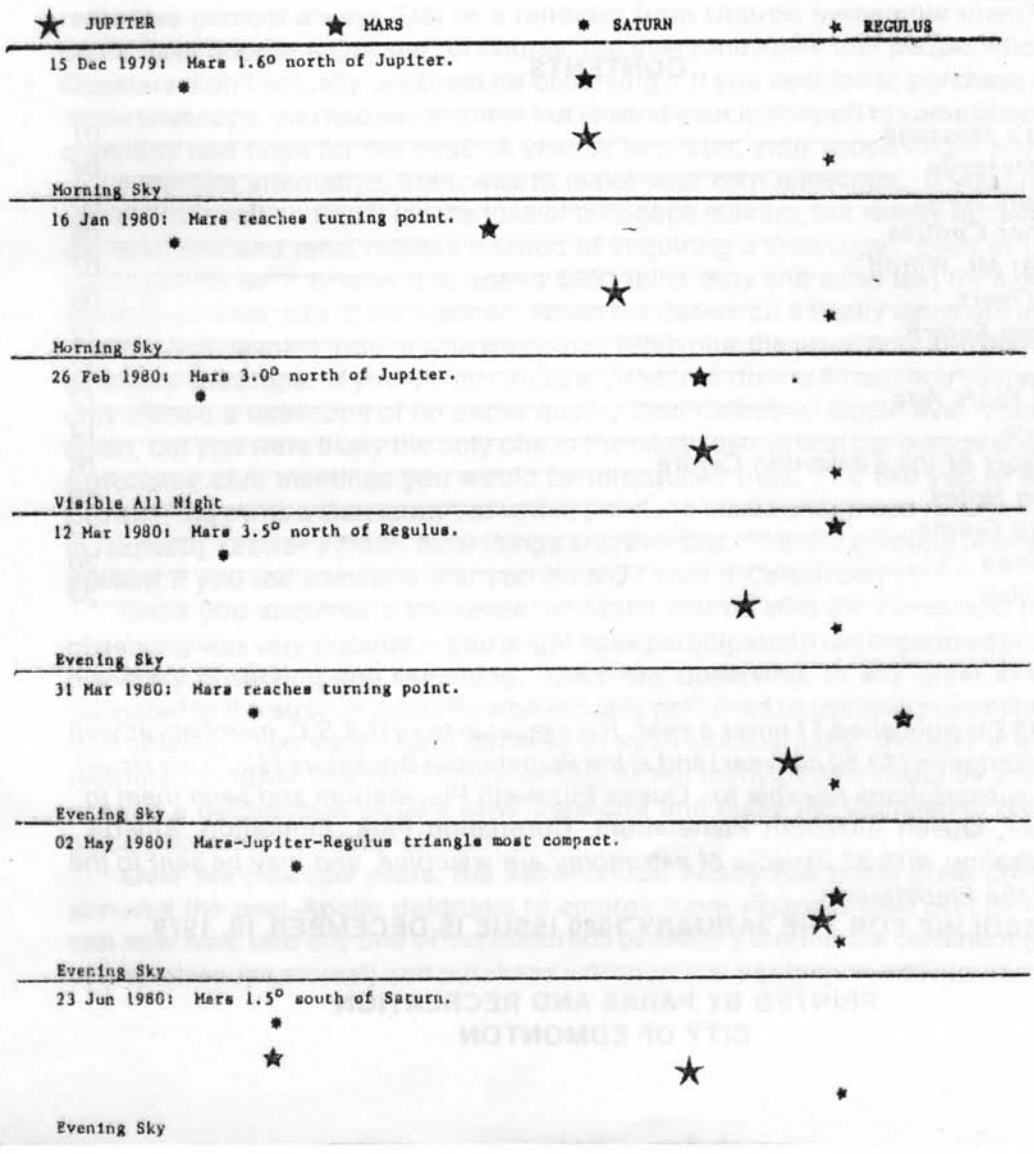
STARDUST

Vol 25 DECEMBER 1979 No 02

35¢ per copy $3.50 per year



STARDUST
December, 1979
Volume 25, #03

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STARDUST *is published 11 times a year. It is available to all R.A.S.C. members as well as by subscription ($3.50 per year) and at the Planetarium Bookstore ($0.35 per issue). Make all subscriptions payable to:* Queen Elizabeth Planetarium *and send them to:* The Editor, Queen Elizabeth Planetarium, Coronation Park, Edmonton, Alberta. *Articles dealing with all aspects of astronomy are wlecome, and may be sent to the Editor at the Planetarium.*

DEADLINE FOR THE JANUARY 1980 ISSUE IS DECEMBER 10, 1979

PRINTED BY PARKS AND RECREATION
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PRESIDENT'S MESSAGE

Amateur Astronomy in the 1980's -- Think back a mere 10 years, to the turn of the current decade. What was the state of amateur astronomy in 1969/1970? The first issue of ***ASTRONOMY*** magazine was still three years away, while a rather drab looking ***SKY & TELESCOPE*** had a paid circulation of 48,000. Celestron Pacific (as it was then called) had not yet begun to manufacture the C-8. In a commercially made telescope you had a choice of several traditional Newtonian reflectors (almost always F/8) or a refractor from Unitron (remember them?). (You could have bought a Questar, of course, but everyone knew that people who bought Questars didn't actually use them for observing!) If you decided to purchase a ready-made telescope, you had no recourse but to send your money off to some obscure U.S. company and hope for the best. A year or two later, your scope might arrive.

A definite alternative, then, was to make your own telescope. If you chose this route, it was not so much for the love of telescope making, but simply because it was the cheapest and most reliable method of acquiring a telescope. Even in 1970, not many people were prepared to spend $600 (plus duty and sales tax) for a deluxe 8" Newtonian from, say, Cave Optical. When the Celestron 8 finally came out in 1971, it was the rich devotee indeed who would pay $850 (plus the usual duty and tax) for such an exotic telescope. If you did purchase a Celestron during those early years, you not only owned a telescope of far better quality than Celestron would ever manufacture again, but you were likely the only one in the city to own one of the orange scopes. (At astronomy club meetings you would be introduced thus: "I'd like you to meet Joe Brown -- he owns a Celestron", at which point the membership was required to kneel in respect!) *(Editor's Note: Now things are reversed. There is a feeling of amazement present if you tell someone that you do* ***NOT*** *own a Celestron!)*

Once you acquired a telescope, what did you do with it? Lunar and planetary observing was very popular -- you might have participated in an organized program of planetary observing and sketching. Deep-sky observing, to any great extent, was relegated to the strange minority who actually preferred to use low-power short focus instruments. You might have dabbled in astro-photography, thought it was likely restricted to lunar and planetary shooting as not many people could be bothered to acquire a guidescope, build a drive corrector and make the illuminated reticle eye-piece necessary for deep-sky work.

Over the past few years, the astronomical hobby has made great progress. It survived the post-Apollo doldrums to emerge more vigorous than ever before. You can now walk into any one of the hundreds of dealers around the continent (imagine, actual telescope stores!) and purchase astronomical equipment and literature to your

heart's content. ***ASTRONOMY*** magazine now boasts a circulation of 100,000, while the venerable but now very colourful ***SKY & TELESCOPE*** is at the 75,000 mark. We also now have a third publication, ***STAR AND SKY*** entering the market.

Astronomy is now a big business -- it is no longer only the eccentric who spends over $1,000 for telescope gear.

The hobby is more popular than ever -- think about the numbers of people who descended upon the path of totality for the February 1979 eclipse. Compare **that** event to the solar eclipses in 1970 and 1972. Were Mexico, the NorthWest Territories or Nova Scotia any less accessible than southern Manitoba in mid-winter? Yet, in the early 1970's, it was the devoted amateur indeed who made the trip all the way across the continent to see a solar eclipse.

What does the next 10 years hold for astronomy? Interest in the subject will continue to grow, though there is the danger of another slump in the mid-1980's due to a lack of planetary space probes and a space shuttle program which, by then, will be routine and unexciting. Oddly enough, the one boost that the space program needs most -- the development of permanent space stations and solar power satellites -- is the development that ground-based astronomy needs least, due to the increase in light pollution that would result from large reflective orbiting structures (not to mention the radio pollution from the microwave power beams). By the end of the 1980's, we may see a resolution of this astronomical dilemma, though perhaps not to everyone's satisfaction.

The problem of light pollution will become a prime issue amongst amateur and professional astronomers, with both of these groups becoming much more "militant" in their campaigns to convince civic authorities of the advantages of decreased street lighting. As astronomers, we'll have the deepening energy crunch on our side.

One factor that will contribute to the continued growth of the hobby will be the ready availability of at least one (if not all) of the astronomical magazines on the newsstands. You will be able to walk into your local drugstore and pick up a copy each month of your favorite astronomy publication. More people will discover the hobby in this manner; subscriptions will cease to be the major means of distribution for the general interest periodicals, since the mail service is certainly **not** going to improve! (As a current example of how astronomy magazines will eventually be distributed, check ***OMNI***. How many of you purchase that magazine each month? Yet, how many of you subscribe to it, or even intend on subscribing? Far fewer than buy from the newsstands, I suspect.)

The membership in astronomy clubs will also continue to increase over the next few years, though not at the same rate as the hobby itself. Many amateurs will prefer to pursue their interest in relative isolation from organized clubs and activities. As the information from magazines becomes more readily available and as planetariums increase their offering of astronomy courses, the need for someone to join a club just

to learn about astronomy will decrease. Nevertheless, people will continue to find club membership a satisfying adjunct to their hobby since it will provide them with a means to share their interest with others. But clubs will have to work much harder to reach these people through whatever public education programmes they can devise to advertise their existence.

During the 1980's the manufacturers of telescope equipment will become much more professional, geared to high volume business. The days of the basement operation producing units only to fill specific orders are numbered. Amateur astronomers will refuse to be kept waiting months on end for delivery of items that should be off-the-shelf. Some of the companies that have been around for years will have to change their production philosophy drastically or else go under, victims of a very competitive market. Some of the Japanese camera manufacturers may enter the market in a big way, though as long as they insist on producing refractors (and as long as the yen remains high while the dollar low), their impact will be mild.

As the telescope industry expands, consumers and manufacturers alike will begin to demand an objective set of standards by which various instruments can be compared, eliminating false advertising claims and giving the purchaser some assurance that his equipment at least meets certain minimum specifications. This will help to end such arguments as: "Which is better, a Dynamax or a Celestron?" or "Is a Questar really that much better?" It will take the mystery out of purchasing what is essentially a very simple mechanical and optical device, one whose parameters can and should be defined largely by measureable specifications. This approach will lead to the inevitable publication of test reports in the astronomy magazines. Camera and stereo equipment are subject to these sorts of tests in the photography and hi-fi hobby magazines. The astronomical hobby will soon follow suit. We are already seeing a growing consumer concern in amateur astronomy, as is evident in some of the amateur newsletters. The pro magazines will eventually pick up on this, though in a manner that doesn't offend manufacturers and cost them advertising dollars.

Telescope dealerships will, of course, proliferate, with the first astronomical chain stores starting up within a few years. (Whether they feature big golden arches with a sign outside boasting "Over 24 billion Celestrons sold" remains to be seen!) The astronomy stores will likely evolve into general science/computer/electronics stores with additional emphasis on a well-stocked section of science books, something that most conventional bookstores lack. *OMNI* has shown that there is a market for science and technology; soon stores will begin to cash in on it.

Amateur astro-photography has made great strides in the past few years -- the type of results that are considered commonplace today were considered remarkable achievements only a decade ago. The next revolution will come when the charge-coupled device technology filters down to the hobbyist level. As in every other aspect of life, electronics is going to change the face of astronomy. (We're already seeing the

prototype versions of the microprocessor-controlled amateur telescope, but how about a portable flat-screen electronic star-chart, with several hundred finder fields in its Read Only Memory?)

But what of astronomical events in the 1980's? Will we see the long overdue supernova? It would be the biggest single event in amateur and professional astronomy, but it would be just our luck to have it occur in the southern hemisphere sky! On the other hand, Halley's Comet is going to be the biggest disappointment since Kohoutek, and it isn't too soon to begin to advertise that fact right now. But we can expect at least one bright comet-of-the-decade in the next few years, and the interest it will generate will be enough to keep planetariums, observatories and astronomy clubs busy for several months. (As long as it doesn't blaze forth immediately after the spring, 1986 opposition of Halley's Comet!)

In conclusion, I think it is safe to say that at the **beginning** of the 1970's, the public's interest in things astronomical was at a low ebb, while at the **end** of the decade it is all everyone in the business can do to keep up with the public's demands for astronomical knowledge and merchandise. I believe that the RASC, and in this city the Edmonton Centre, the Queen Elizabeth Planetarium and the University of Alberta can all be very proud of contributing to that trend. I, for one, am looking forward to the next decade in astronomy.

Alan Dyer

EDITOR'S MESSAGE

Well, here we are with the last issue of 1979 -- the last issue of the decade known as the 1970's. Many things have changed over the past 10 years, including the Edmonton Centre of the R.A.S.C. I doubt if, in 1969, anyone would have thought that the Centre would be meeting in the Centennial Library because there were too many members to fit into the lobby of the Queen Elizabeth Planetarium. It is also unlikely that anyone would have suggested that ***STARDUST*** would be typeset and Xeroxed **at no cost to the Edmonton Centre!** Now if only we could find a friendly printer.....

There are several points I wish to bring up at this time. First of all, the Xerox 9200 (upon which this newsletter is copied) is being replaced by the City. I have never heard of the machine that they are bringing in in its place, but I do believe that it will do much the same functions as the 9200. The January ***STARDUST*** will be run off on the new machine, and at this point in time I have no idea whether the quality will increase, decrease or remain much the same.

Next, I am requesting that all submissions for the January issue be passed on to me as soon as possible after the December 10 meeting. This month will be extremely

busy for me, and I would like to have ***STARDUST*** finished (ie typeset, copied and mailed) before Christmas. Therefore, anything received after the 14th will have to wait for the February issue.

Elsewhere in this issue you should find a list of names. These are all the paid-up members of the Edmonton Centre as of November 24th, 1979. If your name is not on the list, you will **not** receive a January ***STARDUST*** because it will mean that you are no longer a member of the illustrious Edmonton Centre. While this is, naturally, a sad state of affairs for you (since you will also not receive the other publications of the R.A.S.C.) and for the Centre (since your support will be lacking), it will be a happy time for me because it will be one less name on my ever-increasing mailing list. So...why not make me miserable -- sign up for another year!

Finally, a comment regarding Alan's column. I think you will agree that he has given the subject of astronomy in the 1980's a fair amount of thought, with the result being a very optimistic outlook for the growth of the hobby. But I wonder if any of our resident cynics out there in RASC-land have a different viewpoint (ie. the collapse of the hobby due to various economic/social pressures). If so, I would like to hear from you -- either in time for the January issue, or for the February newsletter. After all, it seems that **everybody** is busy trying to predict the future -- why not you?

As well as another reminder that submissions for the January issue are due on the evening of the December 10th meeting, I would like to thank Alan for lending a hand with the construction of this issue. The help is appreciated.

Paul Deans

PLANETARIUM NEWS

Alas and alack, we have lost our Chief Technician! Gary Finley has departed to take up residence in the workshop of the University of Alberta's Psychology Department. In addition to losing his skills in the technical areas of show production, we will also be losing our "resident skeptic". (There is some debate as to which is the more serious loss.) Nevertheless, we shall try to carry on redundantly. Knowing the speed with which the Royal Mail works these days, Gary's position may already be filled by the time you read these words.

Until the end of December, *The Case of the Christmas Star* is being presented in the Star Theatre. The show deals with the various theories that have been proposed to explain what celestial object guided the three Wise Men to the birthplace of Christ. However, our show is not a traditional planetarium programme in that the main character of our story is Inspector K.L. Metre (of the Yard) who is given the assignment of searching for the true explanation of the Star. The show could be likened to a radio

play with visuals, and the visuals are all original pieces of artwork done in 'cartoon' fashion. This will probably be the last year for this particular Christmas show -- we are planning to write and present a new version next year. The eventual plan is to alternate the different Christmas shows from year to year, so the Inspector may return to the dome a few years down the road.

Beginning January 12th is *EXPLORATIONS: A New View of the Solar System.* This is a planets show, with special emphasis on the results of the Voyager probes to Jupiter plus the Pioneer mission to Saturn.

Paul Deans

FROM OTHER CENTRES

Wanted: Good Astronomical Slides -- The Royal Astronomical Society of Canada maintains a collection of 35mm astronomical slides as part of its National Library. These slides are available for loan to Centres and individual members. They also form a potentially valuable reference and archival collection of astronomical photographs. The slides are housed in convenient trays in a sturdy cabinet, and we have recently checked, sorted and catalogued the slides on computer cards so that the catalogue can be easily updated and reprinted. An accurate catalogue should be available to Centres and members very soon.

Now is a suitable time to add slides to the collection. We are asking you, therefore, to consider donating two or three of your best slides to the collection. The slides can be black and white or colour, mounted in cardboard, plastic or glass (though some projectors have trouble with the latter). We would especially like slides with a special significance to the Society, to the amateur, and to Canadian Astronomy; amateur and professional telescopes and observatories; planetariums and museums; historical sites; Canadian astronomers, past and present, amateur and professional; Society and Centre activities; eclipses and similar events. We would also like **good** slides of astronomical objects.

We intend to be selective in what slides we accept, so send us your best! Include a brief caption, and the name of the photographer. The photographer retains the copyright; we will not allow your slide to be used for any commercial purpose without your prior permission. We are also willing to reimburse you $0.50 per slide for the cost of making the slide copy, if you specifically request it and if we accept the slide.

Please send your donations to: *Slide Collection*, Royal Astronomical Society of Canada, 124 Merton Street, Toronto, Ontario, M4S 2Z2.

John R. Percy

A NIGHT AT MT. WILTON

An icy rain filtered between the bright, orange streetlights which ringed a muddy hectare or two of clammy Yorkshire soil known as Wilton Park, Batley, England. And in the middle of this, towering above the cows and the shrubbery and the dwarf acacias, standing foursquare against the teeming rain, and at its uttermost pinnacle being fully half the size of a nearby streetlamp, two observers could dimly make out the mighty outlines of the Batley & Spenborough Astronomical Society Observatory.

Shivering a little -- surely not from the chilly wind, which whistled around like it had come straight from Fingal's Cave, but rather from awe -- two observers trod wearily through the mud to the entrance.

"Some grand clouds out tonight", shouted one to the other, over the gale.

"Eh?" said the other.

"Clouds. They're grand tonight!"

"Eh?"

"Never mind."

"EH?"

They reached the entrance, and the orange light played strangely on them; two hard bitten, dedicated men, products of the moors and the rocks, their hands and minds gnarled by much overtime at the local mills. Very Dickensian. They wrestled with the door for an hour or so, then:

"It won't open!" said one, the more logical and keenly perceptive of the two.

"EH?"

"I said it won't open, the lock's jammed again!"

"I think the lock's jammed," said the less keenly perceptive one.

They exchanged a glance. Clearly, the mighty, 15-inch George Ellory Queen Whodunnit telescope was not going to do much swinging into action tonight. The pair were saddened, for they were dedicated, and came up to Wilton Park daily to observe the wonders of the sky -- cumulostratus, stratus, cirrus and nimbus -- they'd seen them all.

They trudged home.

"Pity, there were some grand clouds tonight," said one. But his companion was listening even less than he usually listened. He was looking up to the sky, where, by a fantastic freak of nature, the clouds had parted momentarily, and in the gap, a tiny, frail, bluish light was shining. It persisted for a moment then was extinguished by a particularly fine component of the overcast sky.

"Did you see that! It was a light! In the sky! It was a star! It was a star!" He was aquiver with excitement. But his friend, more knowlegable, put him to rights.

"It was a seagull," he said.

Glenn Meyers, England

NEBULAR FILTERS

They have been called the biggest advance in amateur astronomy in 25 years. "See faint nebulosity in light-polluted skies!", the ads proclaim. Frankly, the hype made me suspicious. It seemed that these fancy bits of filter technology were developed solely to combat the malignant growth of another type of technology -- that of street lighting. Why pile more gadgets and geegaws upon more technology when surely the best solution to an artifically bright night sky was : a) reduce the effect of street lighting by eliminating the lights themselves (legally, I mean) or b) driving a sufficient distance away from the lights to truly dark skies, instead of observing under light-polluted skies that are artifically **darkened** by a filter.

However, I now find that I must change my stand. Nebular filters are every bit as amazing as the ads claimed, and likely represent the most significant improvement you could make to your telescope system for a relatively modest cost. I would think twice about buying that new eyepiece or set of conventional colour filters for planetary observing. Instead, give some serious consideration to a nebular or "LPR" filter -- their Canadian price is in the range of $75 to $130, depending on the size and model.

My high regard for these little silvery devices comes from an evening of the most enjoyable observing I've experienced for quite a while.

Using the Filter The occasion was an observing session at the Edmonton Centre's "near site" at Ellerslie, just south of the city limits. The skies at this site have a darkness factor of about 6, where 0 is the darkest sky possible and 10 is the grey murk of a downtown city sky. In a type 6 sky the Milky Way is plainly visible overhead but not near the horizon. Instead, large areas of the horizon are dominated by city glows and clouds appear bright against the sky.

The filter we were using was a Daystar 300 marketed by Leo Henzel and Associates and purchased at the Queen Elizabeth Planetarium. The filter is designed to screw into the base of most $1^1/_4$" eyepieces. The telescope was a 20 cm F/5 Newtonian built and owned by a fellow observer Stewart Krysko. Our usual eyepiece was a Meade research-grade 20 mm Erfle which yielded a power of 50x and a field of 1.5°.

The first object we observed provided a convincing demonstration of the power of these filters. The Helix Nebula (NGC 7293) in Aquarius is a large, diffuse planetary nebula, a difficult target at best. Using a Skalnate Pleso Atlas and the appropriate Astro-Card from George Kepple's sets of deep-sky index finder cards, we located the field exactly. We could stare into the eyepiece knowing full well the Helix should have been there, but we saw nothing obvious. Then we casually slipped the filter in front of the eyepiece and the nebula instantly appeared like magic! There was no mistaking it; set against a black sky was a circular greyish blot with a dark central core. We were impressed.

With the filter firmly attached, we eagerly scanned the skies for more challenging objects. The Veil Nebula in Cygnus is a relatively easy object; I have seen both east and west components of this supernova remnant a number of times, though always from skies somewhat darker than Ellerslie's. On this night, the Veil Nebula was faintly visible **without** the filter. With the filter, it was literally outstanding. We could see structural detail in the faint wisps, as well as some faint fingers of nebulosity extending from the bottom of the east component (NGC 6992-5). These "fingers" are shown on most photographs of the object but I had never seen them before at the eyepiece. Another first was sighting the faint middle component to the Veil, a bit of nebulosity which carries no NGC designation.

We were beginning to jump up and down with enthusiasm at this point. Next -- the North American Nebula, an object so large we could not hope to see it all in the eyepiece at one glance. But it was there; sweeping across the field showed dark sky, then the greyishness of the "Mexico" area, then black sky, then some more nebulosity -- the Pelican Nebula (IC 5067-70)! Imagine, the Pelican Nebula visible from a site only 15 minutes drive from the city!

From there we explored NGC 281 in Cassiopeia, a large emission nebula that is relatively unknown; NGC 246, a diffuse planetary nebula in Cetus noted for its invisibility though listed as magnitude 8.6; and finally NGC 1514. This last object, a planetary nebula in Taurus, is rather interesting; it is a 10.8 magnitude nebula with a 9.7 magnitude central star, an unusual reversal of the typical planetary nebula where the central star is usually very faint. The bright central star has the effect of washing out the surrounding nebulosity, unless you use a filter!

All these objects were next to invisible without the filter. Once we used the filter and knew how the object really looked, we sometimes were able to pick out the nebula amid the grey sky, but without this advantage, I suspect we never would have found them.

Some Caveats It should be mentioned that nebular filters are just that -- they are useful for observing deep-sky objects that are composed of a collection of interstellar gases and are emitting light of their own. This means the filter is suitable for observing emission nebula and planetary nebula, but not reflection nebula, star clusters and galaxies. The light from all these objects is emitted by stars in a broad continuum of radiation. Nebular light, on the other hand, is only emitted at certain discrete wavelengths, primarily 4861 Angstroms (H β), 4959 and 5007 (doubly ionized oxygen) and 6563 (H α). The multi-layer coatings of a nebular filter are designed to transmit these wavelengths, while blocking all others to a certain degree. This suppresses the spectral lines emitted by street lamps which, quite happily, do not largely coincide with nebular lines. However, the filters are also useful for suppressing natural skyglow as well as artificial light pollution, making these devices also useful at sites normally considered to be "dark".

This is by way of explaining that nebular filters are not very helpful in observing clusters and galaxies. For example, on our "test night" we observed M33, the diffuse, face-on spiral galaxy in Triangulum. There was a subjective improvement when the filter was employed in that the galaxy could then be seen in a black field instead of a grey sky. But the filter dimmed the galaxy as well, and in what we could see of the galaxy, no new detail could be glimpsed by using the filter. This is in contrast to observing gaseous nebulae, where the filter made the difference between seeing the object or not seeing it at all.

It is in this application that nebular filters are most impressive -- in observing "threshold" nebulae, ones whose surface brightness is barely above that of the background sky. And the darker your sky is to begin with, the better your chance of seeing fainter objects, at least to the theoretical limits of your telescope. For example, from the Ellerslie site we were unable to spot the California Nebula (NGC 1499) even with the filter. But from the darker skies of the Centre's "far site" at Buck Mountain (some 130 kilometres south-west of the city), Centre member Gary Finley was able to see this faint object fairly easily through an identical filter. A nebular filter turns an average site into a good one, and a good site into an excellent one, **but** only for a certain class of deep-sky objects. There is still no substitute for truly dark skies, especially if one is attempting photography.

If you are to get the most out of a nebular filter, you still have to search for objects. It does not make finding deep-sky objects any easier, and I know of no observing aids better for this task than a Skalnate Pleso Atlas and a set of Astro-Cards.

Full use of a filter means that you will soon have to graduate from the basic Messier objects to the more exotic deep-sky wonders. Of the 110 objects in Messier's Catalogue, only 12 are nebular (if you include the nebulosity around the M16 star cluster). One would soon tire of this limited repertoire. The observing really becomes interesting however if you can venture into the realm of faint, lesser-known nebulae, in particular big, diffuse patches of singly-ionized hydrogen gas, commonly referred to as H II regions.

What to Observe The sort of objects on which nebular filters work most effectively are ones best observed with a fast, wide-field telescope. With this type of telescope, the darkening of the sky and improvement in contrast will be most pronounced. However, any telescope will benefit from the application of a nebular filter to a certain degree, provided low magnification is employed.

Having acquired a nebular filter, what do you observe? Beyond the basic Messier catalogue, here is a brief listing of suitable objects. The list is by no means exhaustive, but serves as an introduction to observing in nebular light.

Many of these objects will be challenging targets, even with the assistance of a nebular filter. Most will require at least a 20 cm telescope and fairly dark skies (Type 6 or darker). For more specifications on these objects beyond what we could list here,

EMISSION NEBULAE

NGC No.	CON.	Remarks
0281	CAS	near α Cas; discovered by Barnard in 1883; relatively easy
0604	TRI	H II region in M33 galaxy
IC 1795	CAS	brightest part of vast IC 1805 complex
IC 1848	CAS	extremely large, faint nebulosity
1499	PER	very large and faint
1931	AUR	haze surrounding four faint stars
1973/5/7	ORI	near M42 and M43
1990	ORI	ε Orionis nebulosity
IC 434/B33	ORI	dark nebula superimposed on emission neb.
2024	ORI	near ζ Orionis
2237-9	MON	very large and faint
2261	MON	Hubble's Variable Nebula
2264	MON	cluster with nebulosity
2327	CMa	part of IC 2177 complex called Eagle Nebula
6820/23	VUL	emission nebula with sparse cluster
6888	CYG	supernova remnant
IC 1318	CYG	γ Cygni nebulosity
6960	CYG	west component
--	CYG	middle component
6992/5	CYG	east component
IC 5067/70	CYG	near North American Nebula
7000	CYG	extremely large, near Deneb
7023	CEP	large and faint nebulosity
7129	CEP	large and faint nebulosity
IC 5146	CYG	near M39
7538	CEP	near M52

PLANETARY NEBULA

NGC No.	CON.	Remarks
0040	CEP	11.5 magnitude central star
0246	CET	large and diffuse
1501	CAM	distinctive oval
1514	TAU	10.8 magnitude nebula with 9.5 magnitude central star
2393	GEM	very bright
2438	PUP	within M46 cluster
2440	PUP	fairly large, irregular shape
2474/5	LYN	composed of two very faint patches of nebulosity
3242	HYA	very bright
4361	CRV	12.8 magnitude central star
6772	AQL	large and faint
6781	AQL	large and faint
6804	AQL	13.3 magnitude central star
6826	CYG	very bright
6842	VUL	large and faint
6894	CYG	faint annular type
6905	DEL	faint and ill-defined
7008	CYG	12.9 magnitude central star
7009	AQR	very bright
7048	CYG	faint, near Deneb
7293	AQR	very large and diffuse
7635	CAS	near M52, large and very faint

consult the Skalnate Pleso ***Atlas of the Heavens Catalogue*** or Burnham's ***Celestial Handbook***.

For more extensive information on nebular filters themselves, check the March 1979 issues of ***Astronomy*** and ***Sky and Telescope*** for two very excellent articles. They are required reading.

Nebular filters have opened up a new realm of observing for this amateur astronomer. For any given observing site, objects previously considered far too faint are now within reach. And that is a very exciting prospect indeed!

Alan Dyer

NEWS FROM SATURN

T. Gehrels and J. Van Allen, on behalf of other experimenters and the Pioneer Project, communicate: "A new Saturnian ring, provisionally named the F ring, was observed by the optical and energy-particle instruments on Pioneer 11 during the recent Saturn flyby. The ring has a width of ~2000 kilometres and is centered at 2.35 Saturn radii, where 1 Saturn radii (the approximate equatorial radius of Saturn) is defined to be exactly 60,000 kilometres. An absorption feature in the intensity of energetic particles was observed in the F ring for at least one tens-of-kilometres-sized object. The separation between the F and A rings was provisionally named the Pioneer Division; its width is ~2600 kilometres. The optical instrument observed a satellite, designated 1979 S1, at ~2.53 Saturn radii. Independently, three energetic-particle instruments observed an absorption feature at 2.534 Saturn radii, attributed to a nearby satellite, 1979 S2, of diameter ~ 170 kilometres. The positions in the orbit indicate that 1979 S1 and 1979 S2 are the same object; the orbital radius is similar to that reported for 1966 S2.

I.A.U. Circular #3417

SOL III

The world's largest infrared telescope was inaugurated last October on the 4200 metre high summit of Mauna Kea. The 3.8 metre United Kingdom Infrared Telescope (UKIRT) is larger than any of the three telescopes now operating on the same mountain top; but thanks to experience gained with the small prototype infrared telescope on Tenerife in the Canary Islands, the new scope features some novel and bold engineering. The designers of UKIRT have broken with tradition which dictates that a mirror should have a diameter only six times its thickness and have instead made

a Cer-Vit mirror with a diameter sixteen times its thickness. As a result the mirror weighs only six tonnes compared to the fifteen tonnes it would have otherwise. This has allowed the telescope to have the lightest support structure and cheapest cost of the three telescopes on Mauna Kea. Another feature of the UKIRT is its unique earthquake protection mechanism which consists of brass pins set in the underfloor assembly of the telescope which shear under sufficiently strong horizontal forces. Already this year, the telescope has survived two earthquakes of magnitudes 5.0 and 5.5 on the Richter scale. On each occasion the pins sheared off as designed, the telescope shifted a mere 4 mm and was jacked back into position in less than an hour. (*New Scientist*, Vol. 84, No. 1176, pp. 91-92)

When the Soyuz 32 crew of Vladimir Lyakhov and Valery Ryumin returned from their sojourn in the space station Salyut 6 they had set a most impressive new record for a space mission duration. Launched on February 25th, they returned on August 19th for a total flight of 175 days. This is 35 days longer than the previous Soviet record and a full 91 days longer than the U.S. Skylab record. It is also, as Soviet commentators were keen to point out, sufficient for a manned trip to Mars. After the mission, former cosmonaut Konstantin Feokistov said that missions shorter than one month's duration are ineffective because "one has hardly grown used to the absence of gravity when one must return to Earth". As to future space exploration and exploitation, Feokistov was particularly ebullient: "Let's get on with it, there is a lot of work to be done."
(*New Scientist*, Vol 83, No. 1176, pp. 118-121)

Anthony Whyte

50 AND 100 YEARS AGO

December, 1929:

"It is now known that plans for the construction of a 200 inch reflecting telescope are being worked out at the Mount Wilson Observatory. In construction of the new instrument, experience gained in constructing the present 100 inch instrument at Mount Wilson will naturally be of great assistance, and it will be helpful to recall some of the difficulties met with in construction of the smaller instrument. The greatest troubles were in the construction of the mirror itself. It seems probable that a limit has already been reached in the construction of solid glass mirrors of large diameter. Prof. G.W. Ritchey has recently advocated the construction of cellular mirrors, made by building up a kind of honeycomb from thin glass plates, and this plan has been considered, but its adoption has not been favored on account of the difficulty of figuring with optical perfection the thin glass faces and the edges of the honeycomb

structure. The plan which at present appears most promising to the astronomers concerned is to make the mirror of fused quartz, a substance which possesses a very small temperature coefficient. A 22 inch disc has already been constructed in this way, and it is now proposed to make a 60 inch mirror before finally embarking on the construction of the 200 inch mirror itself."

December, 1879:

"A seventh star of the Orion Trapezium -- In addition to the well-known fifth and sixth stars in the trapezium of Orion, (the former detected by Struve with the Dorpat refractor on November 11, 1826, and the latter by Sir John Herschel with Sir James South's large refractor at Kensington on February 13, 1830) the elder Bond, soon after the mounting of the Harvard instrument, perceived roughly in the direction of the sixth star, a fainter and more distant one, which is No. 24 of his memoir on the nebula published in 1848. M. Otto Struve, with the telescope of similar dimensions at Pulkowa, could not see this star, a circumstance which might be attributable either to variability, or to the difference of altitude of the object at Pulkowa and at Harvard College. If we are not mistaken, this seventh star has recently been caught up with the Ealing reflector; but there are other telescopes in this country which should be competent to cope with it, and the star may deserve some attention."

Edited from ***NATURE***

Anthony Whyte

REFLECTIONS

(Articles from *The Reflector*, the newsletter of the Astronomical League.)

The C-90: Getting Your Money's Worth -- Owning an ultraportable, yet superbly performing catadioptric telescope of small aperture has long been the dream of many amateur astronomers. Unfortunately, the prohibitive cost of such luminaries as the Questar has restricted ownership to the fortunate few, that is, until the advent of the Celestron 90 Maksutov-Cassegrain.

With a clear aperture of 90 mm, the C-90 weighs in at only 3.6 kilograms (8 pounds), including its single fork mount with integral clock drive and slow motion controls on both axes. The whole assembly fits neatly into a compact carrying case, except for the optional wedge which is needed to tilt the instrument into its equatorial configuration.

Mechanically, the C-90 performs well in most respects. The drive is smooth and accurate, and the slow motions track with adequate precision. The right ascension clamp is a bit grabby, but is acceptable once one becomes accustomed to it. The

proximity of the 5 X 24 finderscope to the main tube makes it somewhat difficult to look through in certain orientations, and a right angle attachment might be worthwhile in preventing a bruised nose or cheekbone. One shortcoming I cannot forgive, however, is the C-90's focusing mechanism. The entire front section of the telescope tube rotates in a manner similar to that of a photographic telephoto lens. The movement is relatively smooth, but the stiffness increases markedly in cold weather, and obtaining a sharp high-power focus requires patience and a steady hand. A focusing knob at the back of the instrument, such as the one used on the Celestron five and eight, would be a good deal more satisfactory.

As to the C-90's optical performance, I had not really expected to obtain the superb definition of the much more expensive Questar and Quantum catadioptrics, and my intuition turned out to be accurate. The C-90's F/11 optical system does reach the theoretical limits where double star resolution is concerned. The difficult Castor is nicely resolved as are epsilon Lyrae and the close test double pi Aquilae. Some residual color is at times discernible in the first diffraction ring, but the image quality is certainly acceptable. Deep-sky objects show surprisingly well through the C-90; its fully baffled optics yield a dark field which permits good resolution of globular clusters such as M13 and M22 and provides striking views of the Lagoon and Omega nebulae under dark sky conditions. Sweeping the Milky Way with a low power $1^1/_4$ inch Erfle eyepiece (0.97 inch eyepieces are standard) turns the telescope into a competent RFT.

All of this does sound like rather impressive performance -- the small aperture and size of the C-90 notwithstanding. Yet, there is one aspect of the instrument's prowess that ranks as a disappointment. Lunar and planetary images, enigmatically perhaps, appear sharp and well-defined at medium and high magnifications, but they somehow lack the image contrast necessary for the viewing of minute and delicate detail. Jupiter, for instance, reveals the major belts, zones and Great Red Spot, but the detail has a washed out look to it. Saturn, even when observed under excellent seeing conditions, shows a clean ring system with the Cassini Division, but not much else. This is not to say that the C-90 gives a poor image. Its quality is commensurate with its low price, and one should not expect performance on an absolute par with the vastly more expensive Questar or a first-rate refractor.

For a retail price of $495, considerably less if one shops the dealer ads found in ***Sky & Telescope*** and ***Astronomy***, the C-90 seems an excellent value for the beginning astronomer and the perfect instrument for the enthusiast who requires the utmost in portability. There is simply no other telescope in its class. *(Editor's Note: The price quoted is in United States funds on an instrument purchased in the United States. A similar instrument bought in Canada will be higher in price due to exchange and tax. The Queen Elizabeth Planetarium sells the C-90 scope for $599.00)*

Perhaps one final word is in order. When my C-90 originally arrived, it suffered from a peculiar corrector lens thermal distortion which resulted in poor images when

used in cold winter weather. When appraised of the problem, Celestron International immediately set to work to find the cause of the problem and did not cease until the instrument was restored to its full potential and returned to me. They were most accommodating in all of my contacts and were highly concerned with providing the best product and service possible. Such a corporate philosophy is altogether too rare these days, and Celestron must therefore be highly commended on their exceptionally fine attitude.

Lawrence M. Carlino
Buffalo (NY) Astronomical Association Inc.
Buffalo, New York

(Reprinted with permission from the November 1979 issue of **The Reflector**.)

(Editor's Note: Two omissions were made in last month's column that dealt with the Ad Astra III. It should have been mentioned that the column first appeared in the August 1979 issue of The Reflector. *Secondly, the table listing prices for the Celestron 90, the Quantum 100 and the Ad Astra III was in United States dollars, and was for instruments bought in the U.S. To obtain approximate Canadian selling prices, add 52% to each figure in order to account for exchange and taxes.)*

THE EARLIER YEARS OF THE EDMONTON CENTRE

Part 2: 1936 - 1940

In 1936 the Centre made a presentation of ten transparencies of Astronomical objects to the University; these were installed on the second floor of the Arts Building in the corridor, with lights behind them which could be switched on. At that time the Arts Building housed not only Arts subjects but also the Administration, the Library, the Bookstore, and the Departments of Mathematics, Physics, Geology and Botany. The President of the University, Dr. R.C. Wallace, was there at the meeting to receive them and he commented that, pending the time when we have an actual observatory here, these photographs would stimulate interest in astronomy.

One of the events of that year, and of several other years, was an astronomical picnic held in the early fall near Mr. Wates' home. Refreshments were served by Mrs. Clarke, wife of Joe Clarke, Mayor of Edmonton, who lived near by. Those who turned out enjoyed weiners by the bonfire and a look through Mr. Wates' telescope. Also in 1936 the Library of the Centre was started with the purchase of five books -- ***Norton's***

Star Atlas, Moulton's ***Astronomy***, Moulton's ***Consider the Heavens***, Frost's ***Let's Look at the Stars*** and Bartky's ***Highlights of Astronomy***. This was a small beginning, but those were depression years.

In 1936, I gave a talk on *Planetaria*, illustrated by slides loaned by the Adler Planetarium in Chicago. At that time I had visited both the Adler and the Hayden Planetaria (the latter in New York) and was quite enthusiastic about them, but it seemed absolutely hopeless to expect that Edmonton would ever have one. One of our members, who used to run for Mayor every year and collected a mere handful of votes, was all for petitioning the Government of Alberta to build a planetarium here, but nobody else thought it was a good idea. The Spitz projector, such as we have now *(in 1962. Ed.)* had not then been invented, and the cost of the large Zeiss projector was far, far beyond what any Canadian government in those years would dream of spending for so useless a purpose.

At the end of 1936, Mr. J.G. Taylor, a high school principal, became President, with Mr. Wates as Vice-President. During 1937 the question of student membership was first raised, and it was agreed to charge 50 cents for associate members, who would receive the Handbook and notices of meetings, but not the Journal. This scheme was originally on a trail basis, but was later incorporated into the By-Laws. By this time the paid-up full membership was down to 35.

In 1937, Miss Jean McDonald became a member of the Centre. She later became a professional astronomer, took a Ph.D. degree, worked at the Dominion Astrophysical Observatory, published many papers, and married the Director, Dr. R.M. Petrie, later Dominion Astronomer. She recently *(1960's)* completed some of the research her husband was engaged in at the time of his recent death. As a hobby, she shared with Mr. Wates a love of mountaineering.

At the banquet meeting in 1937, Mr. C.G. Wates became President and the Handbook talk was taken over by Dr. Gowan, who prepared a series of slides showing the main constellations visible each month, and commented on the mythology connected with them. In 1938, Dr. Crosby gave his first talk to the Centre, on Solar and Lunar Haloes, illustrated by models of ice crystals.

In February, three astronomical movies were shown to an audience numbering 95. This was the first time we had movies and the largest audience up to then, but in October we had an audience of 150 for a movie on Solar Prominences, made at the McMath Hulbert Observatory in Michigan.

At the annual Banquet in 1939 the Centre sent congratulations and Christmas greetings to Doug Crosby who had recently been elected Rhodes Scholar for Alberta. Unfortunately, owing to the war, he was unable to take it up until considerably later.

Mr. Wates prepared a set of bookplates for the library of the Centre, based on the Society's seal and motto "Quo Ducit Urania". These were posted into all the books belonging to the library at that time. Also, the Centre began publicizing its meetings by notices placed in the Edmonton Public Library.

An annular eclipse of the sun on the morning of April 19, 1939 was about two-thirds total at Edmonton, and since the weather was good, many of our members watched it through dark glasses or saw it projected by a telescope onto a screen. Also one of our members, Mr. Lewis Smith of Sedgewick, Alberta, was officially recognized as an independent discoverer of Comet 1939d. This was of the 2nd to 3rd magnitude, with a fairly long tail. It was seen in Andromeda at 9:30 pm on April 15, and Mr. Smith was later awarded the Donohue medal of the Astronomical Society of the Pacific for his discovery.

At the October meeting a talk was given on *Sundials*, and a brass portable sundial was shown which had been turned up by a plough in Southern Alberta. It was of the universal ring type, in an excellent state of preservation. I wrote a description of it for the Society's Journal in 1940, illustrated by a photograph taken by Dr. Gowan. These portable sundials were common in the 17th and 18th centuries, before pocket watches came into regular use.

At this time Mr. Wates had finished a machine for grinding mirror discs. This was described in the Society's Journal for January, 1941, accompanied by a photograph of Mr. Wates with his $12^1/_2$ inch reflector and his 4 inch richest-field telescope. Mr. Wates was a telephone engineer by profession, but spent most of his leisure time in his basement, working on telescopes. His wife once described herself as a "telescope widow".

At the annual banquet in 1939, a very interesting and scholarly paper on *Shakespeare and the Stars* was given by Dr. S.W. Dyde. This paper was printed in our Journal for February, 1940.

NEXT MONTH: (1940 - 1949) A transit of Mercury; the University builds an observatory; Chant Medal awarded to Cyril Wates; a 90% partial solar eclipse (total in Manitoba!); a talk on space travel and other Buck Rogers stuff.

Prof. E.S. Keeping

OBSERVING NOTES

Mercury: Can be seen for most of the month above the south-east horizon just before sunrise. Greatest elongation west is on the 7th.

Venus: Can be found low in the south-west at sunset, setting some two hours later.

Earth: Winter solstice occurs at 4:10 am, M.S.T. on December 22nd.

Mars: Rises late in the evening and is high in the south-west at sunrise.

Jupiter: Located in Leo, it rises late in the evening and is high in the south-west at sunrise. On the 13th, Mars is 1.7° north of Jupiter.

Saturn: In Virgo, it rises about midnight and is high in the south at sunrise.

During December, watch for: Mars 2° north of the moon and Jupiter 0°.4 north of the moon on the 10th, Saturn 0°.01 south of the moon on the 11th, Mars 1°.7 north of Jupiter on the 13th, Mercury 4° south of the moon on the 17th, and Venus 5° south of the moon on the 21st. The Geminid meteor shower peaks during the late morning hours of Friday, December 14th. At peak, about 40 to 50 meteors per hour may be visible.

Paul Deans

UPCOMING EVENTS

December General Meeting -- This month's General Meeting features a talk from a very special guest speaker. Dr. John Percy of the University of Toronto will be presenting a talk entitled *Observing Variable Stars for Fun and Profit.* Dr. Percy is currently National President of the RASC and is best known as editor of the ***Observer's Handbook***, that indispensible annual volume of astronomical information. Dr. Percy's area of professional research deals with the astrophysics of variable stars, but as Dr. Percy emphasizes, variable stars are not the sole property of the professional astronomer. The amateur astronomer can observe many hundreds of variables with relatively modest equipment, and the observations made by amateurs can contribute significantly to the research being conducted on these strange stars. Dr. Percy's talk will focus on the many "species" of variable stars and on how amateur astronomers can observe them, for fun and for profit!

Be sure to attend this very special meeting; Dr. Percy is an excellent speaker and his enthusiasm for the subject is quite infectious. In addition, if you have any questions, comments, complaints or compliments regarding the ***Observer's Handbook***, this is your chance to talk to the editor in person!

The time and place for the meeting is Monday, December 10 at 8:00 pm in the Music Room of the Edmonton Public Library.

Observer's Corner -- The Observer's Corner meeting is usually held on the fourth Monday of each month, but this month that date happens to be Christmas Eve! Our observers are a dedicated lot, but not **that** dedicated! Needless to say, there will be **no** Observer's Corner meeting in December. Regular Observer's Corner meetings will resume on the fourth Monday of the New Year, January 28. The topic will be announced in the January issue of ***STARDUST***.

A December Star Party -- "In the arctic air of mid-December? You've got to be joking!" No we're not. First of all, everyone knows it's **not** going to be really cold this winter. Secondly, who cares anyway? Not when you have the wealth of winter sky objects to observe. Consider these highlights -- we'll have Orion high in the south-east, the Geminid meteors (the second-best annual meteor shower) will be flashing overhead, and later at night, Mars, Jupiter and Saturn (sans rings!) will put in an appearance.

For this reason, we are inviting everyone out to the Ellerslie Observatory on Friday, December 14, starting at 8:00 pm for a gala Geminid Meteor/Winter Sky observing session. The 20 cm refractor will be fired up and ready for use. We may even have an LPR filter or two floating around for demonstration. But by all means, bring your own telescope and maybe a friend or two. Electrical outlets will be available for plugging in your scope. (However, your car will have to brave the weather with the rest of us as there is not enough power available at Ellerslie for plugging in a large number of autos.) We will have a pot of coffee brewing in the Observatory, but be sure to dress warmly. Keep those feet warm!

To find your way out to Ellerslie, follow the map elsewhere in this issue. This is a good opportunity to become more familiar both with the winter sky and with the Ellerslie Observatory, so why not take a break from your hectic Christmas shopping and join us under the stars.

For more information, phone Mark Leenders at 437-7410 or Alan Dyer at 488-1092.

National Council Meeting -- The Edmonton Centre is hosting a meeting of the R.A.S.C. National Council, to be held Sunday December 9 at 1:30 pm in the Rowland Suite of the Four Seasons Hotel. Centre members are welcome to attend as observers at this business meeting. As of this writing an agenda has not been received from the National Office. However, so far we have received the word that representatives will be attending from the Toronto, Saskatoon, Ottawa and Vancouver Centres, as well as Edmonton of course.

CENTRE NEWS

The 1980 Observer's Handbooks -- Yes, the 1980 version of ***THE OBSERVER'S HANDBOOK*** is out! The Planetarium has received its batch of copies and the Centre should be receiving its shipment soon. Hopefully, we will have Handbooks to distribute at the December meeting. But you will be able to pick up your copy **only** if you have paid up your 1979/80 membership. If you haven't already paid your dues, you will be able to do so at the December meeting.

As always, this year's Handbook features a goldmine of information on upcoming astronomical events. In fact, how anyone can get along **without** the Handbook and still call themself an astronomer is beyond us! This year's version has a few changes, one of them being the addition of M104 to 110 inclusive to the Messier Catalogue, as well as identities for the 'missing' Messier objects, M91 and M102. This rounds out the Messier list to a full 110 objects in accordance with the observing practice here in Edmonton. You will notice, however, that even today sources such as Burnham's ***Celestial Handbook*** do not recognize the identity of M91, M102, and M104 to M110.

Buck Mountain -- No News Is Good News: Earlier in October we officially made application to the Provincial Government for a 21 year lease on 7.31 acres of land on the south slope of Buck Mountain. If our lease proposal is accepted, then this land will become the Edmonton Centre Dark Site for development as outlined in the September issue of ***STARDUST***. As yet, we have not yet received any word from the Department of Energy and Natural Resources, but a reply may arrive any day now. Let's keep our fingers crossed!

Shopping Centre Displays Near Completion -- Work is progressing on the final 12 panels of the Centre's travelling astronomical exhibit. The group is aiming for a completion date in mid-December, allowing us to set up the display at its first engagement early in the new year. With a little luck, we will be able to present a final construction report in the January or February ***STARDUST***.

The Arizona Trio Returns -- During October, Rod McConnell, Dave Beale and Dave Belcher toured the south-western U.S., returning to Edmonton early in November with lots of slides and stories to tell of their visits to planetariums, observatories, natural wonders and fine observing sites. During their tour they visited with Cliff Holmes of the Riverside Astronomical Society, with representatives of the Los Angeles Astronomical Society, and with Gary Fouts, director of the Goldendale public observatory. We are now exchanging newsletters with these groups, extending ***STARDUST***'s domain to the western U.S. At both Riverside and Goldendale, the trio showed a tray of slides they had brought with them, slides which illustrated various past and current Centre activities. We welcome our new friends to the pages of ***STARDUST***; by all means feel free to submit any items that you may consider of interest to readers here in the cold and snowy north. With the winter winds beginning to howl and the aurora blazing away, we can't help but envy your warm (if smoggy) California nights.

Anomolous Shadow During Lunar Eclipse -- From ***Prime Focus***, the newsletter of the Riverside Astronomical Society, comes a note regarding the unusual appearance of the edge of the Earth's shadow during the September 6 lunar eclipse. As they describe it: "During totality, an unusual darkening has been noticed near the crater Tycho which has yet to be explained." The darkening was visible on many of the eclipse

photos the Riverside people had. Have any Edmonton Centre members captured this effect on film? One explanation offered was the presence of Hurricane David in the atmosphere of Earth near the sunrise terminator at eclipse time, blocking (in part) the usual refraction of red sunlight into the umbral shadow.

Your Last *STARDUST* -- All members of the Edmonton Centre should consider this fair warning: If you have not renewed your R.A.S.C. membership by December 31, your name shall be forthwith stricken from the ***STARDUST*** mailing list, a fate too horrifying to contemplate! Therefore, this will be your last issue, unless you act now. Dues can be paid to Christine Kulyk at the December General Meeting, or send your cheque or money order by mail to: *Edmonton Centre, RASC, c/o Queen Elizabeth Planetarium, Coronation Park, Edmonton, Alta.*

Now it occurs to us that some of you out there in RASC-land may well be considering **not** renewing your membership, **or** through an acute case of terminal procrastination, you might inadvertently let your membership slide into oblivion! Gad, what a morose thought! Surely, those of you who have supported us so loyally over the past few months (even years!) would not desert us now, as we are about to enter the brave new world of the 1980's? Renew now, and be assured of a copy of the new ***OBSERVER'S HANDBOOK*** hot off the press, as well as an uninterrupted flow of ***STARDUST***'s. The RASC is going places in the new decade -- why don't you join us?

MEMBERS IN GOOD STANDING AS OF NOVEMBER 25, 1979

If you cannot find your name on this list, it is undoubtedly because you have **not** paid your 1979/80 dues ($20 for Adults, $12 for Student (17 years and under), $8 for Associate). If you believe that you have paid, and your name is **not** present, then please check with the Treasurer, Christine Kulyk (either at the December meeting or by phoning her at 420-6765 during the evening).

ABBOTT, Dr. A. Patrick	AUGER, Dirk	BEALE, David
BELCHER, David R.	CADIEN, Ted A.	CHAN, Peter Chak-Man
CLARKE, Muriel A.	CONNOR, R.J.	CONSTANT, Clinton
CROSS, Darrell	DAHLGREN, Merrel V.	DEANS, Paul
DOBISH, Nick	DYER, Alan	EBBERS, Yni
ELLIS, David C.	FINLEY, Gary	FITZNER, Garth
HOLMES, Peggy	HOLMGREN, Dave	HUBE, Doug P.
HUBE, Joan	JANKE, Keith	KING, Robert W.
KULYK, Christine	KUNZE, Rudy	LAVENDER, William
LEENDERS, Mark	LEENDERS, Nadine	LITTLE, John G.
LOEHDE, Franklin	MACDORMAND, Doug	MAKAROWSKI, Craig
MARELLI, John V.	MARTIN, Cyril E.	MARTIN, Robert J.

MCCONNELL, Rod E.
ODIE, Esau
POLLOCK, Wolfe F.
RANKIN, Mel C. Jr.
ROOT, John
SINCLAIR, Eric M.
WINDRIM, Dennis
YAKIWCZUK, Larry

MCDONOUGH, E. Brent
PAZDER, Stan W.
POPOW, Al
RANKIN, Mel C. Sr.
ROWLANDS, Neil
WARREN, David
WOOD, Diana Lynn

MCNEILL, Richard
PLATONOW, Annie
PRIDEAUX, Gary
RINGIUS, Gordon S.
SIMS, Kathleen P.
WHYTE, Anthony
WOOLLEY, John

ELLERSLIE

THE EDMONTON CENTRE NEAR SITE

The Ellerslie Observatory houses a 20-cm refractor, designed and built by Tony Whyte and Doug Hornbeck. The Site(and Observatory) is available for use by any member of the Edmonton Centre. However, to use the Observatory, you must be checked out on the instrument beforehand. Keys to the Observatory can be picked up for an evening's use from :

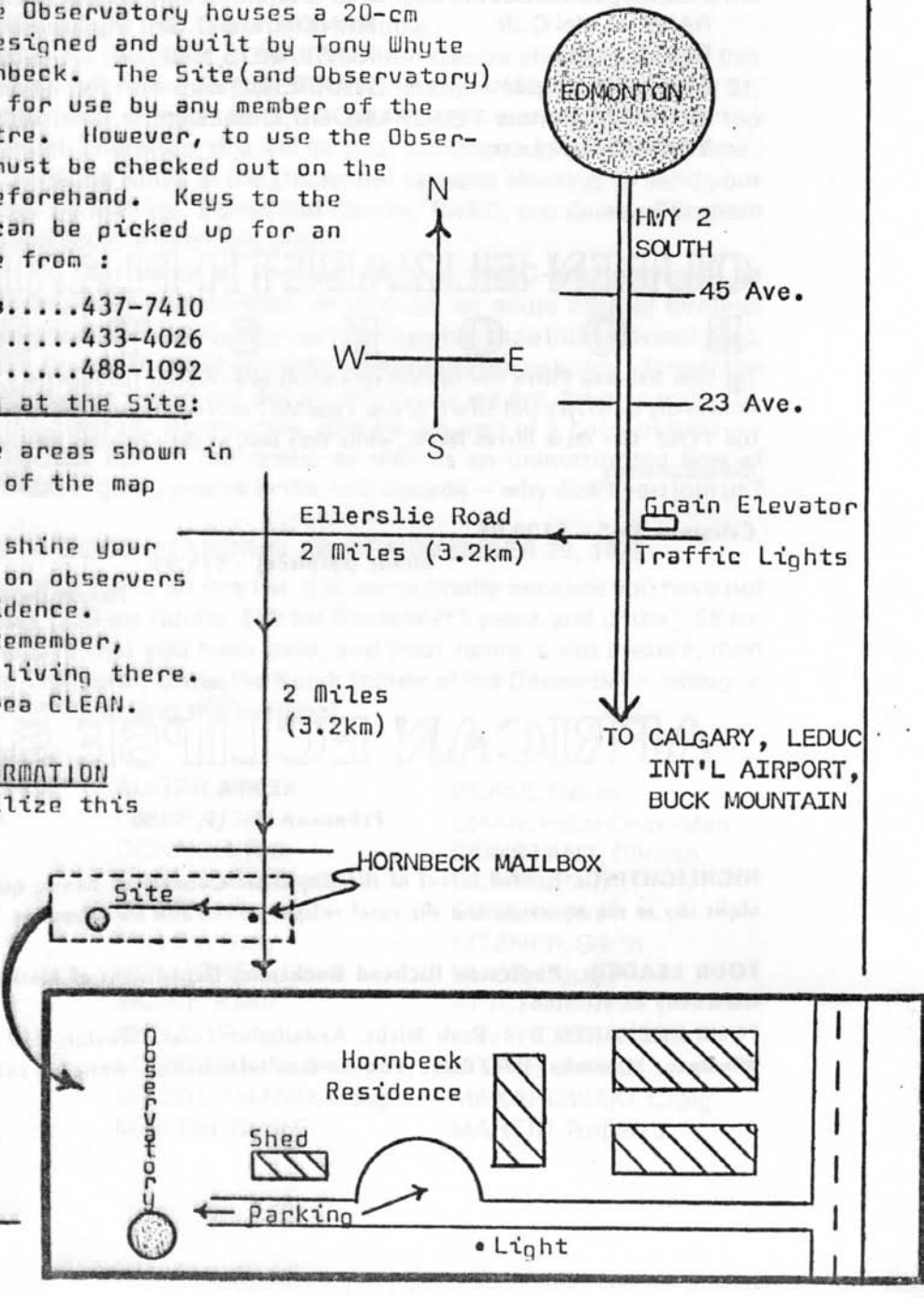
Mark Leenders.....437-7410
Dave Belcher.....433-4026
Alan Dyer.....488-1092

When arriving at the Site:

- Park in the areas shown in the detail of the map opposite.
- Try not to shine your headlights on observers or the residence.
- Be quiet. Remember, someone is living there.
- Keep the area CLEAN.

FOR MORE INFORMATION on how to utilize this Site, call:

Mark Leenders at 437-7410



ROYAL ASTRONOMICAL SOCIETY OF CANADA, EDMONTON CENTRE

Anyone with an interest in the many facets of astronomy can find opportunities for sharing and increasing those interests by becoming associated with the Edmonton Centre of the Royal Astronomical Society of Canada. Membership includes: The annual RASC **Observer's Handbook**, *the bi-monthly* **Journal** *and* **Newsletter** *of the RASC,* **Stardust** *(the monthly newsletter of the Edmonton Centre), plus complimentary admission to all Planetarium shows.*

General Meetings of the Centre are held in the Music Room of the Edmonton Public Library on the **second Monday** *of each month (except July and August) at 8:00 PM. These meetings feature guest speakers whose topics cover all aspects of amateur and professional astronomy.*

The Observers' Group of the Edmonton Centre meets on the **fourth Monday** *of each month at the University of Alberta in Room 445 of the Physics Bldg. starting at 8:00 PM. Anyone with an interest in observational astronomy and astro-photography is invited to attend. Each month also features regularly scheduled group observing sessions at one of the Centre's dark Sites in the country. Members also have the use of the Centre's* **Ellerslie Observatory** *and 20cm refractor telescope. For details of these activities, please feel free to call the Observing Chairperson.*

Enquires regarding membership in the Edmonton Centre may be directed toward the President or the Treasurer, or come to one of our regularly monthly meetings and enquire at that time. Guests are always welcome. Currently, annual membership fees are: **$20.00** *for Adults,* **$12.00** *for those age 17 and under.*

President: Alan Dyer.....
Vice-President: Ted Cadien.....
Secretary: Ivan Rogers.....
Treasurer: Christine Kulyk.....
Editor, STARDUST: Paul Deans.....
Observing Chairperson: Mark Leenders.....

STARDUST
EDMONTON CENTRE, Royal Astronomical Society of Canada

c/o Queen Elizabeth Planetarium
10th Floor, C.N. Tower
Edmonton, Alberta

GENERAL MEETING

Monday December 10, 1979 at 8:00 pm
Music Room, Edmonton Public Library

TOPIC AND SPEAKER
Dr. John Percy,
University of Toronto
Observing Variable Stars for Fun & Profit

OBSERVING SESSION

December 14, 1979
Ellerslie Observatory