REGULUS

MARCH-APRIL 1992

NEWSLETTER OF THE KINGSTON CENTRE
OF THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

MEETINGS AND EVENTS HORIZON

Regular Meetings of the **Kingston Centre, RASC**, are held on the **second Friday** of each month (unless otherwise noted) at **8 p.m.**, in **Room D-216**, **Macintosh-Corry Hall, Queen's University. Non-members are welcome.** Executive meetings are at 7:30 p.m.

Fri., Mar. 6	REGULAR MEETING. Speaker, Ed Kennedy, Saskatoon Centre, "1835 Moon Hoax". NOTE: Meeting date advanced by one week.
Fri., Apr. 10	REGULAR MEETING. Speaker, Denise Sabatini. "Archeoastronomy".
Fri., May 8	REGULAR MEETING. Speaker, Gordon Taylor, et al, "Astronomy Software".
Sat., May 9	ASTRONOMY DAY -- Mall displays, public observing, etc. Details to be announced. Theme this year is "Dark Skies, Safe Places!"

IN THIS ISSUE...

THE MOON, MYTHS AND MANKIND

By David Stokes

PART 1 OF 5

Beginnings: Let's begin with the land between two rivers, Mesopotamia, as the Greeks called it. Long before the Greeks the peoples who lived between the Tigris and the Euphrates built great empires and established a flourishing trade in all the commodities required to maintain a rich life. It was here the date palm was first cultivated and here that agriculture became a way of life. In the relatively short periods between wars of conquest and intense periods of self defence against encroaching tribes there became established a civilization like none before. The Stone Age was a fading memory and the Bronze Age was now well-established. Nomadic life was a thing of the past and people settled in small villages and larger city states.

Raising food for immediate and future needs links man closely to the changing seasons determined by the sun. Long-continued familiarity with the night sky provided a stable background for the journey of the sun in the course of a year. The appearance of a familiar group of stars just before the rising of the sun would herald the approach of a new season for planting or harvest or of coming drought.

The motion of the moon against this starry backdrop was more mysterious. Appearing first in the sky at sunset as a thin crescent marked the beginning of a new month. Rising later night by night, the moon grew in light and splendour until the full moon rose at sunset to shine all night long. Nights are cooler, and moonlit nights in the growing season seemed particularly auspicious for the growth of plants. In the morning the ground was often covered with heavy dew after cool, clear moonlit nights. It seemed perfectly natural that dew came from the moon, nourished the plants and caused them to grow, just as the moon itself grew in light and splendour during half of the month.

The moon too moved against the background of the fixed stars, following a path like that of the sun but distinctly separate. The broad band of constellations traversed by the moon were considered the mansions of the moon, a different resting place for every night, twenty-eight in all. The slower motion of the sun across the starry background had to be visualized but it was obviously well-defined, marked out by twelve constellations, the signs of the zodiac.

The sun and the moon each moved on their appointed courses without mutual interference, dependable and regular clocks that tick off the days, the months and the years.

This celestial rhythm synchronised the daily life of the people in all of their activities and their celebrations and their rest periods. As the moon reaches the full it appears neither to increase nor to diminish for a day or two. This became the time when the people rested from their work and the day was called SABAT, or heart rest. The holiday was called SHABBATU, and in this period no fires were lit to cook by for this was the time to worship the Moon as a god and fire was symbolic of the sun.

The presence of the moon was a time of growth and fertility in plants and animals, particularly in the days of the waxing moon.

Alter SHABBATU the moon was slowly consumed by darkness. Positive forces were on the wane, replaced by the growing strength of disease and destruction. Then the moon was gone from the morning sky and was not seen again until the new crescent appeared at sunset. This dark period required special attention to worship of the moon to ensure the speedy return of the goddess to guide affairs. Thus two periods were established in roughly a month for rest and religious observance. When two more days were designated at the time of first and third quarter the month became divided into four periods of seven days each, a period we call a week. The week began with a moon-day (Monday) and ended with the sabbath (Sunday), the day of rest.

The role of priest, responsible for regulation of religious affairs, and that of calendar maker for regulation of daily life were next to that of ruler and chief of the the fighting forces. While the role of sun and moon in affairs was paramount, and to some extent quite obvious, that of the fixed stars is more obscure. In this or an earlier period of history there was a strange belief that the presence of the sun in a particular constellation influenced the outcome of events on the earth below. Even more peculiar was the belief that this influence was fixed in the child at birth and determined its destiny for life. Just what influence was present and how it would affect affairs became the province of the astrologers. In the same period the people were also given to worshipping all manner of idols which they built out of wood and stone.

The Chaldeans developed a vital civilization that was absorbed and modified by those around them. The Babylonians carried this further and wielded a powerful influence in the region, taking over the culture of Ur and Eridhu and developing the worship of sun and moon. For them the moon was Sinn, a male god whose name was given to Mount Sinai. They also worshipped the sun as Shamash, traced today as Shams through early Semitic and Arabic.

The cycle of the seasons repeats itself in a fixed number of days that averages out to about 360. In this number of days the calendar indicates the beginning of a new year, a new cycle of planting, cultivation and harvest. Over a few years such a calendar and the seasons would slowly fall out of step. To correct this it was the custom of those times to add an extra five days to the apparent end of the calendar year for special celebrations and religious observance. Thus the year became established as 360 plus five days and the solar calendar became fixed for a very long period of time.

While the sun determines the civil calendar of an agricultural people the moon, or monthly calendar was followed for religious purposes. These two clocks do not synchronize in the short term. Firstly, the motion of the moon is somewhat irregular and each month could begin a day or two earlier or later. Secondly, four weeks of seven days each do not well-approximate the average length of the month, and thirdly, twelve lunar months fall short of 365 days in a solar year by 11 days, on average. It thus became very difficult for the calendar-maker-priest to reconcile these cosmic rhythms. The problem was solved by intercalation, that is by adding an extra month to some years. These extra months were of course special in the sense that the five extra days, holy-days, were special and required further religious observances. To the Bronze Age people the seeming vagaries of the moon's motion confirmed their belief in the influence of the moon over their daily affairs and endowed the moon with a special significance that was undeniable and fascinating.

Thus we have today our circle of 360 degrees from the motion of the sun as perceived in the Bronze Age. Our week and its rest day or sabbath and the beginnings of a stable long-term calendar. A knowledge of the moon's motions led to some

(Continued page 4.)

NEWS AND NOTES

A **Light Pollution Committee** was formed at the January 10 meeting of the Kingston Centre. Members are **Bill Broderick, Ian Levstein, Leo Enright, David Stokes, Peter Kirk, Kim Hay.** Our committee will work in cooperation with the **National Light Pollution Committee** of our Society, headed by **Ruth Lewis**, of the Calgary Centre, to help solve the light pollution problem.

Actions on light pollution in the last while include a letter to The Whig-Standard (published February 8), and a letter to the Mayor and Council of the City of Belleville (reproduced on page 7). Also, a letter has been sent to **The Honorable Paul Johnson, MPP** for Prince Edward-Lennox-South Hastings. An interview with **Paul Johnson** will take place on February 28.

Congratulations to **Terry Hicks** on his acceptance of the nomination for the position of **National Treasurer** of our Society. The position will be voted on at the upcoming **GA** to be held in Calgary, July 1 to 5. Best of luck, Terry!

We welcome the following **new members**: **Wayne Taylor, Jim Towgood, Brian Wawrykow**. Good to have you with us.

Life member **Hein van Asperen** has submitted an interesting article on his solar observations during 1991. Because of length, we are printing it as a **supplement** to the newsletter, and copies will be distributed at the meeting on March 6. Anyone not attending on that date may request a copy from our Librarian **David Stokes**.

ASTRO JUMBLE

Unscramble the letters (see clue), then use the **circled letters** to solve the puzzle. Answer in next issue. Good luck!

CLUE: LUNAR CRATERS

S I L V U A C

O R N E S C U P I C

P R E K E L

L O T A P

C H T Y O

THESE FOLKS LOVE TO OBSERVE UNDER A FULL MOON...

Answer from last issue

REFRACTOR, REFLECTOR, NEWTONIAN, CASSEGRAIN, MAKSUTOV, CATADIOPTRIC

A common malady affecting many amateur astronomers...

APERTURE FEVER

MOON. MYTHS AND MANKIND (Cont'd); understanding of eclipses of the sun and moon and from this a need to predict such events in order to propitiate the evil forces that were held responsible for such a frightening cosmic disturbance. The clay tablets recovered from the city states of this period record in detail many of the significant astronomical events of those times. **TO BE CONTINUED.**

FOR THE CONJUNCTION

OF TWO PLANETS

We smile at astrological hopes
And leave the sky to expert men
Who do not reckon horoscopes
But painfully extend their ken
In mathematical debate
With slide and photographic plate.

And yet, protest it if we will,
Some corner of the mind retains
The Medieval man who still
Keeps watch upon those starry skeins
And drives us out of doors at night
To gaze at anagrams of light.

Whatever register or law
Is drawn in digits for these two,
Venus and Jupiter keep their awe,
Wardens of brilliance, as they do
Their dual circuit of the west—
The brightest planet and her guest.

Is any light so proudly thrust
From darkness on our lifted faces
A sign of something we can trust,
Or is it that in starry places
We see the things we long to see
In fiery iconography?

—ADRIENNE CECILE RICH

(From Imagination's Other Place,
a Collection of Poems
by Helen Plots)

NEW BEGINNER'S OBSERVING GUIDE NOW AVAILABLE

As announced in the last issue of **Regulus**, **THE BEGINNER'S OBSERVING GUIDE 1992** is now available. The book is written especially for young people, children and teens, who have had little or no introduction to astronomy. It is also suitable for adults who would like some basic knowledge about astronomy and observing. As well, teachers, and persons involved with Scouting, Cubs, Guides and Brownies, may find the book useful. This new Guide may now be purchased directly from the **Kingston Centre**. Price is $5.35 (GST included). Institutional price (Guides. Cubs etc.) for quantity purchases is $4.00 per copy.

ANYONE FOR A MESSIER MARATHON?

Late March is supposed to be the time when a determined Messier-hunter can find all 110 objects in Charles Messier's famous catalog.

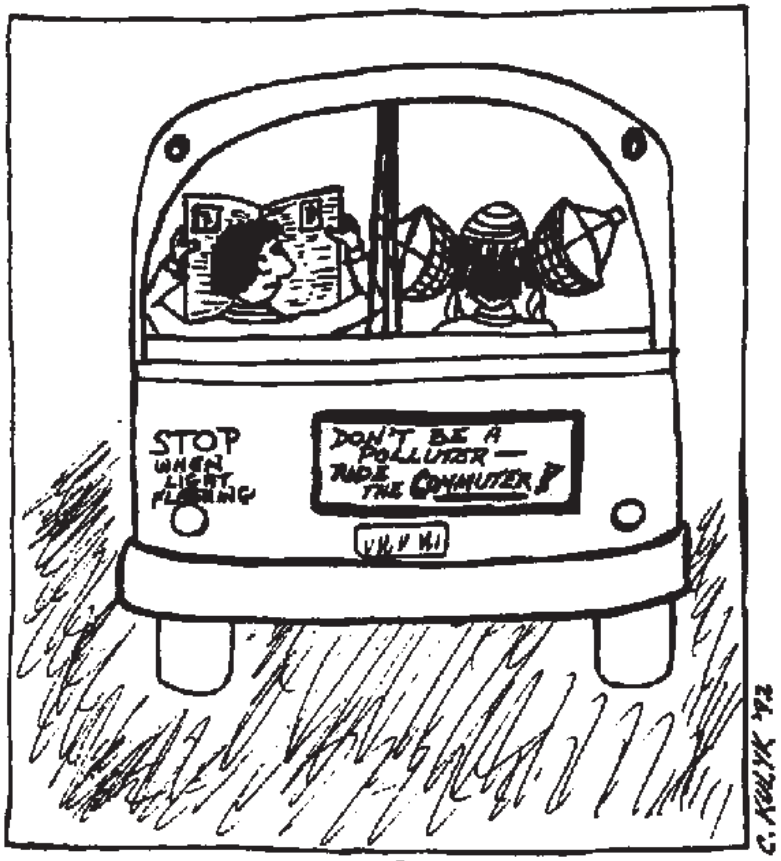
To take advantage of the opportunity to see all of these objects at one observing session at the telescope, however, you have to be prepared to do an "all nighter".

Anyone contemplating the attempt should do some preparing in advance. Not the least, in this regard, is choosing a good observing site, as free as possible from light pollution. Sky-glow and bright lights will almost certainly frustrate your attempts to glimpse the fainter members of the Messier List.

Also, be sure to read the DEEP-SKY OBSERVING HINTS in the **Observer's Handbook** (page 214), at the end of the Messier Catalog.

And lastly, dress warmly! An all night observing session is taxing enough without otherwise neglecting your creature comforts.

Remember, if you're successful in finding and observing all of the Messier objects, you're eligible to receive the Society's MESSIER CERTIFICATE. And you don't have to do it all at one session, either.



INVENTORS WHO NEVER BECAME FAMOUS:

DELBERT K. CRUMP, WHO DESIGNED THE FIRST WALKMAN RADIO TELESCOPE

SEEING THE ZODIACAL LIGHT

February and March are the months for Spring viewing of the Zodiacal Light. Look for it after the end of evening twilight, as a faint cone of light standing on the western horizon—with a slight tilt towards the south. The Zodiacal Light is centred on the ecliptic and may reach nearly to the zenith. As the month of March progresses, the tilt becomes more and more pronounced.

You can increase your chances for seeing the Zodiacal Light by picking a dark-sky site, free as possible from light pollution.

For more information on this interesting phenomenon and how to observe it, read the chapter on INTER-PLANETARY DUST. on page 179 of the **Observer's Handbook**.

ASTRONOMY IS FOR EVERYONE

BILL BRODERICK
XXXXXX
XXXXXXXXXXX, ONTARIO
XXX XXX

* GROUP & SCHOOL TALKS
* HANDS-ON OBSERVING
* PERSONAL & GROUP INSTRUCTION

CEDAR HILL OBSERVATORY - XXX XXXX XXXXXXXX - XXXXXXXXXXXXXXXXX - TELEPHONE (000) 000-0000

January 30, 1992

Mayor Shirley Langer and Members of Council
Corporation of the City of Belleville
City Hall
169 Front Street
Belleville, Ontario
K8N 2Y8

RE: LIGHT POLLUTION

Dear Mayor Langer and Council:

Enclosed with this letter are some articles and other material on a problem that you may not have had occasion to consider before now--light pollution and degradation of the night sky. As an amateur astronomer and Chairperson of the Light Pollution Committee of the Kingston Centre of the Royal Astronomical Society of Canada, I can assure you that this is a serious problem for both professional and amateur astronomers. Fortunately, the solutions to the problem exist and are of benefit to everyone. These solutions have the effect of reducing energy use and lighting costs--and associated taxes--as well as reducing glare and clutter, and increasing visibility.

What is light pollution?

Basically, it's wasted light. It's light that contributes nothing to nighttime safety or utility. It may even be contraproductive, defeating its intended purpose by creating glare and detracting from visibility. It costs money. And it is harmful to astronomy, and in some cases to birds and wildlife.

Components of light pollution include:

1. Urban Sky Glow, which is destroying mankind's view of the universe.
2. Glare, blinding us and harming visibility. Glare is never good.
3. Light Trespass, someone's outdoor lights offending us, "trespassing" on our property.
4. Clutter, trashing the nighttime environment and causing confusion as well.
5. Energy Waste, wasted light costs over One Billion Dollars a year in the U.S. alone– probably over One Hundred Million Dollars a year in Canada.

It's tempting to say that light pollution is the "price of progress". But it isn't, really! It's actually the price of carelessness and thoughtlessness. Of poor light fixture design, that allows the light to spill out in every direction--including upward! Of taking energy for granted and misusing light in ways that are wrong and even stupid--such as leaving the lights of office towers and other structures on all night, creating a hazard for birds– and illuminating billboards from the bottom rather than the top, sending as much or more light into the sky as falls on the billboard. Unless light is actually being used for some purpose, it's wasted. Waste is always wrong. When light is wasted, the energy resources required to produce it, such as coal and oil, are also wasted.

(Over please)

Urban sky glow, the smeary halo of light that envelopes most towns and cities of any size, including Belleville, is a result of a great deal of wasted light. From my observatory near Read, the glow from Belleville effectively "wipes out" the night sky to my southwest. Anyone trying to do more than very basic astronomy from within the city is pretty well doomed.

For amateur astronomers, that is most unfortunate. The night sky is a natural wonder, one that has been with us for all of the ages of our existence on Earth. Until the early years of our present century the stars were available to almost everyone. I can remember being able to see the stars and the Milky Way from the streets of Toronto as a young child in the 1930s. Now, in only a couple of generations, the situation has deteriorated to the point that, if one wishes to see the stars, one must travel for many kilometers into the country. When I lived in Belleville a few years ago, I routinely packed telescope and gear into the car and drove for a half hour or so out of the city. Amateurs in larger urban centres must drive for hours to find a suitable observing site.

For professional astronomers, the situation is even more serious. Certain kinds of observations simply cannot be done in the presence of light pollution. The extremely faint light from the most distant astronomical sources, even in the infrared and ultraviolet, not to mention visible wavelengths, is swamped by the general skyglow from light sources on Earth unless the observing facility is located hundreds or even thousands of kilometers away from them. As a result, some observatories cannot do the work for which they were built and have had to be closed (such as Mt. Wilson Observatory near Los Angeles) and others are threatened.

Any natural heritage deserves our respect and our protection. The stars and the night sky are no exceptions. That's why I'm writing to you. Other municipalities have been convinced to change their lighting policies and practices, not only with benefit to astronomers, but also to the general public. Perhaps Belleville can be persuaded too.

At this point, allow me a slight digression. Light of any wavelength is part of what scientists call the "electromagnetic spectrum". If what we call "visible light" is passed through a prism, it is broken up into its component colours: red, orange, yellow, green, blue, indigo, and violet--the colours of the rainbow. But the electromagnetic spectrum is a continuum. Below the red we have infrared, which we cannot see. Above the violet we have ultraviolet, which we also cannot see. Radio, X-rays, and other types of radiation are also parts of the electromagetic spectrum.

It may surprise you to know that the light output of an incandescent lamp--the ordinary lightbulb--is mostly in the infrared (or heat) part of the spectrum. A mercury vapour lamp (the kind used for street lights for many years) emits a lot of ultraviolet. High-pressure sodium lamps, which have recently become very much in vogue for street lighting, emit very broadly over about half of the visible spectrum. And finally, low-pressure sodium lamps emit only in a very narrow portion of the spectrum (yellow).

When it comes to energy, we pay for what we use. And it takes energy to produce radiation at any part of the electromagnetic spectrum. Thus, if we use a light source that radiates in the infrared or the ultraviolet as well as some part of the visible spectrum, we must pay for that energy. For that reason, in terms of what is cost-effective, high- and low-pressure sodium lamps are definitely the light source of choice.

Let's compare the different lamp types and the amount of light they deliver per unit of energy (watt):

Lamp Type	Lumens per watt
Incandescent	20
Mercury vapor	54
Metal Halide	80
High-pressure sodium	125
Low-pressure sodium	183

Clearly, if we are interested in getting the most light for our energy buck, low-pressure sodium is the winner. Some people see the distinctly yellow cast of this type of light source as a disadvantage. There is almost no colour rendering and the light may take some "getting used to". However, it is not unattractive, and many communities have seen fit to install low-pressure sodium, with considerable savings to all their taxpayers. A Canadian example is the City of Lasalle, Quebec, which replaced all of its mercury vapor lights in 1984 with a mix of high- and low-pressure sodium lighting. They claim a reduction in energy costs of 54.8 percent.

In the United States, the cities of San Diego, Long Beach and San Jose in California, are saving about three million dollars a year each with low-pressure sodium lighting. Tucson in Arizona is almost exclusively low-pressure sodium.

Low-pressure sodium is the light source most favoured by astronomers. Because of the very narrow bandwidth (yellow) of its emission, it can be fairly easily filtered out by astronomers. If we think of the emission of a light source as a kind of fence, through which we must try to view the universe, low-pressure sodium light is a "fence of only one picket" (an analogy suggested by Bob Brucato of Palomar Observatory).

Besides considering light sources, lighting fixtures also need to be looked at. In our homes we almost never put a naked lightbulb into a lamp and leave it at that. The glare from it would be irritating and certainly unesthetic. A lamp shade of some kind is almost always in order. What applies in our homes should also apply on the street. Yet, for some reason, we've been putting up with glary, blinding street lights for years and years. They're not only irritating and unesthetic, the blinding glare actually constitutes a hazard for motorists and other users of the road on occasion. And of course, a great deal of the sky-glow that astronomers complain about originates with such inefficient street light fixtures.

Shielding can be installed on many fixtures, particularly the cobra-headed type, to minimize or reduce the glare from the lamps. I understand that Ontario Hydro offers substantial rebates to municipalities that wish to install such shielding. I think that this would * be something that a progressive and environmentally-aware community would want to look into.

For the future, the fair City of Belleville might well emulate Tucson and other cities that are making a strong effort to install full cut-off light fixtures wherever possible for street lighting, parking lots and other outdoor applications. Full cut-offs ensure that light is directed downward, toward the ground only. All substantial side-light and uplight is virtually illiminated. Such fixtures utilize all of the light to good advantage with no glare. Visibility is maximized. Which is what lighting is all about.

(Over please)

Finally, you might want to give consideration to some kind of lighting control ordinance. The State of Arizona actually requires municipalities to enact such ordinances, and I understand that over 50 are now in force in that State. Such ordinances basically set out certain minimum standards for outdoor lighting, such as types of lighting allowed, shielding, times when it can be on and must be turned off, and so on. Illuminated outdoor advertising signs and billboards, for example, might well be a subject of regulation. Bottom-lit billboards are major sources of light pollution. An ordinance might require that such billboards be illuminated from the top and that they be turned off at a specified hour, say 11 p.m. An ordinance might require that after a specified hour, say 11 p.m., outdoor security lights must be turned off and activated only by motion detectors. I can provide several examples of municipal lighting codes if you are interested.

I would be most pleased to give a lecture and slide presentation to you and Council on this subject of light pollution and its solutions, if you would like that. Such a presentation might well answer many of the questions and objections that some on Council might have. In any case, if I can render you any further information or assistance, please do not hesitate to contact me.

Dr. David L. Crawford, an astronomer at Kitt Peak National Observatories north of Tucson puts it thusly: "Curing light pollution saves money while reducing glare and sky-glow. Unlike other issues involving pollution, it provides us with a rare case where we should strive to be kept in the dark. The stars above us are a priceless heritage, not only for scientific knowledge, but for our identity as human beings."

I do hope you will give this subject the attention it merits, and that I will hear from you further.

Thank you.

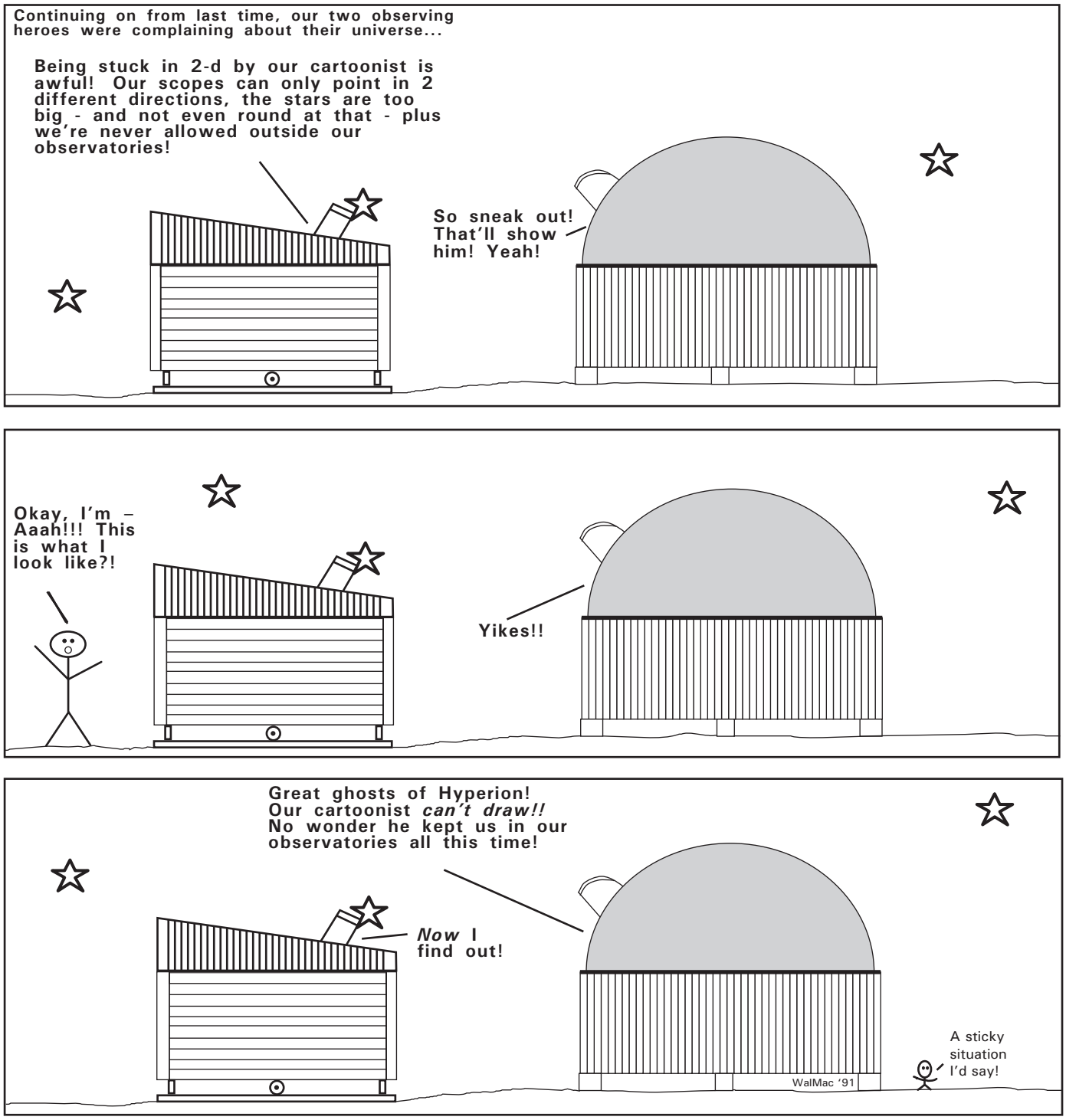
Sincerely,

Bill Broderick

ENCLOSURES:

Shielding the Night Sky, article by Tim B. Hunter and Bob Goff, Astronomy, Sept. 1988
Tower Kills: The Lethal Lure of Light, article by Tim Tiner, Seasons (FON), Winter 1991
Theft of the Night, IDA Information Sheet No. 18
Economic Issues in Wasted and Inefficient Outdoor Lighting, IDA Information Sheet No. 26
The Night Face of North America, satellite photo-mosaic, IDA

* **SEE NOTES (page 8)**



NOTES RE LETTER TO BELLEVILLE

(1) An article in the **IDA Quarterly Newsletter** for January 1992 states that **"Ontario Hydro is now offering substantial rebates to any municipality installing full cut off shields on standard dobra head street lights."** However, in conversations and correspondence with Ontario Hydro officials, I have ascertained that Ontario Hydro is offering a 25% rebate on installation of **new** full cut off fixtures only. They will not pay anything for retro-fitting existing cobra head fixtures with full or partial shielding. The difference is that a new fixture costs in the area of $600 or $700 and the hoods for retrofitting cost only about $100.

(2) I have received a reply from William C. Moreton, City Clerk, that my letter has been forwarded to **Belleville Utilities Commission** for their consideration.

Royal Astronomical Society of Canada
1992 General Assembly
Announcement

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The Calgary Centre would like to invite astronomers, both professional and amateur, to rendezvous near the magnificent Rocky Mountains for the 1992 Royal Astronomical Society of Canada General Assembly. Located in the beautiful Bow River Valley, Calgary-this year's host-city has much to offer delegates attending this gala event. One can shop in Canada's energy capital, or escape into the wilderness of the Rockies, or simply renew or initiate new friendships with other enthusiasts. Accomodations for the 1992 GA will be at the University of Calgary, and an extended stay can be arranged to take in the eightieth running of the Calgary Exhibition and Stampede, plus numerous other tourist attractions. The GA is loaded with interesting activities! Here are some of the planned events:

July 1, 1992
After registering at the University of Calgary, attend the Canada Day fireworks display and public starnight hosted by the Calgary Centre.

July 2, 1992
Enjoy a day trip to Drumheller, Alberta to visit the Royal Tyrrell Museum of Paleontology, and step back in time to when the dinosaurs ruled the Earth. A stop is planned to visit the K/T boundary which marks the extinction of the dinosaurs in the geologic record, possibly due to an asteroid impact 65 million years ago. In the evening, visit the Alberta Science Centre/Centennial Planetarium featuring a robotic dinosaur exhibit, and have a piece of birthday cake to celebrate their 25th Anniversary. The Calgary Centre played an important role in establishing the Planetarium as the city's Centennial Project back in 1967. The Helen Sawyer Hogg public lecture featuring Dr. Alan Hildebrand will be held this same evening at the Planetarium.

July 3, 1992
Friday morning and afternoon are booked for the National Council Meeting and various committee meetings. If you are not committed to these meetings, then you are free to either enjoy the Stampede Parade or take a day trip to Banff and Lake Louise. The evening will feature a Western Barbeque, Murphy Slide Show and Song Contest, and tours of the U. of C. operated Rothney Astrophysical Observatory and the Calgary Centre's home away from the city lights, the Wilson Coulee Observatory.

July 4, 1992
Listen to interesting speakers during the Paper Sessions planned for Saturday morning and afternoon. A group photo will be taken of the delegates during the noon lunch break. The evening will consist of a formal banquet, an awards presentation, and an after dinner talk by Damien Lemay, our National President.

July 5, 1992
On the final day of the GA, the Annual Meeting and National Council Meeting are planned for the morning. The afternoon will feature free astronomical workshops on astrophotography, astronomical computing, CCD imaging, and astronomy education. The final event is a night at the exciting Stampede Grandstand Show.

The GA will include the traditional photography and display contests. The categories this year are:

* Best Centre Display.
* Solar System Observational Display
* Deep Sky Observational Display (Including Radio Astronomy)
* Instrumentation (Scopes and Accessories)
* Non-Observational (Education/ Light Pollution, etc.)
* Astrophoto - Tripod and Piggyback
* Astrophoto - Prime Focus and Schmidt Camera
* Astrophoto - Projection
* Best Youth Display (Under Age 16)
* Murphy Slide Show (Best of the Worst)
* Song Contest

Further information on contest rules is available by contacting the Calgary Centre.

After the GA, take an extended vacation and explore the Columbia Icefields, Fairmont Hot Springs, Waterton National Park, West Edmonton Mall and much more.

See you in Calgary in 1992!

To receive your registration package contact R.A.S.C.- Calgary Centre, c/o Ms. Dennis Goodman, XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX, Calgary, Alberta, Canada, XXX XXX. Phone (000) 000-0000 or leave a message at (403) 237-STAR (24 hours).

DELEGATE REGISTRATION FORMS

FOR THE 1992 GENERAL ASSEMBLY

WILL BE AVAILABLE

AT THE MEETING

IMPORTANT NOTICE: WITH THIS ISSUE WE ARE RETURNING TO OUR FORMER PRACTICE OF DISTRIBUTING THE NEWSLETTER AT THE MEETING. IF NOT PICKED UP, YOUR COPY OF REGULUS WILL BE MAILED TO YOU. PLEASE HELP US TO SAVE ON POSTAGE BY PICKING UP YOUR NEWSLETTER AT THE MEETING. THANK YOU VERY MUCH.
