ceti Equation) need significant revision. The talk will be illustrated with over 100 colour slides and diagrams. Terry has been an editor of *Astronomy* magazine and has worked at the McLaughlin Planetarium here in Toronto. He has also worked as assistant director at the Strasenburg Planetarium in Rochester.

On Saturday, the David Dunlap Observatory is host to an outdoor buffet dinner under canvas, if response is sufficient, we will gladly arrange transportation for interested delegates to visit local observatories after dinner.

No General Assembly is complete without a planetarium presentation and the McLaughlin Planetarium will hold a special showing on Sunday morning. A more detailed itinerary can be obtained by mailing the card below to the printed address for a participation form.

Reasonably priced accommodation will be available through Margaret Addison Residence, Victoria College, University of Toronto. Arrangements can be made through pre-registration. We hope to hear from you soon!

General Assembly

Mail to: Jim McKenzie,
27 Tristan Crescent,
Willowdale, Ontario M2H 1X2

Name .....

Address .....

.....

.....

Number in your party _____ **Will you and your party require** accommodation? Yes ____ No ____

*not March 15, 1977 as previously given.

Assemblée Générale de la S.R.A.C. 1977

Les membres de la SRAC sont cordialement invites à l'assemblée générale de 1977 qui aura lieu du 30 juin au 3 juillet à Toronto.

Le Dr. John Percy de l'université de Toronto sera président des conférences. Les résumés (env. 150 mots) devront être envoyés avant le premier juin* a l'address suivante:

Dr. John R. Percy,
Department of Astronomy,
University of Toronto,
Toronto, Ontario, M5S 1A7

Les présentations seront de dix minutes chacune et auront lieu deux matinées consécutives. Un conférencier invité participera à chaque session.

Les règlements du concours d'astronomie ont parus dans le *NEWSLETTER* d'août 1976; vous êtes priés de les consulter si vous avez l'intention de participer. Pour de plus amples renseignements veuillez écrire à:

W. T. Peters,
c/o McLaughlin Planetarium,
100 Queen's Park,
Toronto, Ontario, M5S 2C6

Les prix seront présentés aux gagnants samedi soir après le buffet.

Afin de souhaiter la bienvenue à tous les congressistes, il y aura un "vins-fromages" jeudi soir. Plus tard dans la soirée il y aura une recontre amicale au planétarium McLaughlin. Vous êtes priés d'apporter vos diapositives favorites (d'astronomie !) et vos vonnes histoires afin de partager ces moments avec tous.

Le conférencier invité sera Terry Dickinson, auteur scientifique pour le magazine *Maclean's*. Il nous entretiendra vendredi soir au "Ontario Science Centre". Terry a été éditeur de la revue *Astronomy*, a travaillé au planétarium McLaughlin et a été assistant-directeur du planétarium Strasenburg de Rochester.

Le buffet du samedi soir aura lieu sous les étoiles et si la demande est suffisante, une visite aux observatoires des environs sera organisée.

Le dimanche matin il y aura une représentation spéciale et une visite du planétarium McLaughlin.

Pour de plus amples renseignements ainsi qu'un programme detaillé et une formule d'inscription, vous êtes priés de retourner la carte ci-jointe à l'adresse indiquée.

Des chambres à prix raisonnable sont disponibles aux residences de l'université et des colleges associés. Les arrangements peuvent être faits lors de la pré-inscription.

Assemblée Générale

Envoyez à: Jim McKenzie,
27 Tristan Crescent,
Willowdale, Ontario M2H 1X2

Nom .....

Adresse .....

.....

.....

Nombre de Personnes _____ Votre group a-t-il besoin de logement a l'universite? Oui ____ Non ____

* et non le 15 mars 1977

Lands-End

by Ken Pilon

The captain came over the intercom, “If I may have your attention, please... we will be arriving at our destination in ten minutes. Arrival weather is sunny and warm. I do hope that you have enjoyed your flight aboard Trans-Isle Airlines and do hope to see you on the return flight out. Please ensure that all parkas are done up securely. Destination temperature is a pleasant –30°.”

The Canadian Armed Forces C-130 Hercules began to circle. Below was a snow-covered infinity of ice and snow. Barely discernible on the horizon was a collection of bright red buildings, neatly arranged in rows. It was Alert, Northwest Territories. Lands-End. And I was there.

Alert is the world’s most northerly inhabited place. It is located on the north end of Ellesmere Island, at the very top of Canada. At latitude 83° N, Alert is less than 500 miles from the north pole. It is closer to Europe than back home, and closer to Moscow than Ottawa.

Alert is on a coastal plane. Inland, clearly visible from the camp, are the Grant Mountains rising to heights of approximately 10,000 feet. Surrounding the camp is a rock-strewn plain not unlike the recent pictures of Mars’ surface, and with gently sloping hills rising to about 2000 feet. Perhaps the most interesting geological feature is the presence of ice caves. These are caves of permanent ice formed by the run-off of summer melt through drifts of snow, often more than 100 feet in depth, that have accumulated in a steeply-sloped ravine or gorge. There are several of these caves within walking distance of Alert.

Alert is one of the coldest and driest regions on the Earth. It has a mean annual temperature of –18°C. Its mean annual precipitation of about 156 mm means that Alert lives in a cold desert. Even so, snowfall is quite high for the polar regions and averages about 145 cm per year. Actually, most of the “snowfall” is in the form of ice crystals that sublimate out of the atmosphere.

As part of the meteorological staff at Alert, my duties were concerned primarily with the launchings of weather balloons, together with other related and not-so-related weather duties: monitoring communications, hauling garbage, air traffic control, washing floors, counting neutrons and protons, clearing clogged toilets, etc.

There is more to Alert than just the met camp; there is also a military base. My department (among others) will not let me say exactly what they do up there, but they do it well. For example, when they go to Crystal Mountain some five miles distant to uncover another rare find of crystalline amethyst or smokey quartz, they do it in style: with the blade of a bulldozer and a crate of dynamite. However, at the other end of the polar spectrum, they string up life lines (flagged ropes) between buildings only when the weather is packing 50 knot winds and visibility is all of thirty feet in blowing snow. Once, I answered one of the base’s telephones only to have it answer back, “I made it!” The caller would telephone over each and every time he left a building and reached another one. He was afraid that he might not make it – something about marauding polar bears, chilling blizzards and packs of half-starved wolves.

Land mammals are, unfortunately, uncommon at Alert. My only sightings were of arctic hare, occasional foxes and caribou, and a lone wolf. Seals, though, were present in a local bay during the summer. Birds are only common along the coastal areas, especially around Alert because of the availability of food (the dump). Jaegers take it upon themselves to meddle (obstruct is probably a better word). They delight in making off with unattended objects, hats and gloves being among their favourites. Jaegers crave attention. Diving at you is one way they obtain it, especially if you happen to trespass into their territory (often part of the camp). Under such circumstances, one quickly learns to keep a low profile.

About the last thing that you would expect to find washed up on the beach in a land with no trees is driftwood. At first, I thought it was discarded wood from the camp. Not so. It turns out that this mysterious driftwood does not originate from this land, or even from this continent. Its source is the taiga in Siberia. Apparently as the river-frontage of the trees dies in central Siberia, the trees fall into rivers and are carried north to the Arctic coast. Here, ocean currents and ice carry the debris eastward, circumnavigating the polar ice cap to reach Canadian shores. Carbon dating indicates that the journey takes about 100 years to complete.

One of the more interesting scientific programmes at Alert was the measurement of the amount of carbon dioxide (Co_2) in the air. It was thought that the CO_2 content would be lower than in the south due to the lack of CO_2-producing sources. To the surprise of most, little

difference was found. This would suggest that the south was not contributing significantly to the overall world level of CO_2.

Contrary to what one might think, the polar skies are disappointing from an astronomical point of view. Limiting magnitude is no better than for a large city – about +4. The reason for this is unknown to me. There are, however, some fascinating aspects to the polar heavens. For instance, the skies do not really rise and set; they are just there, spinning above you like some fantastic kaleidoscope. Almost overhead is Polaris: frozen in space, silent and watching. During the long polar night, I have watched the moon move in dizzying circumpolar arcs around the heavens. I recall the surprise of the pilot of one of our Beaver aircraft as he took off into the sunny skies at 3:00 a.m. one summer morning. He noticed that the sun was being eclipsed by the moon – at "night". Several months later, we were treated to a total eclipse of the moon during the "day".

On one occasion, I was invited to accompany the pilot and a technician doing tidal research for Environment Canada aboard a single engine Beaver aircraft. We made the rounds visiting tidal gauges placed along the coast of Ellesmere Island, Robeson Channel and Greenland, visited glaciers and ice fields, and viewed the awesome landscape of cloud-shrouded mountains, ice-filled fjords, and two thousand foot cliffs. I will never forget those heart-pounding landings on that tricky channel ice, watching ten foot high pinnacles of ice flash by us as we weaved and skidded in an effort to avoid them. The plane slid onwards and onwards until, guided by the instincts of the man attuned to the north, its motor surrendered to the silence and died. Behind us lay a forbidding panorama of snow broken by jutting, grey-black ice.

The month of July brings snow-free lands and "Operation Box Top", which involves 100 flights carrying 20,000 pounds of supplies each. It also brings "R and R" (Recreation and Relaxation) flights south over the Greenland ice-cap to Thule. August brings the first of the winter's blizzards and the camp begins to settle in for another long winter of 70 knot winds and months of 24 hour darkness.

But the north is more than just ice and snow, or oil and gas. It is a feeling, a passion, a way of life. Its love is omnipotent. Once touched by it, it will never let you go.

Ed. Note: Mr. Pilon is a former Upper Air Technician for Environment Canada for which he spent almost two years in the high Arctic. He is presently employed as a Research Technician at York University, Toronto. He has also been active in the Toronto Centre, and served as editor of the Centre's magazine 'SCOPE in 1971.

The Roosevelt ofAstronomy. II.

by Dr. J. D. Fernie, Past President, R.A.S.C.

No sooner, it seems, had the Lowell-Pickering-Douglass trio set eye to the telescope in the autumn of 1894 than Schiaparelli was declared vindicated. The face of Mars was practically crawling with canals, no less than 183 turning up that first run, along with a good 53 of Pickering's "lakes". So good were the observations that a number of the canals were even announced as double.

Within a month of his first observations, Lowell was developing a theory of the happenings on Mars to which he would stick – with ever increasing embellishments – for the rest of his life. In it Lowell carried on his reading in all sorts of subjects ranging from geology through biology to paleontology as well as astronomy, and, since his knowledge of most subjects was broad rather than deep, he soon incurred the wrath of all kinds of specialists quite apart from those in astronomy.

Both theory and observations first appeared in early 1895 in a series of articles by Lowell in *Popular Astronomy*, while a happily astounded public got the news through an article in *The Atlantic Monthly* shortly thereafter. Details were developed at much greater length in a book *Mars*, which appeared the same year, and which would be followed by a series of best-sellers in later years.

The basis of Lowell's theory was that the planets were primordially molten, and in cooling off went through their evolution at a rate inversely dependent on their masses. This applied to their inhabiting life-forms as well as to the planets themselves. Thus little Mercury had already run its course and was now dead, the Earth and Venus were at intermediate stages, while giant Jupiter had hardly begun. Mars, being between the earth and Mercury in mass, was already far advanced in its evolution; it was, in fact, a dying planet. Its inhabitants, struggling for survival as their planet dried up, had been forced to construct this vast network of canals to bring water from the polar caps to their centres of civilization.

It was this kind of aspect that made Lowell's theory of much wider interest than the purely scientific question of the canals' existence. For here he could launch forth into lengthy sociological dissertations, pointing out that the building of such a network of canals would be such an immense undertaking that only if the Martians had achieved planet-wide political unity could they have succeeded. How mediocre were earthlings by comparison, with their endless wars and perpetual bickering.

It must be remembered that the whole idea of canals was then much more in the public's mind than it is today. Canals had until recently played a major role in the industrial development of the United States, and were still revered in song and in legend. And even as Lowell's pronouncements appeared, the public was reading in its daily press of the fearful struggle to complete the Panama Canal. The Suez Canal was still regarded as one of man's greatest engineering triumphs. How fantastic, then, must be the Martians' technology and social organization if they could build such canals, not merely a hundred miles long, but hundreds of canals thousands of miles in length.

Little wonder that Lowell's theory stirred up a furor beyond the ranks of the scientists: everyone was intrigued; theologians, sociologists, novelists (remember H. G. Wells' *War of the Worlds*?) were fascinated.

All this writing and vociferous lecturing took Lowell away from flagstaff, leaving, it seems, something of a hiatus there. Soon Douglass was writing him "I am earnestly [sic] requested by the young ladies to state that in our parties and social gatherings your absence is deeply felt." This brought a series of replies. "Pray convey my continued regrets to the fairer, the picnic half of our world," and later, in anticipation of an early return, "Keep the girls till the end of the month if prayers can avail." This was followed by an intriguing comment on Douglass' observations of the Martian terminator: "My compliments on your 'irregularities' of the terminator. Do you connect them in any way with the wild oats which alone we observed planted by man in the neighborhood of Flagstaff?"

Lowell's relations with women have remained enigmatic: in particular the case of his personal secretary, Miss Louise Leonard, who turned up alongside him on the most unlikely occasions, and who, in his absence, exchanged letters with him almost every day. After Lowell's death she was to publish a book in his most fulsome praise, a matter considered scandalous by those in the know apparently. (She sent a copy of Dr. Chant asking that he mention it in the *JRASC*. He declined.) Lowell eventually married (though not Miss Leonard) at 53, taking his bride to honeymoon in Europe. Never one to lose an opportunity, he ascended

en famille by balloon over London in order to study the visibility of the footpaths in Hyde Park from five thousand feet.

As the 1890s drew to a close Lowell was already famous – or infamous, depending on one's point of view. On the one hand, fan mail poured in from the general public. On the other, most of the experts were outraged. The attack, of course, was generally led by those hill-bound bandits at "the Lick", who lost no opportunity to sneer and jeer at the Flagstaff goings-on, and who all but called the Lowell Observatory Bulletins a pack of lies. Lowell did battle with gusto, but he sorely needed more objective evidence for his canals than mere visual sightings, even if the Flagstaff seeing was so vastly superior to all the others.

Obviously a good photograph of the canals would be of immense benefit in putting the enemies to flight, and in 1902 a photographic expert, Carl Lampland, joined the staff for this specific purpose. But emulsions then were very slow, and despite a great deal of effort no really satisfactory results (as far as canals were concerned) were forthcoming. Not that this stopped Lowell loudly proclaiming on several occasions that canals *had* been photographed, although others, lacking the eye of faith, failed to detect them even on the original plates; and reproduced in print, the pictures were so poor as only to give ammunition to the ridiculers.

Obsessed with a passion to be proven correct, Lowell began a search for sites of even better seeing. The Sahara Desert was tried and given up, and in a short while everyone moved to Mexico to observe. With another opposition forthcoming in 1907, Lowell decided to send a major expedition to observe from northern Chile.

The expedition was headed by Lowell's friend, David Todd, an Amherst professor and included a selection of Lowell's younger assistants, as well as the complete 18-inch telescope. They sailed on a flood of newspaper articles announcing that the expedition would finally settle the whole vexatious question of Martian canals, and the popular press competed ferociously for the rights to publish the first photographs. "The world," reported Lowell gleefully, "to judge from the English and American newspapers, is on the *qui vive* about the expedition... They send me cables at their own extravagant expense and mention vague but huge (or they won't get 'em) sums for exclusive magazine publication of the photographs."

Astronomy Update

Recent Results of Research in Astronomy
by Dr. Doug Hube, Edmonton Centre

The passage of the Solar System through a suitably dense cloud of interstellar matter could prevent the solar wind from reaching the Earth. As a consequence, major climatic changes might occur including the initiation of an ice age.

This, and other effects, might also result from the exposure of the Earth to a nearby supernova explosion. Type II supernovae occur in spiral arms (i.e. in the galactic plane where the Sun is located). A frequency of one supernova (II) per century is consistent with observation and theory. Given the dimensions of a typical spiral arm and the speed with which the sun traverses an arm, it is reasonable to expect a type II supernova to occur within 10 parsecs of the Sun once every 10^8 years, or so.

Such an event at a distance of 10 parsecs will lead to an enhancement in the γ and X-ray energy flux by a factor of 5×10^4 over the normal solar flux. The Earth's ozone layer would be destroyed and its surface flora and fauna exposed to potentially lethal solar ultraviolet radiation.

Some 2,000 years later the expanding shell of supernova ejecta would reach the Solar System and sweep across it for several hundred years. The primary cosmic ray flux would increase by an amount equivalent to a 30× increase in the level of radioactivity, once again destroying the ozone layer. The ozone layer probably contributes to a greenhouse effect and its removal would lead to a sudden cooling of the Earth.
[*Nature* **265**, 318, 27 January 1977]

An analysis of 7563 bright spiral galaxies has revealed a significant excess of "S" spirals relative to "reverse S" spirals. This effect would not be expected if spiral galaxies and their orientations were distributed randomly.
[*Astronomy and Astrophysics* **53**, 431, 1976]

The Geminid meteor shower (2nd week in December) may have increased in strength by about 40 percent between 1974 and 1975. It "may now be the strongest annual shower", exceeding the better-known Perseid shower of August.
[*Astronomical Journal* **81**, 1010, 1976]

Something Old – Something New

by Professor J. E. Kennedy, Saskatoon Centre

The January, 1977 issue of *National Geographic* contains two articles on quite different subjects, both of which, however, have considerable interest for astronomers. One deals with the exploration of Mars by the Viking spacecraft and provides scientists with information from the comparatively recent project; the other deals with the Mystery of the Medicine Wheels and proposes a new approach to the study of relatively old objects.

Working with archaeologists, Dr. John Eddy of Boulder, Colorado, has analysed the structure of a number of these Medicine Wheels in the western United States, as well as in western Canada, attempting to determine their astronomical significance. Last August, at the IAU General Assembly held in Grenoble, France, he presented a paper[1] on his findings as part of the session on "Megalithic astronomy: Fact or Speculation" sponsored by Commission 41, History of Astronomy.

Dr. Douglas Hube of the University of Alberta invited Dr. Eddy to visit some of the universities in the prairie provinces and present a symposium on these interesting objects. In the latter part of March, 1977, Dr. Eddy spoke at the University of Saskatchewan, the University of Alberta, and at the University of Calgary. A number of members from the R.A.S.C. Centres in Saskatoon, Edmonton, and Calgary attended these meetings, together with faculty and graduate students of the sponsoring departments.

Astronomy has long been recognized as the oldest of the sciences. With the advent of modern experimental techniques, aided by the rapid developments of the associated theory, a more accurate cosmological time scale has been developed. As Viking probes the surface of Mars, the question arises as to how many years have passed since the present state of this planetary structure evolved – are we looking at something old or something new? On a slightly different time scale, as Dr. Eddy pursues the study of the Medicine Wheels, will astronomers conclude that we have to take a new look at something old?

[1]D.P. Hube made reference to this in "Astronomy Update" in the *National Newsletter* for December, 1976.

The Telescope Number, T

by Roy L. Bishop
Maktomkus Observatory

On the large scale the basic units of the Universe are the galaxies. Although they cluster together here and there to some extent, a galaxy is a physically distinct, relatively compact, obviously interacting array of matter. Our bodies, the planet beneath us, and all the stars in the sky compose only our local corner of the Milky Way Galaxy; but, aside from this, it is curious that for the unaided eyes there is only one, distinctly visible, full-size galaxy. This is M31, a typical large spiral system and a familiar sight to amateur astronomers.

With the least optical aid other galaxies are accessible. Through the modest telescopes used by amateurs hundreds of galaxies emerge out of the blackness, like dim snowflakes frozen in the eternal night. Most of these are the largest galaxies, spirals or large elliptical systems. Since these are of roughly the same absolute magnitude, the illuminance provided by the dim light each sends to the Earth varies inversely as the square of its distance (R^{-2}). The portion of this light intercepted by a telescope varies directly as the area or square of the telescope's aperture (D^2). It therefore follows that the distance R at which one of these large galaxies can be detected is directly proportional to the aperture D. Thus the ratio R/D is a constant, and, if the same units are used for both R and D, R/D becomes a dimensionless constant or pure number. Using M31 ($R \sim 2.1 \times 10^6$ l.y.) as being roughly at the limit of the dark-adapted unaided eye ($D \sim 7 \times 10^{-3}$ m):

$$\frac{R}{D} = \frac{2.1 \times 10^6 \text{ l.y.} \times 9.5 \times 10^{15} \text{ m/l.y.}}{7 \times 10^{-3} \text{ m}} \sim 3 \times 10^{24}$$

As natural pure numbers go, this is quite large. It pales beside the ratio of the electrical to gravitational forces between two electrons ($\sim 4 \times 10^{42}$), but it is intermediate between the CGS and MKS values for Avogadro's number. It surely deserves the status of a name and a symbol. Perhaps "telescope number, T" would be appropriate.

Let us use T to calculate the visual range of the Palomar telescope:

$$R = TD \approx 3 \times 10^{24} \times 5.08 \text{ m} = 1.6 \times 10^9 \text{ l.y.}$$

Photographic or electronic detection approximately doubles T, and if one switches to quasars rather than large galaxies as the distance beacons, a further factor of about 5 is appropriate, bringing T up to $\sim 3 \times 10^{25}$. Hence the range of the Palomar instrument using the best technology and observing quasars is:

$$R = TD \approx 3 \times 10^{25} \times 5.08 \text{ m} = 16 \times 10^9 \text{ l.y.}$$

a figure consistent with modern estimates of the distance of the observable edge of the Universe.

It is interesting that the aforementioned election force ratio ($\sim 4 \times 10^{42}$) is divided by T, the number obtained ($\sim 10^{17}$) is of the order of the ratio of the diameter of the Palomar mirror to the smallest distances that have been probed in sub-atomic physics. No lesser an array of interstellar molecules than P. A. M. Dirac has devoted considerable thought to numerology of this sort, although I have not encountered speculations that involved the Palomar speculum as an intermediate between the smallest and the largest distances we have probed.

In summary, for observing the Universe on the large scale the telescope number T falls within a factor of 3 of 10^{25}, the actual value depending upon the detection method and object observed.

From *Nova Notes*, Halifax Centre

European Solar Observers

Mr. Reinhard Wiechoczek of Astronomische Arbeitsgemeinschaft in West Germany reports that his organization started its own solar observing programme in March, 1976 and now has thirty co-operating stations in central Europe. He notes that the main thrust of the work is directed towards the compilation of statistics of sunspot numbers. Any RASC members in Canada or elsewhere who are interested in participating in this project are invited to contact Mr. Wiechoczek at the following address: Postfach 1142 – 4790 Paderborn, West Germany.