

NOVA

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1976 Halifax Executive

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- President: Dr. Roy L. Bishop, Dept. of Physics,
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- Secretary: Dr. P.H. Reynolds, Dept. of Physics,
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- Editor: Randall C. Brooks, Dept. of Astronomy,
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UP COMING EVENTS

19 November, 8:00 PM in the Nova Scotia Museum, Summer St.

William Parnell one of our members from Liverpool, will give his impressions of his trip to Stellafane '76--the annual meeting of telescopes and their makers at one of Russell Porter's favourite retreats in Vermont. Before Bill shows some of his slides, Roy Bishop will give a brief history of this famed gathering. The slides will show the winning entries of the competition, a competition in which Canadian telescope makers take at least their share of prizes. Finally our astronomical travelogue will be filled out with a short presentation of slides of astronomical interest taken this summer in Europe by R. Brooks.

17 December, 8:00 PM in the Nova Scotia Museum

Dr. George Mitchell of the SMU Astronomy Dept. has just completed a year's sabbatical working on the problem of interstellar molecules. Although a weighty theoretical problem, he will attempt to give us an explicit idea of the significance of this work in terms of atoms, molecules, nebulae, globules and proto-stars

MEMORANDUM FOR THE MEMBERS OF THE SOCIETY

Our first meeting of the year was held on Friday, Sept. 17 at 7:00 p.m. in the Nova Scotia Museum. Thanks to some extra publicity (courtesy of the Museum), there was a very good turn out - practically a full house. Dr. Bishop, in his opening remarks, reminded the membership that it was again time to pay annual dues. He also noted that the Centre's general elections are just below the eastern horizon.

Dr. Bishop was in addition the evening's featured speaker. His topic was Universal Illusions, a fascinating description of commonplace phenomena which are nevertheless inherently illusory in nature. The first of these is the illusion of completeness (that is, we see only the visible portion of the electromagnetic spectrum). The second, the illusion of 'now' a consequence of the finite speed of light is particularly relevant in astronomy. The third illusion is one of 'out-there-ness', our tendency to mentally project 'out there' and not recognize that the image is actually within us. The fourth illusion relates to the fact that the perception of depth is made in the brain. The fifth is the illusion of light; one can have the sensation of light when in fact there is no light. Dr. Bishop went on to describe the illusion of dark (black as a real sensation), the illusion of the retinal image (it is vastly different from the perceived image) and finally the illusion of space and time (relativistic effects).

Dr. Bishop certainly made us look at a number of common phenomena in a new and intriguing way. He was warmly thanked for his efforts and refreshments were served. While we enjoyed the latter, we were at the same time able to look over a telescope display, the displayers being Peter and Mike Edwards, Randall Tropea and Roy Bishop. Last but not least, Randall showed us a collection of his most recent Viking - on - Mars slides.

Peter W. Reynolds
Secretary

MINUTES OF THE OCTOBER MEETING

Our regular monthly meeting was held on Friday, October 15 at 8:00 p.m. in the Nova Scotia Museum. Dr. Bishop opened the meeting with some general remarks, following which, nominations for next years executive were received from the floor. These are not reported here since acceptance of nominations by people not present at the meeting has not been confirmed.

The theme of this meeting was Telescope Making, a discussion of several aspects in perhaps a more informal atmosphere than usual. Roy Bishop began with a brief description of the famous Foucault test, a must for any mirror maker. Larry Coldwell described his two 4" Newtonians, relatively low-cost, rich-field instruments, with mirrors ground with the aid of a Black and Decker sander! Walter Lukauskas was persuaded to give a short dissertation on the Schmidt lensless camera which he has under construction. The last formal speaker was Randall Brooks who talked about telescope mountings, mountings used on the largest professional instruments, and also some suggestions for the homemade backyard variety.

Refreshments were served prior to adjournment about 10:30 p.m.

Addendum: For the record the following were nominated and accepted nomination for offices in the Halifax Centre for 1977.

President: Dr. D.L. DuBuy

Vice-president: Bill Calnen, Dr. Larry Boser

Treasurer: Alan Bent, Mike Edwards, Walter Lukauskas

Secretary: Lamont Larkin, Dr. P. J. Reynolds

Editor: R.C. Brooks

Peter H. Reynolds
Secretary

NEWS NOTES OF INTEREST

The Halifax Centre has a small library in its locker and is for the use of all members. It contains back issues of Nova Notes, other Centres' newsletters, some Sky and Telescopes, star atlases and a number of introductory astronomy books. At present we do not have a librarian, so any books borrowed are out on the honour system—you may keep them for a month at which time they should be returned to the locker.

We would also like to make a request. Any members who might have unused books sitting around the house collecting dust might consider donating them to our library. If we can get sufficient interest up in the library's use and if we can accumulate more books, a librarian could be appointed to direct and regularly promote its use. Although they have not yet been placed in the library, the centre has Journals of the RASC dating back to 1909. Some of these old issues have some very humorous (now-a-days) tid-bits. At the next meeting look for our locker and see if you can find a book that might interest you!

Slide sets available:

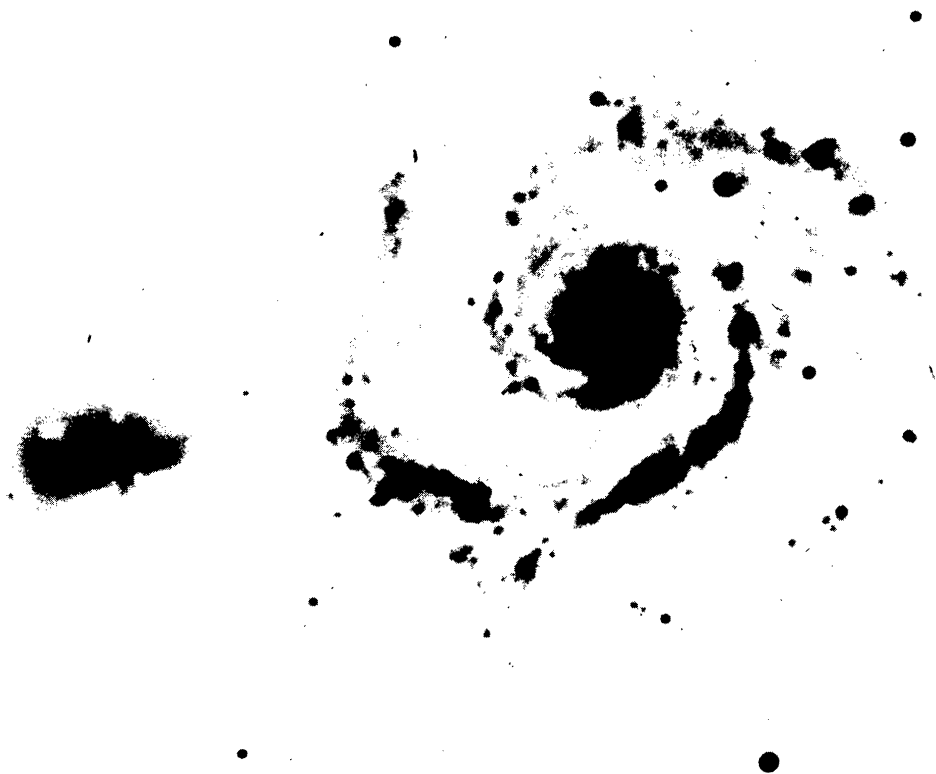
The Halifax Centre now offers Maritime teachers a small selection of slide sets for use in teaching units of astronomy. At present four sets have been prepared: 1) the Solar System 2) Mars 3) Stellar Evolution and 4) Galaxies. Each set includes a description of each slide and the last two which are intended for use in upper grades, have a commentary to help in the class preparation.

If you are a teacher and would like the use of these slides, send a note to R. Brooks, 71 Woodlawn Rd. Dartmouth B2W 2S2 stating the date required, the set you want and a cheque made out to the Halifax Centre, RASC for \$10. This deposit will be returned unashed when the slides are returned. If the response warrants it, we will expand the sets available. We are quite anxious that this service be used, so please pass the word to your teaching friends.

Photos for NN's:

There appears to be competition between RASC centers in recent months to make their newsletters of higher quality than the one next door. As Editor of our scandal sheet, I keep close watch of their progress. I have noticed a correlation between the vitality of a centre (measured by the increase or decrease in membership) and the quality of the groups publication. Ottawa's is consistently readable and Edmonton has some great stuff and has been to their credit. With Vancouver and Montreal making advances recently, I as Editor, in an effort at one-upmanship, with this issue will begin printing photographs with articles. Those which you see in this issue are primarily for test purposes and I would like your favourable or not so favourable comments. It may take some more experimenting to perfect the results so bear with me and if possible send me some material. Photos submitted should be of moderate contrast and fine focus and if possible the negative should be sent as well. The photo must be printed to give a series of dots and this inevitably leads to loss of detail similar to that observed in newspapers. I will not promise to print all photos for either quality or copyright reasons. On the last point, I am particularly interested in printing your own work not reprinting already familiar pictures. All photos submitted for publication should reach me a week before the printed deadline for articles each month to allow for the additional work in copying them.





Wender of wenders, an Editorial!! Last year at the Calgary General Assembly, Jay Anderson of the Winnepeg Centre presented a motion concerning the monies realized as a result of the National Headquarters sale in Toronto. (The motion can be read in the August Journal p.197) As a result of the motion, a committee was to be set up to consider the RASC's future and financial position, their report to be brought before the '77 Assembly for consideration. This meeting to be held in Toronto next June, may see a dramatic turn in Canadian astronomy organizations and the roles they fill for public and professional astronomical needs.

Before I present my views I wish to reprint portions of an editorial written to the Edmonton Centre's Stardust. It is part of a second editorial (the first and a reply can be read in the Sept. issue of Stardust which may be found in the Centre's library) but space obviously limits the amount I can include.

....."In his rebuttal Alan Dyer makes the comment "what we never need in the RASC is some sort of polarized split between professional and amateur ranks in astronomy". He then accuses me of overtly promoting this. Mr. Dyer is right - though I would hope that my intention is not so well hidden as he would indicate

"There is, and has been for some time, a vast gulf between the scientific abilities of the amateur and professional astronomer - a gulf which was not present when the RASC was originally formed at the turn of the century. Today we have in common with our more educated colleagues only our mutual love or interest in the stars. This gulf, I am convinced, is responsible for a large part of the current stagnation in the RASC - a stagnation which is well mentioned in Alan's rebuttal. We are guided by men who have no idea of our problems and who expend little or no effort to learn of them.Mr. Dyer states that the pro's and amateurs "get along well" in Edmonton, but what is the extent of that co-operation? Do they expend very much effort than is necessary to lecture occasionally to the assembled masses, or do they

take an active part, as much as your more dedicated members, in the activities of the club. If your Centre is anything like ours, the professionals attend meetings only occasionally, and rarely present themselves at any other functions.

"Astronomy education in Canada has been passed from the university professional to the planetarium, and Alan should be aware of this. Here in Winnipeg our biggest hinderance to the completion of our new observatory has been the astronomy department of U of M, and yet some of them have been our biggest help.We foolishly continue to elect a leadership which does not reflect our own best interests. Alan is right in stating that we have only ourselves to blame.

"Many years ago the BAA split with its professionals for reasons similar to those I have outlined above. I am sure their working arrangement with British astronomers is no less effective than ours. We need an organization of amateur astronomers only, for the same reason that the Canadian Astronomical Society has been set up for professionals only. Professional astronomy has phenomenal vitality in Canada, but the opposite is true for ourselves.

"Alan completely vindicates my comments about the Journal, when he admits to not reading the technical material - but his desire to go on publishing it anyway is not the answer. The Journal is one of the most expensive items in our national budget, and it must then reflect the abilities of our membership. If we get no articles from our membership, then hold publication until we do. I may be too optimistic, but I think that those items could soon be forthcoming. The Journal should become as much a house organ as Stardust.

"If, as Alan says, the RASC is foremost an amateur organization, then let its internal constitution reflect that fact. Let's become an organization of amateurs for amateurs, instead of amateurs for professionals.

"A part of this goal can be achieved by passing the motion introduced at the Calgary Assembly.....But whatever, lets bring the amateur to a preminent place in the RASC.

Jay Anderson

continued.....

Although I do not subscribe to many of Jay's arguments, there are some truths to his statements and I have included them to provoke your thought and comments and as a way to lead into my comments.

The RASC is a unique organization which has been strong in the past because of the balance of inexperienced amateur and experienced professional astronomers. I suggest that without professionals to guide certain aspects of our organization--such as the Observer's Handbook--we will lose a strong cohesive force binding us together. The RASC survives as a national organization and as an important force in Canadian Astronomy because of the Journal and Observer's Handbook--something which is lacking in the Astronomical League in the US, a loose confederation of strictly amateur groups. The Astronomical Soc. of the Pacific is one society Jay should investigate. It, like the RASC, has a large proportion of professionals in its top ranks. Unlike the RASC (at present at least) it has defined its objectives precisely and the professionals are vigorously trying to achieve these goals and succeeding.

Public education is far from the minds of Canadian professionals (and planetarium staffs!) and this reflects itself in the state of the RASC. Professional astronomers are preoccupied with CASCA, formed five years ago, and the paths of the two groups are about to cross and unless the RASC makes some drastic changes we will be the losers. Before long CASCA will, I believe, attempt to create its own professional journal as many of its members do not feel the JRASC in its present form and outlook, meet their requirement. They like the RASC operate with assistance from the National Research Council (the Journal receives support to the tune of something like \$50,000 annually) and the RASC may well lose this financial aid to CASCA. At present, the Journal is satisfying neither the needs of our amateurs nor professionals. Hence I suggest the RASC and CASCA should cooperate in setting up a two tier membership system on the lines of the ASP - a technical membership and regular membership. In this arrangement the professionals subscribe to their Publications and as well receive Mercury,

and those not desirering the technical part can elect to receive Mercury only which is more interesting to amateurs than is the Journal. The professionals in the ASP are doing a first class job at public education but in Canada lack of and/or conflict of interest has and will continue to create problems for our Society.

Jay's comments concerning the stagnation of the RASC may well held in Winnipeg, but in a few (4 or 5) Centres, including Halifax I hope, this is not the case. But to avoid it requires at least some interested people willing to try new ideas and generally to push the ball rather than let it roll by itself. The RASC national leaders have not since I have been a member, instigated any public educational programs or given any leadership along these lines in national wide endeveurs. An expanding membership is required to keep fresh ideas and energy flowing. Programs to interest and attract public contact with the RASC must be instigated immediately and the theory that infests the upper echelons of our Society that we are not for uninitiated astronomers must be changed.

Finally some recommendations and observations.:

- 1) professional astronomers are essential to the progress of the RASC--however, we cannot leave them to their own devices but must vocally indicate to them (if we elect them to national or local office) where we want the Soc. to head. They can be a curse and hinderance or one of our best assets, BUT when elected they must understand they are primarily working to advance amateur astronomy and public knowledge of astronomy in Canada.
- 2) the RASC must have a solid national publication of interest to amateurs and the public and devoted to public education. It should be a magazine of non-technical review type articles, keeping articles of local or limited interest to a minimum.
- 3) the Journal should become the journal of the RASC and CASCA with a new format and of a more highly technical nature. CASCA would have majority control of the editorial policy. RASC members could subscribe for an additional fee.

4) The Observer's Handbook should remain an RASC publication in essentially present form.

5) The monies from the headquarters sale should be funneled into national public education programs, small amounts (less than 30% of the total) going to centres to promote and carry out these programs in their area. Under no circumstances should the centres receive money without strict guide lines as to what it may be spent on.

6) the constitution should be rewritten to specify more concisely the aims of the RASC and it should be expected and demanded of our National Officers to vigorously strive towards achievement of these goals. Provision should be made in the constitution for more frequent change of officers and centre representatives should be required to report on Council meetings to their Centre or such reports should be made in the National Newsletter by the President. (By the way, have you noticed the number of editors, assistants or what-ers required to glean articles from Centre newsletters?? I should be so lucky to have so much help!!)

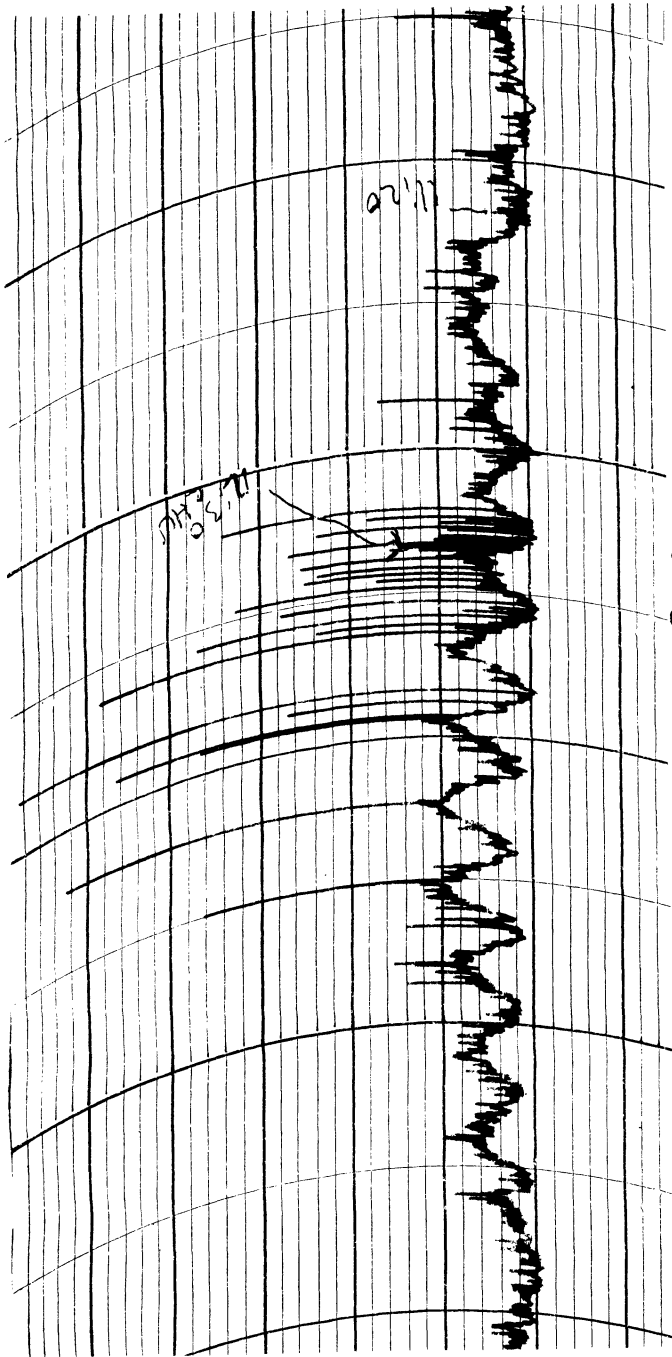
7) the stagnation of the RASC on the national level is due to the cliquish Toronto group who insist on keeping control in Upper (sic) Canada as if they owned it by divine right. On the local level this handicap can be overcome by a few active members and has been in a few places.

Your opinions please!

RADIO ASTRONOMY AT SAINT MARY'S

W.P. Lonc

If you happen to be in the vicinity of Saint Mary's University and if you happen to look up at the top of the Administration building (Robie St) you will notice two largish parabolic reflectors on an east-west baseline and tilted at an elevation somewhere between the southern horizon and the Zenith...this is a two-element interferometer currently operating at a frequency of 260MHz (1 meter) and receiving radiation from the sun at this frequency. The system was built as part of a Master's thesis research project by Marty Zatzman under the combined direction of Drs. David Dupuy and William Lonc, SJ. Modifications and additions are currently being made to this radio telescope installation so that simultaneous observations of solar radiation at 1, 2 and 6 meters wavelength can be made, the objective being to obtain data on sun-spot and solar-burst activity. On the basis of the data, which includes a measurement of the time-difference between observations made at these different frequencies, calculations can be made pertaining to some of the dynamics on the solar surface region. The diagram below shows a fairly typical observation with the interferometer as observed this past summer. Note that the fringe pattern is for an unresolved source... in other words, at this frequency and at this spacing between the reflectors, the whole system 'thinks' that the sun



Interferometer Tracing

With the dishes 15m. apart and tuned to 1.2m wavelengths, the above tracing was obtained 12 July 1976. The signal from each dish are combined to create the sinusoidal patterned observed. These can then be analysed to determine some of the dynamics of the Solar surface. This tracing covers a $4\frac{1}{2}$ h. period centred about noon.

is a point rather than a disk! Plans are underway to make observations at much shorter wavelengths (i.e. 3cm) so that the present spacing (18 m) will result in a resolution of 5 or 6 minutes of arc, which should then produce a quite different fringe pattern. Anyone interested in taking a closer look at the installation should contact Fr. Long at 425-3210, who is working on the modifications mentioned above.

(page filler)

For those interested in amateur radio astronomy, there is a relatively new journal being published, called 'The Radio Observer'. It is published quarterly, began this very year, and a subscription costs \$3 per annum from: The Peterson Press, 657 Circle Drive, Santa Barbara, CA, 93108.

TELESCOPE RAMBLINGS

Of Railways and Copernicus

As a child on a train at a busy station I first became aware of one facet of the subjective nature of vision. For eleven years I had accepted my view of the external world as an accurate, objective record of the way things were. Now, for the first time, I realized that my brain profoundly influenced what I saw. The train I was on began to move and proceeded to gather speed. As it came out past the end of the last car of a train on the next track, everything suddenly froze with a silent crash — there I was, still at rest beside the station! It was the other train that had left.

Copernicus brought the silent motion of the celestial sphere to a crashing halt. Yet although most people today will admit that Earth turns on its axis, as far as our senses are concerned this is still an unreal, unexperienced idea. Our speech mirrors the way we interpret the world and is full of familiar, comfortable expressions such as: The Sun is rising; When does the Moon go down?; What a beautiful sunset! We are still pre-Copernican in our automatic, everyday perception of Earth and sky, and have no right to feel superior to men like Ptolemy or Aristotle.

Twenty-seven men have had the enviable opportunity of backing off a light-second or so to look down at our turning globe, but the rest of mankind must forgo this perspective. However, there is at least one easily arranged situation that has an impact comparable to

that Apollo view. It involves the sublime spectacle of the "rising" Moon when it is near the full phase. In order to experience the effect several conditions should be satisfied:

- (1) Some part of the distant horizon should be silhouetted against the Moon. (This makes the motion easier to detect.)
- (2) The view should be as natural as possible: upright, correct left-to-right, visible to both eyes, and in the direction of the Moon itself. (In presenting an interpretation the brain is influenced by the orientation of the observer's body relative to the visual scene. Hence it is desirable that this correspond closely to reality.)
- (3) The Moon should occupy an appreciable portion of the field of view. (In instances where two objects differ greatly in size, the brain seems to insist that the larger one is stationary.)
- (4) A moderate amount of magnification should be used so that there is a dynamic sense of movement. (Otherwise there can only be an inferred movement based on a noticeable change in position over an appreciable time interval.)

Condition (1) requires a suitable observing site, a clear sky, and proper timing. (2), (3) and (4) can be satisfied by using binoculars, preferably of greater magnification than the usual 7x or 8x variety.

A few weeks ago on a clear, peaceful evening, I checked the R.A.S.C. Handbook for the time of moonrise [sic] , mounted my 15x60

binoculars on a steady tripod, pulled up a stool for comfort, and watched as a distant hillside of spruce trees seemed to burst into flames as the Moon came into view. With the above four conditions satisfied, it required only a gentle mental nudge to switch my brain to a post-Copernican mode. At once, and without further effort of thought, that hill of trees was actually dropping, and I had an impulse to reach out for support as the ground tipped beneath me. For a few priceless moments I was really riding on a planet, the surface of which was silently and ponderously dropping eastward.

Roy L. Bishop
Maktomkus Observatory

Bruce Terquemada

In a recent press release (dated October 20, 1976) the U.S. Navy has announced a new observatory completed, the Lake Pahoe Naval Observatory. The LPNO's main telescope, a 2 metre, is located deep in Southern Colorado far from outside interference and will be used initially for high galactic latitude studies in Cepheus and galaxy cluster studies in Pisces.

Lake Pahoe is in the mountainous Lake Pahoe National Park and so LPNO is obviously well suited since no towns or cities will ever be built nearby, an occurrence which has plagued many observatories. And being located deep in a valley has advantages too, although the zenith angle range of observable objects is necessarily small.

The USN undertook construction of the telescope at the bottom of the crystalline lake 28 months ago and many problems were encountered during construction. For example the concrete took an inordinate amount of time to set, several welders and electricians were given severe shocks, and the wood used kept floating away from the carpenters.

Edwin Bubble, director of the LPNO, also stated that in the darkroom it is difficult to mix chemicals to proper dilutions and spectra of stars tended to show huge amounts of H₂O absorption. However, balancing is extremely easy and the RA drive can move very slowly because of the light refracting through the lake. Morale is very good among the astronomers at the observatory, mainly because they are all fond of the funny voices they have at the 130 ft. depth.

The novel positioning for the telescope came about by accident when a jet cargo plane transporting the mirror for a second, 1 metre, telescope developed engine trouble while crossing the National Park and crashed into Lake Pahoe. When astronomers were preparing rescue operations with USN frogmen, however, the advantages of the site became obvious and it was decided to build the entire observatory at the bottom

Another LPNO staff member, Subashree Chandrasekhar, likes the way it is possible to get a snack of trout anytime one wishes by merely going to the darkroom. This room seems to have a strange fixation for the fish for there is always a large group of them around. (Pike, however, are a problem as they tend to eat the print paper, preferring Kodabromide 2, matte, and perch try to nibble the emulsion off 103aD plates during exposures.)

The seeing from LPNO is usually excellent but occasionally the lake's surface becomes a bit choppy, which can out seeing down to about 15 minutes or so. It was discovered early that a new type of photography was possible in poor seeing: short exposures of stars gave spotty images with a wealth of detail lost in longer exposures; the name given to this is speckled-trout photography. Winter seeing is best for then a sheer ice layer coats the lake and when the ice is snow free the images captured are, as Carl Sunkin said, "the clearest I've ever seen. Uh...Is this being taped for TV?"

A few things are still uncertain as yet about this observatory. How the continual wetness will affect the aluminum on the mirror is one, another is that astronomers taking plates longer than 2 minutes tend to drown. (So far only graduate students and post-doc fellows have been used to avoid loss of valuable people). A third problem is using the p.e. photometer without having the high voltage power supply electrocute anyone. But these are minor problems and worries expected to be resolved soon, and it is felt by LPNO staffers that their telescope will make valuable contributions to astronomy now and in the years to come.

(Note to Sky & Telescope readers, a photo essay on the LPNO is to be presented in an up and coming issue, being 'specially produced at this moment by Jacques Cousteau.)

WESTERN WASTES OF CHRYSÉ

-Bill Calnen

Since July 20, 1976 Viking A is in an upright position and performing its proposed functions. It was greeted by cold and deserted western wastes, softly rolling landscape with reddish soil and scattered shades of brown and red rocks. The wind was light and the sky was a beautiful pinkish orangy hue. To the south and east lie dunes, surrounded by fields of light and dark boulders. In the north lie dunes, sand patches and a possible crater rim; to the west lie sand piles, surrounded by rock fields. The soil itself is much redder than the rocks, this explains early theories why Mars is red.

Chryse can be described as a red desert at this point. Larger rocks have their surfaces weathered constantly, exposing their light and dark brown color. The smaller particles of rock material are beaten down to fine soil particles by the environmental agents. The small grains, made of individual mineral crystals are stronger and more resistant to erosion. (The agents responsible are causing ferric iron minerals to weather and oxidize to a reddish color.)

At dawn the temperature remains low at minus 87⁰ Centigrade; by noon the haze has lifted off and the air warms to minus 30⁰ Centigrade.

The Viking A lander dropped in for its visit in the afternoon at about 4:00 local Martian time, while Earth was waiting for the first portrait of the Martian surface. It showed a region of gravel near the Viking footpad.

The first photograph was missing the Martians, the deserted cities, and strange plants which science fiction romantics wrote of in the past.

The picture showed typical patterns from prevailing winds. Based on the camera geometry, the largest rocks

in the first picture are estimated to be four to six inches across. The rocks revealed pits and cracks as well as flat angular surfaces that may indicate the rocks were broken by the action of severe winds or dust storms. The patterns of partially buried rocks suggest that this surface has been built up by wind added soil layers.

Viking A Orbiter showed photos of Chryse plains that may be lava plains or similar to the lunar maria. It is a possibility that water may have flowed over them in the past. Large and small gullies may, scientists claim, be caused by water erosion, but more recently wind and dust storms have played a dominant role. As fine dust is blown away, the heavier rocks are left behind, while dunes have accumulated in other areas and gullies may have been filled in. The surface seems quite firm because lander's number three footpad penetrated the surface only about 3.5 cm.

Viking B lander reveals ice at the edge of the north polar cap. Viking B reported that this region mostly contained frozen water not just carbon dioxide, commonly known as dry ice. It was previously discovered that there is at least some water vapor in Martian atmosphere. But now we know that there are massive amounts of water frozen into the north polar cap. Viking B detected permafrost at its landing site 48 degrees north of the equator. The Orbiters will be able to observe the north and south polar caps growing in the winter and shrinking in the summer. The presence of ice may fit the description as to why the planet has great channels, canyons and riverbeds that appear to have been carved by water on the dry Martian surface. Scientists theorize that the portion that swells and diminishes consists of carbon dioxide which vaporizes into a gas in the comparative warmth of a Martian summer, but the vast bulk of the polar caps which remains constant is frozen water.

There is no life in the latest soil sampling experiments carried out by the Viking B lander confirming the earlier A results.

Summer is now present in the Northern Hemisphere where Viking A and B landed. The planet's thin atmosphere is relatively calm but by next April Viking Orbiters will

provide scientists with photographs of the surface during times of violent dust storms. From these photos scientists will determine how these storms change the Martian landscape and to what extent.

The United States government has given NASA the go to extend their exploration of Mars into the summer of 1978. This will allow scientists to watch Mars closely during the full period of the Martian year, (687 Earth days).

In 1981 NASA plans to send another Viking craft to Mars. Viking C will probably carry a roving robot to explore places where Viking's cameras are unable to detect.

Dr. Carl Sagan reports,

"We need to land on safe places and then rove to interesting places. Such a mission could rove to its own horizon each day."

A LAST AND FINAL NOTE

The old planetarium of the N.S. Science Museum which used to reside on Spring Garden Road, is now finally and irrevocably deceased. As a result of some recent inquiries by the Halifax Centre, the Museum, in its (not so) infinite wisdom, has decided that the planetarium projector is now part of their historical artifacts collection and will never be used again except as a demonstration in a new planetarium facility. Their decision was based on the fact that the instrument was the first public planetarium in Canada it having been aquired about 1953/54.....You mean I'll considered of historical interest too? I satisfy those meagre requirements anyway. Shall we all say a prayer for our deceased friend.

- Anderson, J. Editorial 135
- Bishop, R.L. Telescope Ramblings 4,17,29,67,90,99,143
- Beschat, M. Guide to Meteors and Meteorites 57,87
- Besum, R. (Perlo) 6,17,28
- Brooks, D. Atlas Review-4 69 Lunibin '76 12,46
- Brooks, G. Personal Equation in Astronomy and the Rise of Experimental Psychology 40, 53,117
- Brooks, R. Colour Accuracy in Astrophotography 14
Editorial 135; Focus on Telescopes 62
Newest Discovered Neighbour 93 Observing
Planning Aid 83; Recent Books on Mars 79
- Calmen, B. Some early Viking Results 104; Story of the Catadioptic Telescope 85; Western Wastes of Chryse 148
- Coldwell, L. Binoculars for Celestial Viewing 36
- Cunningham M. Have You Read? 45
- Edwards, M. Lensless Schmidt 112; Notes on the Solar Wind 18
- Edwards, P. The Great Kearney Lake Meteorite 26
- Kennedy, J.E. Royal Observatory at Greenwich 7
- Reynolds, P.H. Minutes Nov-75 10; Dec-75 24; Jan 24
Feb 52; April 74, May 75; June 96; Sept 130; Oct 131
- Terquemada, B. A New Theory to Explain UFO's 109
New Observatory Opened 146
- Comet 1976(d) 126
- Comet West Positions and Map 20; First Observation 33
- From The Centres- Anderson, J. Editorial 135
Amin S. New Type of Telescope 124
Salmon R. Hydrogen Hypersensitization 80
Semers D. Calculating the Mass of the Galaxy 80
- Halifax Centre Members 47
- Meteorites--the Easy Way to Make \$100 101
- Notes--Astrophotography - Increase II 66; Grinding
Compounds Source 103; Library 132;
Photos for NN's 133; Slide Sets 132
- Observing Reminders 22,50,72,94,128,152
- Steady State Astronomy 92,127
- Vancouver Centre Eclipse Trip 34

OBSERVING REMINDERS

- Tues. 16 Nov. - Leonid meteor shower under a favorable third quarter moon. The spectacular display of the '66 edition is not expected.
- Sat. 20 Nov. - Occultation of Uranus possible about 2 AM
- Sun. 28 Nov. - Comet Pons-Winnecke at perihelion but unless you've booked time on the U. of T. 74", you aren't about to see it so why not go to the local and celebrate with 1.24 beers--its perihelion distance on this auspicious occasion.**
- Sat. 4 Dec. - Possible occultation of Jupiter--the UFO addicts might have a field day with this one but you, being all knowing, can watch the event with deeper understanding.
- Mon. 13 Dec. - Geminids with the Moon again at Last Quarter. 50 meteors per hour may be able to keep your interest up but an electric blanket will keep you from freezing up.
- Fri. 17 Dec. - If you missed the occultation of Uranus Nov. 20 then look this one up or is that look up at this one.
- Tues. 21 Dec. - Winter Solstice at 1:36 in the Afternoon. Sun's position is R.A. 18^h Dec -23°
- Wed. 22 Dec. - Ursids under a nearly new Moon.
- Fri. 24 Dec. - With nothing else to do Christmas Eve you could go out to watch the grazing occultation of BD 10° 5714 (mag. 7.3)
- Tues. 4 Jan. - Quadrantid meteors will be more rewarding than the Ursids.

** Or you could wait until aphelion and have a real celebration.

Notice of Meeting	129
Minutes of the September Meeting	130
Minutes of the October Meeting	131
Notes: Centre Library	132
Slide Set Library	132
Photos for NN's	133
Editorial: The RASC--What's its Future ..	135
Radio Astronomy at SMU; W.P. Long	140
Telescope Ramblings; R.L. Bishop	143
New Observatory Opened; P. Torquemada ...	146
Western Wastes of Chryse; P. Calnen	148
1978 Index to NN's	151
Observing Reminders	152

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