NATIONAL NEWSLETTER

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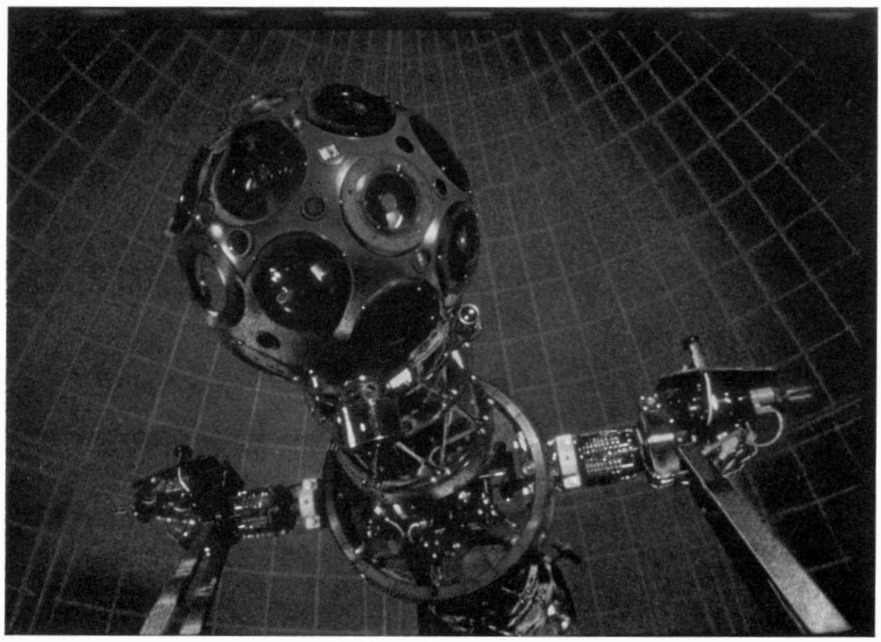

Looking like an alien creature from another world, the VEB Zeiss Jena Cosmorama Star Projector of the new Edmonton Space Sciences Centre will be welcoming delegates to the Society's General Assembly in Edmonton, June 28 to July 1. *Photo courtesy Edmonton Space Sciences Foundation.*

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February, 1985

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Deadline is six weeks prior to month of issue.

The Application of Standard Time to Railways (Part I)

by Omer Lavallée
Corporate Historian and Archivist,
Canadian Pacific Limited, Montreal

Editor's Note: Following is the text of the paper delivered by Mr. Omer Lavallée to the Society's General Assembly in Hamilton on June 30, 1984. At the conclusion of his talk, Mr. Lavallée presented to the Society a beautiful antique comparitor clock, fully restored and in working condition. The clock recognises the contributions of Mr. Malcolm Thomson, a past national president of the Society and retired head of the Time and Frequency Section of the National Research Council of Canada. The clock has been mounted at the National Office of the Society in Toronto. Part II of the paper will appear in the April *National Newsletter*.

As with so many modern accomplishments, standard time is something that we tend to take very much for granted. Practical exposure of the average person to the effect of distance on time variation in our era is likely to be limited to experiences such as "jet lag", or, more familiarly, the cold recepton that we receive when we pick up our telephone in Toronto or Montreal, bright and early at nine am., to call cousin Lucy in Vancouver, only to find that we have aroused her from a sound sleep at six am., Pacific Time. The only other occasions when the "man in the street" has a consciousness of the time variation is the seemingly unnecessary but annual spring and autumn ritual of changing from standard to daylight saving time, and vice versa. Since most of these variations are reckoned in hourly intervals, the adjustment is a simple one. The classic Canadian exception is, of course, the province of Newfoundland, which is the butt of many jokes because it is only 30 minutes ahead of Atlantic Standard Time, in effect using time of 52 degrees, thirty minutes, west longitude.

Adjustments of this kind were unknown in the ages before the first primitive mechanical timepieces were invented about 650 years ago. For the next four hundred years, until the dawn of the Industrial Revolution, clocks and watches were slowly improved in accuracy, in portability and in reliability. Even so, with travelling speeds limited to the pace of the fastest horse, a pilgrim's progress over long distances was reckoned in terms of weeks or months rather than minutes and hours.

Because time variations only occur when people move or communicate quickly over longer distances, it should not be surprising that the needs of transportation provided the stimulus for improvement in this scientific field. As clocks became more reliable, astronomers were able to enlist their aid, in conjunction with charts recording the known movements of heavenly bodies, to compile almanacs used by seamen in determining longitude. The first such nautical almanac was published by the Royal Observatory at Greenwich, England, in 1767. The observatory itself had been established by Charles II almost a century before, in 1675. For obvious reasons, these almanacs postulated a zero meridian passing through Greenwich. Just one century ago on 26 June 1884, the scientific world concurred in this designation.

The advent of the Industrial Revolution in the Eigtheenth Century raised public consciousness about the necessity of recording time more precisely in the community. The first applications, regulating the working hours of business and industry, soon influenced family life and social functions. As the designation of a common standard of time became necessary, the problem was resolved simply by using astronomical observations to determine solar time at the particular longitude of a given community, and adopting that time as a local standard. Larger communities became, in this way, local chronological units. The difference in time with other communities east and west was measured and expressed in added or subtracted minutes. As an example, when it is noon in Toronto, it is 12:23 pm in Montreal, 12:03 pm in Buffalo and 11:45 am in Detroit.

The necessity to adjust between local times, as far as travellers were concerned, was hardly an inconvenience. Steamers and stage coaches were no faster than horses alone. Thus, the difference of 23 minutes between the local times of Toronto and Montreal, spread over a journey taking a minimum of two full days, was insignificant. Even the advent of public railways in the 1830s, with greatly enhanced speeds, did not materially change the situation as all were short, local lines. Many of them, particularly in Canada, were only portages for navigable waterways, and their operations were dependent upon the arrivals and departures of connecting steamships.

This leisurely and casual era came to an end just before the middle of last century as a result of two factors. The first was the invention of the electric telegraph, which is attributed to Samuel F.B. Morse in the mid-1830s. The resulting expansion of the telegraph for commercial long-distance, instantaneous communication, made time differences between communities much more apparent. A supply house in Toronto, for example, receiving an order for goods by telegraph from Montreal, could not fail to notice that the telegram, whose dateline contained Montreal Time, had apparently been forwarded quite a number of minutes after it had been received in Toronto.

The second factor was the adoption of the electric telegraph for railway operations communications beginning in the late 1840s. As the railway networks expanded and their services became inter-related, the establishment of standards of time became crucial. As most railway main lines were single-track, precise predetermined schedules became necessary to govern, not only departures and arrivals, but also the meeting and passing of opposing trains at sidings, connections with trains on other lines, and changes in meeting or connecting points when trains became delayed in their schedules. To achieve this purpose, each railway system selected one of the time standards in its locality, usually that of its headquarters community. That standard governed operations, and statements to this effect appeared on all working and public timetables, and in public notices.

As a corollary, railway employees whose duties involved the movement of trains were required to carry reliable and accurate watches, which had to be compared daily with designated standard clocks in stations. These clocks were called "comparison clocks", and they were regulated daily by telegraph impulses from an observatory. On smaller lines, there might be only one comparison clock – usually the one on the train dispatcher's desk – and this was designated as the standard timepiece for the whole line. It is an interesting commentary on the unreliability of early pocket watches, that many companies required their employees, when trains were to be met or passed, to arrive at least five minutes before the scheduled time so as to compensate for possible variations in the accurary of railway watches. In time, specifications were developed for railway pocket watches in order to improve accuracy, and such precautions became unnecessary.

Local time variation became apparent when the main line of one railway reached a community served by another railway, whose operations might be governed by the standard of yet a third community. The railways themselves organized regular meetings, known as Time Conventions, at which schedules were regulated so as to ensure smooth connections and transfers. We may take the city of Buffalo in the 1860s as an example. The city had its own standard solar time which was also used by local lines radiating from the city. However, trains arriving from Canada operated on Toronto time, those from the eastern part of New York State on New York city time, and those from Ohio on Cleveland time. Stations jointly used, as in Buffalo, had individual clocks showing these various times, but the poor traveller was left to cope with an increasingly confusing situation. Lest the United States be seen as the sole culprit, let us give a contemporary Canadian example.

The pioneer Champlain & Saint Lawrence Rail Road, opened in 1836, based its operations on Montreal Time. The Ontario, Simcoe & Huron Union Rail Road, the first public steam-operated railway put in operation out of Toronto in 1853, utilized Toronto Time. There was no conflict until 1856, when the Grand Trunk Railway of Canada opened its main line between Montreal and Toronto. Since a single time standard was mandatory for train operations, the GTR adopted Montreal Time for the Montreal-Toronto section, but Toronto time for its operations between Toronto and Sarnia, opened throughout in 1859. Complications multiplied with the building of local feeder railways, each with its own, different time standard. To give a concrete example of the utter absurdity of this system, let us take the experiences of a hypothetical traveller making the relatively-short 210 km trip from Peterborough to Hamilton via Port Hope and Toronto, a journey which would take a little more than seven hours in actual travelling time.

Travelling the fifty kilometers from Peterborough to Port Hope in a little over two hours, our traveller would find the trains of the Port Hope, Lindsay & Beaverton Railway running on Port Hope Time, which was twenty minutes slower than Montreal Time, and three minutes faster than Toronto Time. That is to say, when it was noon in Montreal, it would be 11:40 in Port Hope and 11:37 in Toronto. Upon arrival at Port Hope, he would connect with the Grand Trunk Railway for the trip to Toronto, a distance of one hundred kilometers. But at Port Hope, he would discover that for operating reasons, the Grand Trunk ran its whole division between Montreal and Toronto on Montreal Time. So he would have to advance his watch twenty minutes to agree with the time shown at the Grand Trunk station and in its timetable. Arriving at Toronto about four hours later, he would again find himself out of step with that community's clocks, and would have to retard his watch 23 minutes, in order to have it on Toronto Time, on which he would continue to Hamilton. If the subject of our story was a regular travelling salesman or "drummer", making his way from city to city throughout Canada and the eastern United States, he would have had to contend with more than eighty changes of time in an area now covered by only two, the Eastern and Central Time zones.

What was to be done?

(To be continued)

The Study of Variable Stars Using Small Telescopes

by Dr. John R. Percy
Department of Astronomy, University of Toronto

The study of variable stars is an interesting and worthwhile area of research for astronomers with small telescopes. If the telescopes are local and therefore regularly accessable, they are particularly suited to long-term projects, which are difficult to carry out at remote sites such as the national observatories. The study of variable stars is a fruitful area of research for amateurs: dedicated and proficient individuals who pursue astronomy as a serious avocation rather than as a career. The study of variable stars can also satisfy the need for meaningful project work for science students in schools, colleges and universities. This topic therefore has scientific, educational and cultural perspectives.

This symposium is aimed at professional and amateur astronomers, and at college and university

teachers, who are interested in these perspectives. It deals with the observation of variable stars, using photoelectric, photographic, and visual techniques, with telescopes of smaller (typically 0.2 to 0.6 m) aperture. It also deals with the analysis and interpretation of the observations. The emphasis is on the science, as opposed to technology, of small-telescope astronomy.

Place: Department of Astronomy
University of Toronto
Toronto, Ontario
Dates: Thursday evening, July 11 to Sunday, July 14, 1985

This symposium is part of the celebration of the 50th anniversary of the David Dunlap Observatory of the University of Toronto. Participating organizations include the American Association of Variable Star Observers, the International Amateur-Professional Photoelectric Photometry association and the Royal Astronomical Society of Canada, as well as individual scientists and teachers with an interest in the subject.

Several invited review lectures will be given by astronomers with a special interest and expertise in small-telescope astronomy. A limited number of contributed oral papers will be accepted by the organizing committee. Participants are encouraged to contribute "poster" or "display" papers on subjects related to the topic of the symposium: telescopes and instruments, methods of analysis, descriptions of observing programmes, results of projects, and experiments and projects for use in laboratory and project courses in schools, colleges or universities.

In addition to the scientific sessions, there will be displays, tours of local astronomical facilities (including the David Dunlap Observatory, the McLaughlin Planetarium and the University of Toronto Campus Observatory) and numerous formal and informal social events to facilitate discussion and enjoyment. Comfortable, inexpensive accommodation will be available in the residences of Victoria College, University of Toronto, as well as in local hotels.

The scientific organizing committee consists of Dr. Emilia Belserene (Maria Mitchell Observatory), Dr. Christine Clement (University of Toronto), Russell Genet (I.A.P.P.P./Fairborn Observatory), Dr. Douglas Hall (I.A.P.P.P./Dyer Observatory), Dr. Janet Mattei (A.A.V.S.O.), Ian McGregor (R.A.S.C./McLaughlin Planetarium), with the writer as chairman. For further information, please write to me at: Department of Astronomy, University of Toronto, Toronto, Ontario Canada M5S 1A1.

Nominations for R.A.S.C. Officers, 1984–85

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.

This year, we must elect the following officers specifically: Librarian and Recorder.

If any member wishes to make suggestions in this regard, he should contact the Committee Chairman, Mr. Franklin Loehde, 11107-63 Street, Edmonton, Alta., T5W 4E3, 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 March 30, 1985 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.

John Paul Cox (1926–1984)

by R.H. Garstang
University of Colorado

As a long time member of the R.A.S.C. I greatly appreciated seeing on page L77 of the October 1984 *National Newsletter* the photograph of the invited speakers at the Cepheid Bicentenary Colloquium. It is therefore with particular sadness that I report the death on August 19, 1984 of one of the invited speakers, John Cox. He was born in Florida and educated at Indiana University. He served on the faculty of Cornell Universty from 1954 to 1962, and on the faculty of the University of Colorado from 1963 onwards; he was also a Fellow of the Joint Institute for Laboratory Astrophysics in Boulder from 1963. His principal interests were the theory of stellar interiors, stellar stability and stellar pulsations. His publications included *Principles of Stellar Structure* (with R.T. Guili) (1968) and *Theory of Stellar Pulsation* (1980), along with many review articles and papers. We mourn his premature passing.

Sounding Rocket Research in Canada

by Kenneth Pilon
Box 1277, Gimli, Manitoba R0C 1B0

To maintain a strong and viable scientific capability, Canada must have at its disposal instruments that probe both the microcosm of the atomic nucleus and the macrocosm beyond our planet. To ensure the availability of such equipment to the Canadian scientific community, the federal government has assumed responsibility for their construction and operation, designating them national facilities under the supervision of the National Research Council. One such national facility is the Churchill Research Range at Churchill, Manitoba on the west coast of Hudson Bay.

The Facilities Branch of the Canada Center for Space Research is a national facility for space and upper atmospheric research employing sounding rockets. The Branch also supports the development of ground-based scientific instrumentation; conducts rocket launches; engineers the production of rocket payloads and subloads, and the interfacing of scientific instrumentation with command, telemetry, tracking and data recording systems.

The main rocket launching site at Churchill has been in use since 1955 with approximately 900 major launches to 1983. A secondary launch facility is located at Port Parry, Northwest Territories. There is also mobile capability which provides launch facilities for special events such as the 1979 total solar eclipse, when Red Lake, Ontario saw the launch of 15 major vehicles and 20 minor ones for a total of 35 rockets.

The Churchill Research Range consists of four launch pads capable of handling rockets up to 20 m in length and weighing 5 tonnes, along with facilities where rockets and payloads can be assembled and pre-tested before launch.

The firing of research rockets into the upper atmosphere is carried out by many countries, but Canada, with its proximity to the north magnetic pole enjoys an almost unique position in one particular aspect of this investigation. Her uniqueness is the aurora borealis whose polar-encircling belt in Canada comes farther south than anywhere else in the northern hemisphere. In the heart of this auroral belt lies Churchill. The many and varied experiments which have been conducted so far have produced much new information on the structure and behaviour of aurora. This has resulted in a much better understanding of the interaction of the stream of charged particles from the Sun and the Earth's magnetic field.

Canada has also developed a family of rockets which are particularly suited to upper atmospheric research. Known as *Black Brants*, many of these rockets are launched from Churchill. They are manufactured by Bristol Aerospace of Winnipeg. Vehicle sizes of major rockets range from 9 to 17 m in length with up to four stages. These vehicles will carry from 40 to 400 kg of payload to between 100 and 1500 km altitude. Flight speeds are typically 4000 m/s. This compares to the 3000 m/s for an airliner, or to the 8500 m/s needed to achieve orbital velocity.

On a large, three-stage vehicle, such as the 16 m Black Brant 10, some fifty people will be involved in direct launch support of a 200 kg payload over a 14-day launch "window". When the science and weather conditions are right, the launch occurs. The first stage will burn for just 4 s. At 800 m altitude and travelling at 390 m/s, a differential drag causes the first booster stage to separate and it will impact with the earth just 1500 m from the launcher. The rest of the vehicle will then coast upwards for 8 s until the second booster stage ignites for its 32 s burn. At 32 km altitude and now travelling at 1620 m/s, the second stage separates, falling back to earth 140 km from the launcher. The vehicle then coasts for 31 more seconds until the main and final third-stage rocket completes its 18 s burn. At the end of this final burn the vehicle is now travelling at 3260 m/s, is at 120 km altitude and 34 km downrange. From there it will coast for almost seven minutes until it reaches its maximum altitude of 680 km at 390 km downrange.

The vehicle's payload science instruments are functioning from just after the end of the third-stage burnout. These instruments, with several year's work labouriously put into them, will have just 12 minutes to sample the scientific medium and transmit data before deployment of the parachutes at an altitude of 6 km on the downward flight. Once the instruments are on parachutes, the data collecting has ended.

Throughout the flight a host of ground equipment is collecting data in conjunction with the main rocket experiments. This includes: magnetometers, ionospheric radio soundings, photometers and all-sky camera. The vehicle is also continually followed with ground-tracking antennas. On touchdown of the science payload, some 780 km distant from the launcher, a helicopter is dispatched to recover the experiments. These can then be re-used on a later launch. The entire flight from launch to touchdown of the payload on its parachutes takes just 15 minutes!

Most of the recent sounding rocket experiments deal with the measurement of particles, fields, gases, currents, and radiation. In particular the distribution of nitrogen in the aurora, spectrometer measurements of atomic oxygen and hydrogen, magnetic currents, natural aurora radio-frequency emissions, plasma probing, electron density and temperature, oxygen airglow emmissions, and energetic electron precipitation were studied.

One of the more interesting science launches of late was Project Waterhole first launched in 1981 and followed up with another launch in 1983. This experiment saw the explosive release of 300 kg of water above the aurora at 300 km altitude. The purpose of the experiment was to monitor the aurora for any changes in its structure, behaviour, or strength in an attempt to understand better charged particle interactions. The water release saw the extinction of the aurora over a large area. At the moment of detonation, instruments showed that the aurora dimmed by half throughout the area scanned – perhaps across the entire sky. An ionospheric "hole" nearly 50km in diameter was formed. The changes lasted for three minutes, whereupon the aurora recovered to its pre-launch condition. In effect, Project Waterhole managed to "turn-off" the aurora.

The winter of 1984–1985 will see the launch of six more major vehicles from Churchill, and I'll be there to help with the launch support!

Editor's Note: Last autumn the federal government announced its plans to close the two rocket launch sites in Gimli and Churchill, Manitoba as part of its cost-cutting measures. This blow to small-scale space science research in Canada may indicate the government plans to concentrate on more-advanced programmes on satellites and with the Space Shuttle. We will have to wait and see.

The Mount Kobau Star Party 1984

by Jack Newton with Muriel Enock
Victoria Centre

Twenty years ago, Mount Kobau (altitude 1861 m) was selected as the best site in Canada for the proposed 4 m Queen Elizabeth Telescope. Its qualifications were confirmed on August 23–27, 1984, when the Okanagan Astronomical Society held its first annual star party there under very dark clear skies.

Just north of the U.S. border, Mount Kobau is 11 km from the nearest town, Osoyoos, B.C. The Dominion Radio Astrophysical Observatory near Penticton is about 30 km to the north. The mountain lies near British Columbia's Okanagan Valley vacationland, famous for apples and wine, where summer temperatures average 27.8C with litle rain.

We drove the 435 km from Victoria with our Centre's Evans-Vander-Byl mobile telescope (EVBT). Determined not to delay reaching our goal, I drove to the summit by the neglected multimillion-dollar gravel road – potholed every metre or two – at warp speed. Beside me sat Leo Vander Byl, white as the road dust and speechless with concern about what might be happening to the 0.5 m telescope which he had so lovingly built. When we reached the top we found everything was mechanically in good condition, but a layer of dust coated the telescope. We borrowed an air gun and blasted off all the dust, sealing the doors against another dose with window sealant.

About 75 people registered for the star party and enjoyed the clear skies at night and the warm sunny days. Telescopes were set up beside the Atmospheric Environment Service trailer on the site, where a few of us could stay for a couple of nights to take full-time advantage of these wonderful skies. Observers lined up at the telescopes until the wee hours; the EVBT was in demand until 0300 each night. I found that with a light-pollution filter, I had the finest view of the Veil Nebula that I had ever experienced. On Mount Kobau, most of the objects are as good *visually* as they are at my usual site photographically; they showed twice the contrast I get visually at my observatory 12 km outside Victoria.

Twilight talks were given each night, including one on the history of Mount Kobau by Craig McCaw (Vancouver) and one on the proposed Canadian Long-Baseline Radiotelescope Array by Dr Tom Landecker of the Dominion Radio Astrophysical Observatory, which we toured on Sunday. I talked about cold-camera photography; unfortunately no presentation was made this year in the astro-photography contest. In the telescope-making contest, the following winners were selected.

– *Optical Excellence* (amateur-made optics): Walter Wolanski's 0.2 m Newtonian mirror.
– *Mechanical Excellence* (nonprofessional): Don Falconer's large steel fork-mount telescope, which he presented unfinished.
– *Mechanical Adequacy when made with Limited Tools*: Peter Kuzel's Dobsonian made by hand of wooden broom handles – awesome in its simplicity.
– *Most Innovative Design*: Chris Horsfield's Dobsonian (with a tube of moulded wood strips only 6 mm thick, glued and fibreglass coated) with an improved bearing which redistributed the bearing load for better support.
– *Other Amateur-Built Astonomical Objects*: Dale Baglow's chart table, the subject of a recent *Sky & Telescope* article.

Informal seminars and disussions went on throughout the star party. It had attracted observers from all over Western Canada and the northern U.S.A. There were R.A.S.C. members from Vancouver, Edmonton and Calgary, as well as members of Victoria Centre from both Vancouver Island and the Interior. Everyone cooperated to make certain that absolutely no lights interfered after sunset with visual observing or dark-sky photography.

When we left for home, Leo insisted on driving down the mountain at 6 km/h, but the views of Osoyoos Lake and the Okanagan Valley as we descended were so beautiful, and we had had such a superb observing weekend, that the snail's pace didn't really bother me. We hope the Okanagan Astronomical Society can make this an annual event, so that observers from across the country and south of the border can take advantage of this incredible Mount Kobau site. In fact, the O.A.S. have here the makings of another Riverside or Stellafane.

The Return of "Elms Lea"

by Dr. J.D. Fernie
David Dunlap Observatory

I suppose for about as long as it has belonged to the University the Director's residence has been known as "Observatory House". I'm not sure who chose this, but I suppose it was done in imitation of

such historical precedents as are to be found at places like Greenwich. Certainly it is not unique. Nor does it seem to be official. All blueprints and documents in the hands of Physical Plant refer to it by the quaint term "The Astronomer's Residence", which (emphasizing the first word) may be pleasing to the incumbent but has little else to recommend it.

Anyway, when the family who originally owned the house took renewed interest in it a few years ago, they expressed a certain polite regret at the passing of the original name: "Elms Lea". On reflection Yvonne and I came to like this name, finding in it a pleasing lilt and uniqueness lacking from "Observatory House". So when it came time last summer to have the driveway sign repainted we opted for "Elms Lea", and now that elms are making a comeback we intend exploring the possibility of replanting some around the house. The impact of this name change on Physical Plant will, like so much else, probably be nil, but at least it restores a little history.

Reprinted from *The David Dunlap Doings*

N.A.S.A. Summer Student Programme 1984

by Keith Hitchon
Calgary Centre

In December 1983 I was fortunate to be selected as Canada's participant in the 1984 N.A.S.A. International Summer Student Programme. My science fair project, which looked for a relationship between ages and vector origins of the nearby stars, was narrowly selected in competition with other science fair projects across Canada to participate in a two month programme at a N.A.S.A. field centre. Subsequently in July and August of 1984 I spent a highly enjoyable summer at Ames Research Centre in Moffatt Field, California, working as a "research assistant". Upon arrival, I was able to discuss with Dr. Erickson, head of the Astrophysical Experiments Branch, what I could be doing over the summer.

Primarily, I worked with Dr. Martin Cohen, studying the variability of emission lines and continuum level light fluxes of late-type red giant carbon stars. I observed the construction and testing of a liquid helium-cooled infrared grating spectrometer and attended a number of talks, including the 96th Annual Meeting of the Astronomical Society of the Pacific and a symposium on airborne astronomy. Tours of the University of California at Berkeley Campus, Lick Observatory, and both the Stanford applied physics laboratory and linear accelerator were made available to me.

Dr. Cohen, originally an amateur astronomer, is working on an observing project of late-type red giant carbon stars. Modern theory holds that stars of a particular range of initial mass evolve off the main sequence, a stage of equilibrium in stellar evolution, and are called carbon red giants as opposed to oxygen-rich giants of a slightly different initial mass. In the latter stages of its life the carbon-rich red giant undergoes a type of thermal disequilibrium with convection currents. The stars actually expand periodically and eject a circumstellar dust shell. Eventually the shell gets so thick that the effect of the pulses can only be seen in the infrared.

Dr. Cohen found candidate stars from an infrared Air Force Survey and made visible spectra of the surfaces of the candidate red giants from Lick Observatory. These spectra showed variability of emission lines and blackbody continuum levels, hence supporting the theory of thermal pulses. My job was to help define the periodicity and nature of the emission line and continuum level variability and to look for relationships in the data that could help develop the theoretical mechanism of thermal pulses. Continuum variability would be a temperature indicator indirectly defining the thermal pulse, and the emission lines would be the effect of the pulse. For example, at a characteristic continuum level there was a corresponding peak of Hα emission. Theory holds that the star expands and ejects matter from the surface. This matter collides with an inner dust shell and creates the strong shock-induced Hα emission line. Towards the end of the summer the very first "overtone" variability was discovered. Since different stars have different periods the pulse periods could be changing. There was one unique star whose thermal pulse reoccurred before the preceding pulse could die down and return to "normal". This process is quite critical to the present theoretical mechanism, which is being modified to account for the new results.

This work is frontier research, because the data represent a study of the last visible stages of evolution

for this type of star. It is still quite uncertain how the red giant eventually disperses a large portion of its mass, leaving only the core as a white dwarf. A more detailed account of this process can be found in Dr. Cohen's article "The Vanishing Act of Carbon Giants", in *Astronomy* magazine, June 1982. Dr. Cohen's research will likely help to advance the theory for this stage of stellar evolution.

I was also able to learn of much research at various seminars and talks. The general topic at the 96th Annual A.S .P. meeting was stellar populations and metallicity of galaxies. N.A.S A.'s symposium on airborne astronomy discussed the Kuiper Airborne Astronomy Programme, science and technology. The Kuiper Airborne Telescope is a one-metre telescope on board a C-141 airplane. The programme, designed for infrared astronomy, will follow up on IRAS results. Especially worthy of note were the lunchtime talks and discussions, where many people in the department would get together and informally discuss topics such as planetary formation.

I had a tremendous summer, and would like to thank the many people at N.A.S.A. who made it all possible.

Reprinted from *The Starseeker*

(Mr. Hitchon is a two-times Canada-Wide Science Fair astronomy prize-winner. – Ed.)

Conference and Special Events Calendar

International Symposium on Astronomy
For travellers to South America next summer, a major astronomical conference titled "The New View of the Universe" is being held in the city of Medellin, Colombia from August 15–19, 1985. Organised by La Asociacion Colombiana de Aficionados a la Astronomia (A.C.A.F.A.), the conference will feature many talks given by well-known English-speaking astronomers including Nigel Henbest, Patrick Moore, and Simon and Jaqueline Mitton. Further details can be obtained by writing to Mr. Kevin P. Marshall, Calle 56, No. 47–23, Apto. 601, Medellin, Colombia, South America.

Planetariums to Meet
The 1985 conference of the Planetarium Association of Canada will be hosted by the McLaughlin Planetarium in Toronto from May 25–29, 1985. The conference theme is "Telling the Story" and will feature paper sessions and workshops of interest to both big and small planetariums as well as teachers and educators involved in astronomy education. Information can be obtained by writing to Mr. Chris Sasaki, McLaughlin Planetarium, 100 Queen's Park, Toronto, Ontario. M5S 2C6.

Gathering of Canadian Astronomers
The Canadian Astronomical Society will be holding its annual conference in Toronto from May 28–31, 1985. Hosted by the Department of Astronomy of the University of Toronto the conference will be highlighted by the 50th birthday celebrations of the David Dunlap Observatory in Richmond Hill on May 31. For additional information contact Dr. John R. Percy, Department of Astronomy, University of Toronto, Toronto, Ontario M5S 1A1.

International Astronomy Day
Last year many R.A.S.C. Centres and astronomy clubs across Canada organised special programmes for International Astronomy Day. This year's event takes place on Saturday, April 27. Mr. Leo Enright of the Kingston Centre is acting as National Coordinator for the event. Centres and clubs planning activities should contact Leo in advance so that he can help to coordinate publicity, or give helpful ideas of things to do. Contact Leo by writing to: R.A.S.C. Kingston Centre, P.O. Box 1793, Kingston, Ontario K7L 5J6.

I H W Coordinators

In the June 1984 *National Newsletter* (p. L47) Chris Spratt of Victoria Centre outlined how amateur astronomers could contribute data to the International Halley Watch (I.H.W.). Volunteer Recorders will receive the data and forward them to the I.H.W. Lead Centre.

Recorders for Eastern Canada are:

Visual Observations: Warren Morrison
955 Ford Street
Peterborough, Ontario
K9J 5V5

Photography/Spectroscopy: John Sabia
1112 Fairview Road
Clark Summit, PA, U.S.A. 18411

Recorders for Western Canada are:

Visual Observations: Chris Spratt
1431 St. Patrick Street
Victoria, B.C. V85 4Y5

Photography/Spectroscopy: John Sanford
2215 Martha Avenue
Orange, CA, U.S.A. 92667

The I.H.W. Amateur Coordinator is Stephen J. Edberg. For more information, contact him at Jet Propulsion Laboratory T1166A, 4800 Oak Grove Drive, Pasadena, CA, U.S.A. 91109.

Across the R.A.S.C.

HAMILTON: The Centre has found it necessary to increase its regular membership fees to $30.00 from $25.00 while keeping its student rate at $20.00.

NIAGARA: The autumn conference of the Niagara Frontier Council of Amateur Astronomical Associations (N.F.C.A.A.A.) was hosted by the Centre on November 10. Active variable star observer Steve Sharpe of the London Centre, who does about 4000 estimates per year, has moved to the Niagara area. In late October Centre members set up their telescopes to show about 60 Brock University students some spectacular views of the night sky. John Dekker's 16-inch Meade reflector has been giving some very enjoyable views of the faint deep-sky objects.

LONDON: Five Centre members (Dale Armstrong, Eric Clinton, Jim Lucyk, Mark Sinkins, and Thomas Steckner) have observed their 110th Messier object and received their Messier Certificate. This past autumn Eric Clinton, Peter Jedicke, and Dale Armstrong have been doing slide shows and observing sessions for grade 6 to 8 students at a Boy Scouts of Canada site outside of London.

OTTAWA: The new Observer's Group Executive was elected in November. Doug George is the chairman and twelve other members fill the coordinator positions. The Annual Dinner Meeting was held in November with former Centre member Doug Welch as guest speaker. Congratulations to Linda Meier who has won the Variable Star Award for 176 brightness estimates.

CALGARY: The Annual Banquet was held in November with National President, Dr. Roy Bishop, as guest speaker. The Centre gives a monthly 5–10 minute radio interview on the current sky. The programme is heard on CBC-AM (1010 on dial) on the first working day of each month between 6:30 and 7:30 am.

HALIFAX: While the National Society has been conducting a survey of the availability of computers in the twenty Centres, several Centres have been having special programmes relating to computer usage. Last November Halifax held a meeting to discuss the role of computers in astronomy.

WINDSOR: Dr. Roy Bishop was the guest speaker at the Centre meeting in late January held prior to the Society's National Council meeting in Toronto on January 26.

KINGSTON: Congratulations to Centre member and well-known Canadian amateur David Levy on his discovery of a new comet in November (see page L12 for details). Warren Morrison is convinced he has seen Pluto in his 6-inch f/15 refractor and has issued a challenge to other amateurs with dark skies and 6- to 10-inch instruments to observe the planet in 1985. The Centre will be celebrating its 25th anniversary in 1986 and not only has it formed a committee to plan celebrations but has also confirmed Dr. Roy Bishop, our National President, as its guest for their January 1986 meeting!

VICTORIA: Preliminary results of a survey of the Centre's membership have revealed that about 40% of the members have a computer. This is almost as many members who have telescopes! The Centre also has a number of telescopes it loans for one-month periods to paid-up members only.

TORONTO: The Centre's first banquet in many years was held on November 10 at the Harbourcastle Hilton Hotel with Timothy Ferris, author of the popular book *Galaxies*, as the guest speaker. The first winners of the new Centre awards were announced at the Banquet – Andrew Elvins Award (Brian Beattie), H.A. Winearis Award (Alia Alsharif), Bertram J. Topham Award (Michael Watson), and Jesse Ketchum Award (John Hicks). Five members travelled to New Guinea for the November 22 total eclipse of the sun and viewed the spectacular event under clear skies. At the Centre' s Annual Meeting in December, Randy Attwood was elected to a second 2-year term as President. After six years as Centre Secretary, Ralph Chou moved up to First Vice-President, and Betty Robinson is the new Secretary.

Across the R.A.S.C. is a regular feature of the *National Newsletter*. Centres are encouraged to notify us of any interesting or late-breaking news in their Centre so that we can report it. Send newsletters to Peter Jedicke, 810-1297 Huron Street, London, Ontario N5Y 4L9, or phone Peter at (519) 455–5907.

Comet Levy-Rudenko (1984t)

Just less than two months after Rolf Meier of the Ottawa Centre discovered his fourth comet, David Levy of the Kingston Centre discovered his first comet. Observing on the evening of November 13–14 from his home in Tuscon, Arizona, Levy found this new comet in the constellation of Aquila low in the western sky just after sunset. Estimated to be at a brightness of 9th magnitude, the comet reached perihelion in mid-December and was observed by many observers in December.

David Levy discovered the comet after 917 hours of comet-hunting spread over 19 years. The instrument he used was his 16-inch f/5 "Jupiter" reflector. The following evening an independent discovery by Michael Rudenko of Amherst, Massachusetts (also a comet-hunter with 250 hours logged) added the second name to the official comet designation. Both Rolf Meier and Terence Dickinson of Odessa, Ontario also observed the comet the same evening.

In a written letter describing this discovery Levy says "I am especially happy about some coincidences regarding my role in the discovery of Comet Levy-Rudenko. I found it 59 years to the day after Peltier found his first comet. That one was also co-discovered, and Venus and Jupiter were also close together in the evening sky." Leslie Peltier (1900–1980) was a world-famous amateur astronomer with twelve comets to his credit and over 132 000 variable star estimates.

Congratulations David on your comet discovery! We hope your "second comet" will not be as long in coming.

Times Past: A Look at Earlier Days of the Montreal Centre's Observatory

by David H. Levy
Historical Committee, R.A.S.C.

Standing on a hill that overlooks McGill University and downtown Montreal is an odd building with three floors and a dome on top. Perched precariously on this hill, passersby might wonder why the university bothered to construct a storage shed that with the next rain might tumble off into a nearby parking lot. Those who know a little more would recognize the dome as belonging to an astronomical observatory, and those who know a lot more would understand that what is stored here are decades of observations, some fine telescopes, and a cornucopia of happy memories.

The idea to write some of my recollections about this observatory and its programme was born from a conversation I had one late summer afternoon with Dr. Peter Millman, chairman of the R.A.S.C.'s Historical Committee, who wants to assemble information about Canadian observatories. Now would be a good time, I felt, to take a look back at some of the activities of that special observatory of the Society's Montreal Centre. Built out of a converted structure at McGill University, this building has seen two generations of Montreal area amateurs learn to love and work with the stars. Overlooking McGill's football stadium in downtown Montreal, at first glance it would hardly seem a likely site for the birth and development of one of the major amateur programmes on the continent. Even in the middle fifties the Montreal skyline was a major deterrent. But the place was accessible, and the group, inspired and led by Isabel K. Williamson, took advantage of the usually steady seeing and fine old refractor to launch some effective programmes.

The building has three floors whose only apparent common factor is a huge pier that begins several feet below ground level and then rises defiantly through the basement, the main floor meeting room, and up to the dome. Atop the pier, back in the fifties and sixties, sat one of the most beautiful old brass refractors I have ever seen. Its fine 15 cm lens gave hundreds of people their first high quality views of the planets.

Many people forget that you do not need a black country sky to appreciate the moon and planets. Isabel Williamson took advantage of the fine telescope and that fact to organize a programme of lunar and planetary observation that for two decades was second to none other in Canada. The programme extended right to the very beginner. I know that, because when I first walked into the building, I was greeted by Miss Williamson's enthusiastic smile and then was sent off immediately with the *Sky and Telescope* lunar map. "The object," she explained, "is to find all 326 lunar features that appear on that map, and to create your own map with each of the craters and mountain ranges you have discovered." It took me some two years to finish this project, time enough to get hopelessly hooked on astronomy as a lifetime pursuit.

To encourage the full use of this facility, meetings took place (and still do) twice each week, on Wednesday and Saturday nights. Wednesday meetings were meant for members only, when Miss Williamson and members of her observation committee would guide members through their programmes. Sometimes so many members would arrive that other telescopes would help out. The most popular of these "associate professors" was an absolutely marvelous 10 cm Zeiss refractor on an old wood altazimuth tripod. We would spend some 15 minutes setting it up, but the first quick look through justified that effort.

When the observatory was first opened, the sky was dark enough that observers could find some of the brighter Messier objects. These were the targets of a friendly competition called the "Messier Club" which Miss Williamson had begun in the '40s. This Messier Club competition, which is still active in the Montreal Centre today, is the first of dozens of Messier clubs at local and national levels that now flourish all over North America.

As the Wednesday observation meetings were considered "observing business only" Miss Williamson and her committee felt that time was also needed for regular public "star party" sessions at a convenient time at the Observatory. The result was the Saturday observation meetings which took place every week. Beginning at 8pm the dome would open; observations of planets, double stars or bright deep-sky objects would begin and run for about an hour. Promptly at 9pm the traditional bell would ring

and the meeting would begin. With talks scheduled every week, each active member and many not-so-active members, had an opportunity to test public speaking skills before a friendly audience. These lectures were usually well prepared and interesting. On cloudy nights they would be followed by a lengthy question period and discussions, but on clear nights they would be followed instead by a dash upward to the observatory for more peering through the first rate refractor, often until midnight.

The lunar crater project was the first of a staged programme that Isabel Williamson designed both to interest new observers and to develop their observing skills. The second lunar stage consisted of drawings of six selected craters, and each would have to be drawn at three different sunlight angles. After this second stage, observers could move on to the small amount of trigonometry that was involved in calculating heights of various lunar mountains.

With the planets, programme observations were patterned after the programmes of the Association of Lunar and Planetary Observers (A.L.P.O.), although Miss Williamson added a basic training programme that inspired new observers.

The last major object of observation to be added to the programme was the sun, an observing project which did not get a good start until the 1964 solar minimum had passed. A series of four report forms covered aspects of solar observation that were alien at that time to amateurs, whose main interest was the American Association of Variable Star Observers' (A.A.V.S.O.) spot counting programme. To these routine counts the Montreal Centre added an enthusiastic morphology project for which whole disk drawings and detailed observations of individual groups could be submitted. There was also a host of other projects involving every major field of observation that amateurs could handle. An interesting part of the design of all this was that no programme involved sophisticated accessory equipment. Miss Williamson's programme aimed to give observers a solid basis in observational astronomy. I often wonder what must go through the mind of a new observer who attends a centre meeting and is told to go out and observe asteroids photometrically. I often wonder how many good observers are lost when they are introduced to the stars carelessly and quickly, rather than through an organized process that nurtures both the eye and mind of a new observer.

To underline her conviction that expensive equipment is not necessary to accomplish good science, Miss Williamson developed a meteor observation programme in which observing teams watched meteors over many years. For many newer observers, this was a good introduction to the value and purpose of careful observations in groups. Sent to the National Research Council in Ottawa, the results of these watches provided a considerable proportion of archival data about meteor behavior in the sky over southwestern Quebec.

Of the dozens of fine people besides Isabel Williamson who helped develop the observatory's programme, a few names stand out: DeLile Garneau, whose Wilson Avenue observatory served the Centre for the years before it moved to the present site: Charles Good, whose meticulous development of the Centre's library added a major input to members' interest; Frank DeKinder, whose brilliant observation record inspired others; Constantine Papacosmas, whose work during the '50s and '60s was so energetic that other members wondered if he ever got any sleep; E.E. Bridgen, whose interest in the constellations set the pace for where observing really starts. Of these people and many others, Frank DeKinder and Isabel Williamson are Chant Medal laureates. The heart and soul of all this activity, Isabel Williamson devoted years of time and enthusiasm that have paid off in two generations of amateur and professional astronomers from Montreal who are now spread through a galaxy of cities, towns, and observatories throughout the world.

A warm place where people gathered to learn about the stars through talks and observing, through working and partying, the Montreal Centre's observatory was and is a good place to begin a love affair with astronomy. Those who have continued as serious observers retain a place in their hearts for this building and for the unique person, Isabel Williamson, who organized and inspired their work. Sometimes the members from those earlier days will, from time to time, remember with a smile those fun days when astronomy was happening at "The Observatory."

Royal Astronomical Society of Canada General Assembly
June 28 to July 1, 1985 Edmonton, Alberta

The Edmonton Centre is hosting the R.A.S.C. General Assembly, to be held at the University of Alberta, June 28 to July 1, 1985.

Edmonton is a vibrant city offering a full range of cultural amenities from theatre, opera, music and art to the beautiful river-entwined Capital City Park. Shopping and dining in Edmonton provide a galaxy of experiences for the visitor. The nearby Elk Island and Jasper National Parks, as well as other points of interest in Alberta, allow visitors to make their trip to Edmonton a complete summer vacation.

From the ramparts of old Fort Edmonton to the myriad delights of West Edmonton Mall, North America's largest shopping and indoor amusement centre, the 1985 General Assembly will be a memorable experience. The star attraction will be the brand-new, world class Edmonton Space Sciences Centre designed by internationally acclaimed Canadian Architect Douglas Cardinal. The Space Sciences Centre features a Zeiss planetarium, IMAX movie theatre, space museum, science store, and a fine restaurant.

The Observing Competition and Display will feature a couple of new ideas this year. See the December 1984 *National Newsletter* for details.

We welcome ten-minute dissertations for the Paper Sessions from amateur and professional astronomers alike. Members interested in presenting a paper should write to:

Dr. Douglas Hube
Department of Physics,
University of Alberta,
Edmonton, Alberta T6G 2J1

with an abstract of 150 words no later than April 30, 1985.

R.A.S.C. members are reminded that travel assistance to attend the General Assembly is available from National Headquarters through your local Centre.

For more information about the General Assembly in Edmonton return the following form:

R.A.S.C. General Assembly 1985
Edmonton, June 28 to July 1, 1985

Name _____ First: _____ Init: ____

Address: _____
(Street)

_____
(City) (Prov.) (Postal Code)

Total number of persons in your party: _____

University Accommodation required: Yes _____ No _____

Other Accommodation required: Yes _____ No _____

Will provide own accommodation: Yes _____ No _____

Please complete this form and return to the address listed below for April 30, 1985.

NEW ADDRESS:
Membership Committee
c/o Howard A. Gibbons
#1606, 9916-113 Street
Edmonton, Alberta
Canada T5K 2N3

Société Royale d'Astronomie du Canada Assemblée Générale
28 juin au 1er juillet 1985 Edmonton, Alberta

Le Centre dEdmonton sera l'hôte de l'Assemblée Générale de la S.R.A.C. qui se tiendra à l'Université d'Alberta, du 28 juin au 1er juillet 1985.

Edmonton est une ville vibrante qui offre une foule d'agréments culturels à partir du théâtre, de l'opéra, la musique et les arts en passant par le site enchanteur du Parc de la Capitale avec sa rivière tortueuse. Les magasins et restaurants d'Edmonton fournissent une galaxie d'expériences pour le visiteur. L'Île Elk, le Parc National de Jasper de même que plusieurs autres points d'intérêt en Alberta, font qu'un voyage à Edmonton peut satisfaire tous les besoins d'une vacance.

Depuis les remparts du vieux Fort Edmonton jusqu'à la myriade de délices de "West Edmonton Mall", le plus grand centre d'achat et d'amusements de l'Amérique du Nord, l'Assemblée Générale 1985 sera une expérience memorable. Le clou de la réunion sera le tout nouveau "Edmonton Space Sciences Centre" dont le design est de Douglas Cardinal, un architecte canadien de renommée internationale. Le Centre possède entre autres un planétarium Zeiss, un cinéma IMAX (à écran géant), un musée spatial, un magasin et un restaurant.

L'exposition de travaux astronomiques comprendra quelques nouvelles idées cette année.

Nous invitons les amateurs et les professionnels à participer aux séances de communications. Dix minutes seront allouées à chaque auteur qui devra envoyer un résumé d'environ 150 mots avant le 30 avril 1985 à:

Dr. Douglas Hube
Department of Physics
University of Alberta
Edmonton, Alberta
T6G 2J1

Nous rappelons aux représentants officiels des Centres de la S.R.A.C. qu'une aide financière pour assister a l'Assemblée Générale est disponible du Bureau National. Vos demandes doivent être approuvées par votre Centre.

Pour plus d'information sur l'Assemblée Générale qui aura lieu à Edmonton, retourner le formulaire suivant:

S.R.A.C. Assemblee Generale 1985
Edmonton, 28 juin au 1er juillet 1985

Nom _____ Prénom: _____ Init: ____

Adress: _____
(rue)

_____
(ville) (prov.) code postal

Nombre total de personnes dans votre groupe: _____

Vous désirez demeurer à l'université: Oui _____ Non _____

Autres accommodations requises: Oui _____ Non _____

Vous faites vos propres réservations: Oui _____ Non _____

Complétez ce formulaire et retournez-le à l'adresse suivante pour le 30 avril, 1985.

NOUVELLE ADRESSE:
Membership Committee
c/o Howard A. Gibbons
#1606, 9916-113 Street
Edmonton, Alberta
Canada T5K 2N3