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Reflections: The Magic of f-Ratios

Gary Seronik
Vancouver Centre
reprinted from *NOVA*

I have a rather old eyepiece in my collection, a design called a "Galoc". It has a focal length of 16.3mm and seems to have a generous apparent field of approximately 75 degrees. That is about all I know about it. Its optical configuration is an utter mystery to me and I have no desire to dismantle it just to figure it out. How does the Galoc perform? Well, one night I put it in Lee Johnson's 17.5" scope and was amazed! The field was so comatic that the stars appeared as they do on *Star Trek* just as the *Enterprise* lurches into warp drive. In short, it sucked! The good old Galoc was utterly useless in Lee's scope. Yet, I would recommend one, without hesitation, to any Schmidt-Cassegrain owner.

Why? Is it part of some particular animosity I have for owners of Schmidt-Cassegrains? No, I would recommend the Galoc because it actually works very nicely in Schmidt-Cassegrains. One recent night out at Stave Lake, the Galoc gave very pleasing views in Frank Marino's C-8. How can this be? How can an eyepiece perform so poorly in Lee's telescope yet perform like a jewel in Frank's? Call it the magic of f-ratios.

An f-ratio is simply the ratio between a telescope's objective diameter (its main light collecting element, whether lens or mirror) and its focal length. Lee's 17.5" has a focal length of about 79" for an f-ratio of about f/4.5 while Frank's C-8 is an 8" with a focal length of

approximately 80"—an f/10. Often you will hear such and such a telescope referred to as a slow or a fast scope. Generally, anything under f/5 is considered fast, while f/6 to f/8 is medium f-ratio, and telescopes with f-ratios of f/9 or greater are considered slow scopes. This terminology is a hold over from photography but provides us with a handy way of generalizing certain aspects of telescope performance. In this scheme, Lee's scope is considered fast and Frank's slow.

Now, as the example of the Galoc shows, there is apparently some connection between eyepiece performance and a telescope's f-ratio. Why did the Galoc perform so much better in Frank's scope than in Lee's? For the answer, we have to delve a bit into the history of telescopes and eyepieces. The Galoc is an eyepiece designed in an era dominated by medium to slow f-ratio telescopes. Indeed, many of today's better known designs, such as Plössls, Orthoscopes, and Kellners date back to this period. Now, keep in mind that the most popular telescopes of the 1950's and 1960's were 3" f/15 refractors and 6" f/8 reflectors. These were optically slow telescopes and were well served by relatively simple eyepiece designs. The aberrations present in the gently converging cone of light in a slow system could be adequately corrected by a four element eyepiece, provided that the apparent field remained a sensible 50 degrees or less.

With the advent of the Dobsonian revolution two things happened. Firstly, there was an explosion in the numbers and size of large aperture Newtonians. These telescopes were necessarily of the fast variety. (One can imagine the ladder needed to reach the eyepiece of a 17.5"

f/10 perched some fifteen feet above the ground!) Observers discovered that their Orthos and Plössls no longer did the job. The field was badly comatic only a few degrees off axis. The older eyepieces were never designed to cope with the rapidly converging light cone of an f/4.5 system.

The second major change was the desire for wider true fields which necessitated eyepieces of larger apparent fields. This stemmed from a shift in emphasis in what backyard astronomers were viewing. For various reasons, the planets became passé and surveying the deep sky—something the larger scopes were well equipped to do—became the occupation of choice. While field size mattered little in viewing planets, it did become an issue for deep sky viewing. Suddenly there was a demand for wide field designs with corrections capable of handling the fast (f/4.5) focal ratios of these new Dobsonians. Thus the Nagler eyepiece was born, along with a succession of imitations. It was not long before the eyepiece industry exploded with a profusion of designs and brands, all claiming 70 degree plus apparent fields with "tack sharp" correction.

Now, getting back to the telescopes of Lee and Frank. Remember that Lee's 17.5" is an f/4.5. Lee has to use a well corrected eyepiece, such as a Nagler, particularly if he wants a wide field design. Frank, with his f/10 telescope has an advantage. His telescope does not require the same degree of correction as Lee's. There is no reason for Frank to pay for a Nagler when a much less sophisticated wide-field design will do. He can get by with, dare I say it, a Galoc! Even an Erfle, or one of the many other less

(continued on page 8)



BULLETIN

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Cover Picture: The Windsor Casino, Ontario's first (and so far only) casino.

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Letters to the Editor

Don't Forget Pickering!

In the February issue of the *Journal*, on page 38, a book entitled "The Explorers of Mars Hill" by William L. Putnam is reviewed. Towards the end of the third paragraph, it is stated that "for the planet Pluto so named, of course, the first letters, PL, superimposed to form the planet's astronomical designation, were also the initials of Percival Lowell..."

PL can be interpreted to represent the initials of Percival Lowell, and he had rightly predicted the existence of the planet, but he was not the only one. There is another way of looking at it, and PL could also stand for the first letter of the last name of each of two famous astronomers. William H. Pickering, at about the same time, also predicted a trans-Neptunian planet which he term "O", in contradistinction to Lowell's planet "X".

When Lowell died in 1916, Pickering continued the search, and in 1919, he actually altered his theory regarding its hypothetical location, and accurately predicted that the orbital perihelion of the planet might, at times, bring it closer to the Sun than Neptune.

For this research alone, Pickering deserves some credit, although he has been largely ignored where Pluto is concerned, by quite a number of astronomical authors. Therefore, in my opinion, PL could equally well stand for Pickering-Lowell; in this way he is vindicated.

Dimitri P. Photiades

299 Spring Garden #310, Dollard-des-Ormeaux, Québec H9B 1S7

Little More Than Orange Juice?

I am writing in response to Stephen Biggs' letter in the long-lost August **BULLETIN**. It is very clear from Mr. Biggs' letter that NASA, the Canadian Space Agency, and the scientific community in general have to do a much better job

of selling the benefits of pure scientific research. Much of what we enjoy and take for granted today started life as pure research in the eighteenth hundreds. This may seem like a very long time to wait for rewards, but think of where we would be today without such basic research; no antibiotics, no electronics, no automobiles, no modern medicine, and (heaven forbid) no quality telescopes at a "reasonable price".

The space program in particular does little or no work in publicizing its successful spin-off technologies. I have spent a few days doing some reading and would like to share some of what I have found with other readers of the **BULLETIN**.

There are several obvious benefits to space technology. Both sensing and communications satellites provide an invaluable resource to all the people of this world. The weather forecasting and environmental monitoring services provided by these devices have saved countless people from the ravages of severe storms. A satellite due for launch soon, called RadarSat, promises to provide some of the best information available to emergency response teams fighting forest fires and oil spills. The radar imaging system employed by this device is based on the one used in the Magellan space probe that has returned so much information on our "sister" planet.

There are also several less obvious benefits to research done for the space program. Materials research done by NASA and others, has led to many useful innovations such as Gortex, that wonderful material that allows FarWest to make outrageously priced clothing. Gortex was not developed by NASA, but was instead characterized and refined by the agency for use in space suits. This characterization then led to the use of Gortex for artificial arteries, thus allowing people with severe vascular problems to lead safer, more productive lives. Ceramics are another material that has been placed under the NASA microscope. The research done on the

ceramic material used for heat dissipating tiles on the shuttle has led to ceramic coatings for many modern pacemakers. It turns out that this ceramic material is almost never rejected by the body.

Another area that has benefited from space research is electronics. In the early sixties, NASA led the way to the integration of many components on a single chip of silicon. This technology now shows up in everything!!! It has led to better brakes in automobiles, smaller computers, improved navigation, modern medicine, and even better toasters in our homes.

As for whether or not there is an immediate return from the space program, just look at the numbers. NASA's budget is just under six billion dollars for manned space flight this year. That seems like a large outlay of cash, until you factor in the eleven billion dollars in sub-contract work, parts purchases and general employment this expenditure stimulates in the North American economies.

Incidentally, of the three spin-offs mentioned by Mr. Biggs in his letter, the only one that owes its life to space research is pens that write upside-down. Velcro is used in space, but was around before the space program decided to use it. Tang was developed in the USA to replace an orange crop lost to frost.

Blair MacDonald

28 Laurentide Drive

Halifax, Nova Scotia B3M 2N1

Testimony to an Astronomer

It is with sadness that I write this memorial to my good friend and observing partner, Paul Smith. Paul fought valiantly against a very aggressive cancer and fell victim on the morning of May 22nd. Life seems to deal us a "bad hand" sometimes, regardless of how well we try to plan and live it.

I met Paul through our hobby, next to his beloved telescope in Mount Albert. Paul was a skilled and persistent astronomer, who, to my

knowledge, never gave up easily until the light of dawn. In fact, many a night, at a star party event, I found myself dragging my feet around, in a sleep-walking state, trying to keep alert, while he went about finding that "last object of the night", which was always far from the "last". My fondest event with Paul was at the Winter Star Party in Key West, where we both "flew off into the dream world of southern skies and southern hospitality". How fortunate I was to be able to share this fantastic event with him, and I shall always enjoy this memory of his friendship. Although we astronomers always talk about the technicalities of astrophotography or optical theory, we are basically aesthetes, and Paul loved astronomy as his own life. To see him talking about his favourite object, the focusing device of his own design, was to see him in his area of joy, for he truly loved to make and market his personal invention. At all the star parties we went to, I remember him standing persistently behind his table of products, diligently promoting his Kwik-Focus, to the last moment.

Paul had a common-sense attitude toward astronomy, which I loved to see him promote. He truly lived for the nights he could focus in on his favourite object; the Moon. Some of his high resolution photos of the Copernicus area are the best I have ever seen. He used a 6-inch D&G refractor, mounted atop his old favourite 16-inch Deep Sky reflector. How he endured some of the cold winter nights that provided his best resolution photos I will never know—but I truly admired his tenacity to achieve excellence. He called me almost daily from his office in the plant in Newmarket to talk about his observations of the preceding night. I miss his cheery calls immensely.

The astronomers of our region have lost a long-time companion and friend of the night. It seems so very unfair that his dreams for a personal business in astronomy were cut short. I feel the tragedy of Paul's untimely demise so poignantly now. God bless Paul for his special enthusiasm and for enriching the lives of all those who knew him in our hobby. May he rest within the skies he loved so much.

His friend in astronomy,

John Hicks

P.O. Box 75, Keswick ON L4P 3E1 ☎

AstroAds

8" f/15 refractor, D&G Optical, motorized equatorial mount, counterweight, Motofocus, balance brackets, brackets for JIM Minimax \$5,400. Philippe Aubry (514) 631-6071 ☎

Items of Interest

Eclipse Expeditions Organized

Expeditions to India to view the October 24th solar eclipse have been organized by two groups, one in Calgary and one in Vancouver. The basic package for both tours consists of a ten day expedition which will view the eclipse from a site at the edge of the Great Indian Desert. Included are many side trips to interesting sites, both astronomical and otherwise. Additional options, including side tours to Nepal are also available. The basic tour, departing from Vancouver is about \$3,600 - \$3,800.

For more information about the Calgary tour contact:

Don Hladiuk
(403) 266-7809
don.hladiuk@f122.n134.zl.fidonet.org
or
Alan Dyer
(403) 221-3731
science@cadvision.com

For more information about the Vancouver tour contact:

David Hurd
Pacific Science Centre
(604) 738-7827
gstation@pacific_science_centre.bc.ca

All in a Flap

The International Deep-Sky Association's February 1995 newsletter carried an item from Paul L. Aird, of the Faculty of Forestry at the University of Toronto's Earth Science Centre

concerning their Fatal Light Awareness Program (FLAP). This program seeks, on the one hand, to document the harm to birds and other animals caused by light pollution, and on the other, to publicize the problem. One bad weekend in Toronto, for example, resulted in over 10,000 bird deaths

FLAP is a registered charity in Canada; if you would like to support the program financially or in any other way, your assistance would be very much appreciated. They can be reached through:

PAUL L AIRD
FACULTY OF FORESTRY
EARTH SCIENCE CENTRE
33 WILLCOCKS STREET
TORONTO ON M5S 3B3 ☎

Event Horizon

Alberta Star Party (Sept. 1st-4th)

The star party will be held at the Eccles Ranch in Caroline, Alberta. Registration before August 1st is \$10 for a single, \$15 for a family; add \$5 after this date. There are campgrounds and motels in the area.

For more information contact:

ALISTER LING
13337—116TH AVENUE
EDMONTON AB T5M 3E4
(403) 454-9267
or
RICK AND CAROL WEIS
4612 17TH AVENUE NW
CALGARY AB T3B 0P3
(403) 265-8222 ☎



A smiling David Levy (standing at right) on stage at Acadia University, where he recently received an honorary degree. It was at this ceremony that he announced, to an unsuspecting audience, that an asteroid, acadia, had been officially named after the university.

Star Charts Suitable for CCD Cameras

Chris Brown
Winnipeg Centre

CCD cameras have changed the world of astrophotography—some would say for the better, others for the worse. On the plus side, exposures that used to take hours with film take minutes, or even seconds with a CCD camera and appear immediately on the computer monitor instead of hours later in the darkroom. Unnoticed mistakes that used to ruin a whole night now get caught right away. On the down side, CCD astrophotographers require a specialized electronic camera (which is not able to take family photos!), a computer and some place to keep the computer warm in winter. Image sizes are small: a few arc minutes across instead of a few degrees with film. The list of pluses and minuses goes on—as does the debate—but it is probably safe to say that CCDs and film both have a place in amateur astronomy.

The first time you use a CCD camera you will be made aware of a new problem. Within seconds you may be looking at a bunch of fifteenth magnitude stars (not to mention the possibility of some anonymous galaxies) in a tiny patch of the sky. Unless the telescope is pointed very precisely at its target, your image will be of some area near, but not on, the target. You need to know where you already are to be able to nudge the scope to where you want to be.

The star atlases used by most amateurs show stars only as faint as sixth to tenth magnitude and at a scale of a degree or more per inch. Trying to relate CCD images to these atlases is like trying to find your way around a city with a map of North America. In the last few years several computer star-charting programs have appeared on the market. A few include the fifteen million stars of the Hubble Guide Star Catalog (HGSC), developed by NASA for pointing the Hubble Space Telescope. Such detailed star charts are essential for finding your way around the sky with a CCD camera.

This article is a review of some of these star charting programs. There were only three criteria used to select the programs for review: IBM compatibility, a cost of less than \$US100 and inclusion of the HGSC. Three programs were reviewed:

- Project Pluto's Guide version 3.0
(DOS & CD-ROM) \$US 69.00
- Distant Suns version 3.0
(Windows & CD-ROM) \$US 69.00

- Megastar version 1.1
(Windows, CD-ROM) \$US 99.00
(Windows, floppies) \$US 149.00

As this was being written it was learned that *Deep Space 3D* (\$US 100) now makes charts that include the HGSC. A program named *The Sky* was not reviewed because of its cost of approximately \$US 250.

Guide

Project Pluto's Guide arrived tax- and duty-free in a plain brown envelope shortly after I ordered it. The manual is Xeroxed and the DOS interface is simple. The program can be run entirely with a mouse (useful in the dark) or from the keyboard. It installed effortlessly, was easy to use and only complained when I tried to run it with only 500K of RAM—550K is sufficient. The program offers a lot of flexibility in designing charts: field sizes, objects shown, object labels, star sizes and legends are all controllable. Extended objects such as galaxies are drawn to the correct scale and orientation.

My only complaints are small. In order to make the faintest stars appear bigger than specks on a laser printer the brighter stars end up huge or not to scale. Making the minimum dot size bigger would solve the problem. Also, object labels are sometimes overwritten by the object and vice versa. Otherwise, I found it to be an excellent program and the "best buy". In addition to plotting charts, one can click on any object for information. There are several screens of technical info on the better known objects, taken from every conceivable catalogue. Planets, comets and asteroids can be plotted or "trailed" to draw their lines of motion on the charts. Time and location can be entered so the program can calculate the location of the horizon and an object's altitude and azimuth. If you own a Meade LX200 telescope, you can control the scope with the program.

Distant Suns

Until recently, the second program reviewed, Distant Suns, cost \$US150. The "sale" price of \$US 69 has been available for some time and may be the new price. The program took almost a month to arrive. Since it was in a big, glossy, shrink-wrapped box, Canada Customs ignored the \$10 value someone had marked on it and charged taxes and handling on \$CDN 60 (a total of \$13). Although the program uses a CD-ROM, almost twenty megabytes of programs were added to my hard-drive during installation. The installation itself went smoothly, the Windows interface is well organized and easy to use, however, this program is not designed for creating useful CCD star charts. The smallest field size is 3 degrees and all the fainter stars of the

HGSC are lumped together in a few dot sizes—each dot size representing a 3 or 4 magnitude range. Only the centre points of objects like galaxies are indicated. There is no hint of the extent or orientation of the object. The program allows animations of the Moon and planets against the background stars but when I set it up for the January 1995 lunar occultation of Spica as seen from Winnipeg, the Moon missed Spica. Customer service was very friendly, explained that the program was not designed for that sort of precision and offered to refund my money. What the CD-ROM did contain was 1 500 images of planets, deep-sky objects and other such goodies. Some, I have seen nowhere else.

Megastar

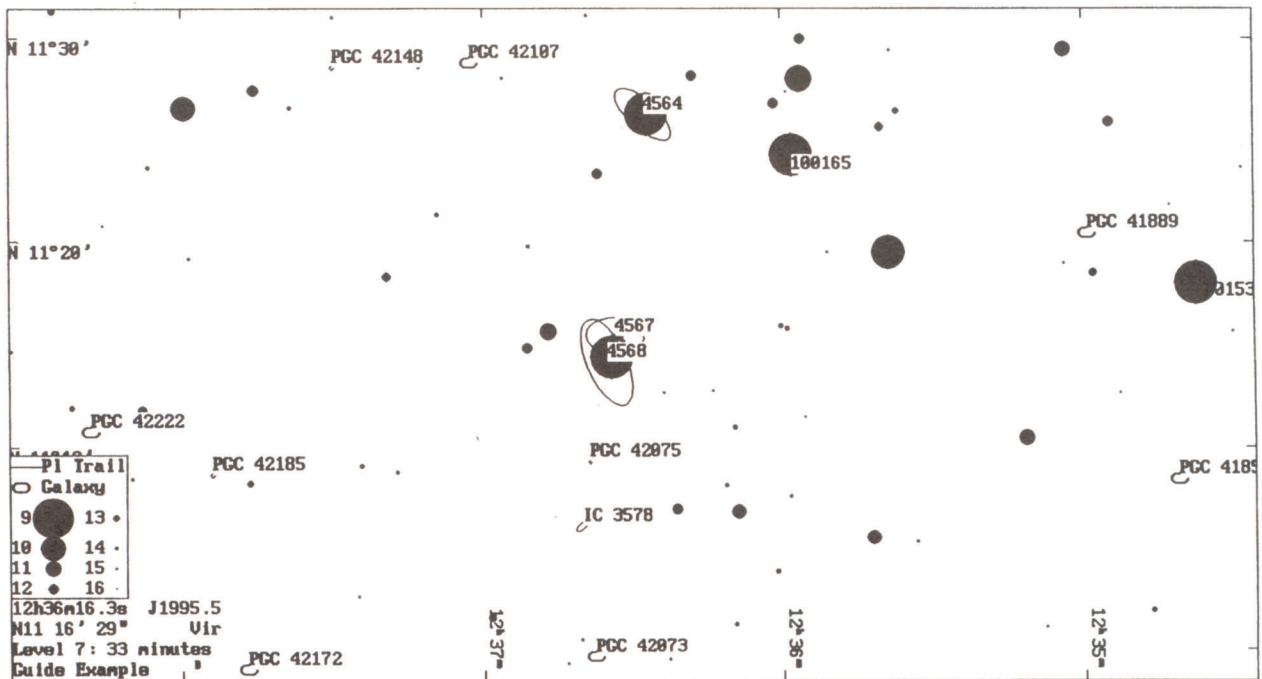
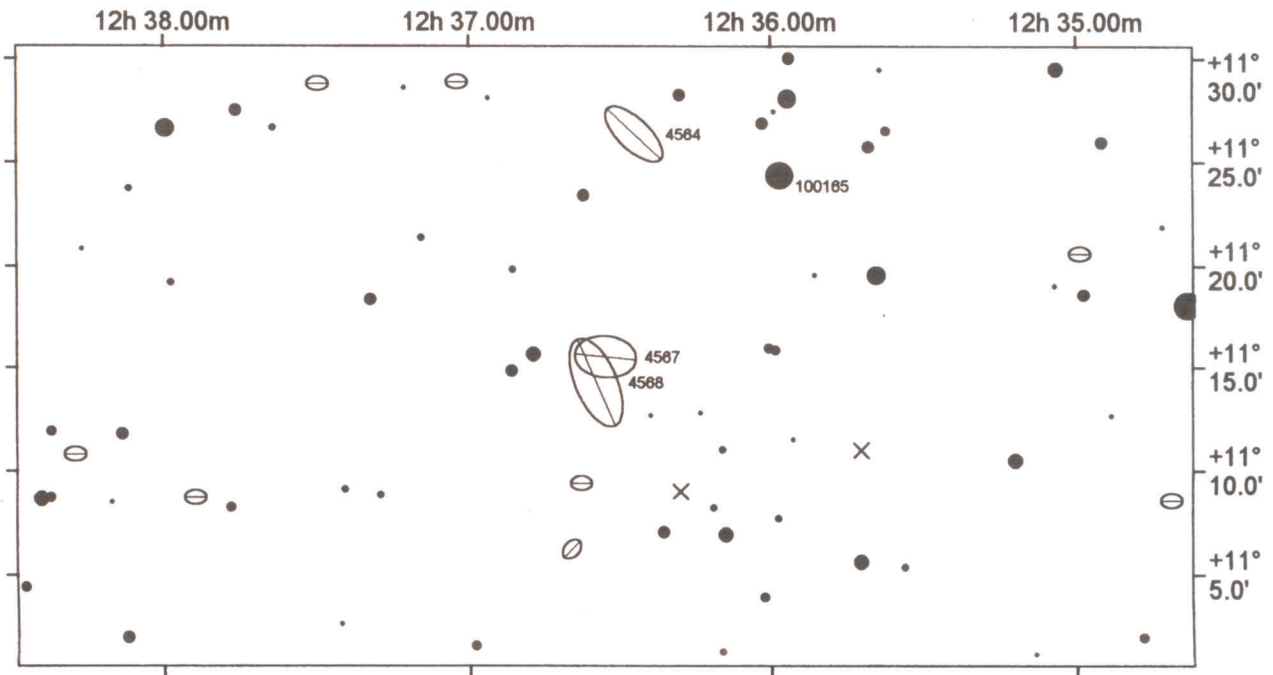
The writer of the third program, Megastar, offers a free demo-disk that includes a complete working version of the program with data on a small part of the sky. Installation of the Windows program was straightforward. The program is very easy to use and produces clean, good looking star charts with very little effort. One can adjust field sizes, objects shown, object labels and legends. Labels are well placed and can be selected by object type or limiting magnitude. Extended objects such as galaxies are drawn to the correct scale and orientation. An eyepiece circle or camera rectangle can be overlaid on the chart. Planets, comets and asteroids can be plotted and animated to leave "trails" on the charts. There is little flexibility in the sizes in which the stars are printed but the default dot sizes are fine. Clicking on stars and objects produces a short table of information about the object, including rise and set times. The author added a note that the next version—which should be available by the time you read this—will include variable star data and controls for LX200 and Sky Commander driven telescopes.

Conclusions

Making the decision between *Guide* and *Megastar* will probably be based more on your operating system than on the programs. Both produce good charts of extended objects, solar system bodies and stars to fifteenth magnitude. If you do not have Windows then *Guide* is your choice and if you do not have a CD-ROM then *Megastar* is the one (although the extra cost of the floppy disk version could be used to help pay for a CD-ROM player). Either way, these programs are going to be a great help to anyone exploring the sky with a CCD.

This review was intended as a quick overview of programs advertised in *Astronomy* and/or *Sky & Telescope* magazines. If I have overlooked any programs or features in the ones reviewed, please accept my apologies. ☆

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Galaxy 	GlxY Cl 	Globular 	Open Cl 	Planetary 	Clust+Neb 	12h 36m 32.8s +11° 15' 35"			
Bright Neb 	Dark Neb 	Asterism 	Unknown 	Comet 	Asteroid 				



Examples of star charts made with Megastar (top) and Guide (bottom). In both cases the field is about one degree wide and all stars down to the limit of the Hubble Guide Star Catalogue are shown.

Lightwaves: Why Be Concerned About Light Pollution?

Bill Broderick
Kingston Centre

Twinkle, twinkle, little star,
How I wonder where you are.
I know you're up there in the sky,
But I've got these streetlights in my eye!
—BB

Light pollution is something like the weather; we amateur astronomers gripe a lot about it, but very few of us try to do anything about it. Why not? Perhaps one reason is that we are not quite sure how to begin. Another may be that, apart from the inconvenience to ourselves and to professional astronomers, we do not see it as a very serious problem.

A Tax Issue

Sky-glow, glare, and light trespass, however, affect us in many ways besides blocking our view of the night sky. One of these ways is in the pocketbook. Since the light is going up into the sky rather than illuminating anything useful, it is wasted light. Wasted light means wasted utility and tax dollars. The International Dark-Sky Association (IDA) estimates that in North America alone, we waste between one and two billion dollars a year. As Kitt Peak astronomer David Crawford, IDA's executive director, likes to put it, that is a lot of money just to light up the bottoms of birds.

With government and business coming up against a tax and cost wall in the 1990s, it makes sense to explore every option we can to cut expenses. Cutting light pollution would certainly save us money.

An Environmental Issue

If the thought of your hard-earned tax dollars going to waste to light up the sky is not enough to make you sit up and take notice, how about light pollution's effect on the environment? In certain parts of Florida, for example, municipalities have found it necessary to regulate outdoor lighting in the vicinity of the beaches because baby sea turtles are attracted by the lights and come up on land by the thousands to be crushed on the roads and highways.

Consider also migrating birds. They are attracted by the bright lights of office towers and other high structures. I first heard about the

phenomenon of tower kills" during the building of the CN Tower in Toronto. Years later I read about a ten-year period at Ontario Hydro's Bath Generating Plant, west of Kingston, where nearly 23,000 birds were killed by flying into the plant's floodlit smokestacks. The problem there was finally solved by replacing the floodlights with strobe lights, which do not have such an attraction for the birds. This solution was implemented, though, only when members of the Kingston Field Naturalists raised a public hue and cry that forced Ontario Hydro to act.

Besides animals and birds, there is evidence that plants are also affected. For example, deciduous trees and shrubs located near streetlights and yard lamps, sense the artificially long period of "daylight" and continue to grow into the fall. They thus fail to harden properly and are weakened by excessive winter damage.

People also may be affected, to their detriment, by too much night-time lighting. Some studies indicate a possible link between artificial lighting and breast cancer. The theory is that bright lights curb the brain's nocturnal production of melatonin, a regulator of estrogen production, raising women's susceptibility to this disease.

Then there is the glare. Road lighting is supposed to help us see better when driving at night, but how many accidents are caused by drivers being blinded by the glare from the very lights that are supposed to help them see?

Many Reasons

Thus, there are many reasons why amateur astronomers, and others too, should be concerned about light pollution. It wastes tax dollars, adversely affects the environment, may be a factor in reducing human health, and interferes with our astronomical pursuits, and everyone's enjoyment of the night sky.

Join IDA

In future articles in this section, we will look at what constitutes bad and good lighting, and what we can do, individually and collectively, to promote responsible lighting in our homes, businesses and communities. Right here and now, though, I want to suggest how every one of us can help in this regard, whether or not we ever become active in a more personal way. That suggestion is quite simple: join the International Dark-Sky Association. IDA is the leader in the push for better lighting. By joining it and supporting its efforts, we can make an invaluable contribution in our own right. As a member, you will receive the IDA's newsletter, which will keep you up-to-date on developments everywhere. Believe me, there is lots going on that everyone

interested in the light pollution problem should know about. Progress is being made on many fronts, most of which is due to the IDA and IDA members and supporters, and keeping up with this news can suggest to us things that we could be doing in our areas.

IDA Information Sheets

Another reason to join the IDA is for the information sheets. There are currently ninety-six of them, and more are being added all the time. They are a veritable gold mine of information for anyone contemplating taking any kind of personal action or for anyone who just wants to understand the issue.

In the information sheets you will read what many people, some well-known, have had to say about the proliferation of poorly designed lighting and the virtual destruction of the night-time sky. You will be able to read up on the actual specifications of various kinds of lighting and see why some types are really better than others. You will find numerous examples of actual state and municipal ordinances regulating lighting. You will get actual "how to" ideas and tips on how to deal with particular problems, such as "How To Talk To Your Neighbour Who Has A Bad Light". The latest is entitled "How To Get an Outdoor Lighting Ordinance."

Where is Everybody?

According to the October 1994 IDA newsletter, there are seventy-five Canadian members. I find it hard to believe that out of 3 000-plus RASC members, not to mention members of other Canadian astronomical clubs and associations, there are only seventy-five people who care enough about light pollution as a problem to join IDA. I think we can do better. A lot better. IDA is doing a great job, but it needs our help, our support, our membership. If you really do care about light pollution—and I know that lots of you do—send off your membership today. Dues are only \$US 20 a year. You can pay by cheque or money order and IDA also takes Visa and Mastercard. The address is:

INTERNATIONAL DARK-SKY ASSOCIATION
3545 N STEWART
TUCSON AZ 85716
USA

Until next time, clear (and dark!) skies!

Readers are invited to share their news and views on this problematic subject. Please send correspondence to:

BILL BRODERICK
RR#1
SHANNON VILLE ON K0K 3A0 ☎

National Astronomy Day 1995

Sandy Ferguson
National Astronomy Day Coordinator

International Astronomy Day 1995 was held on May 6th, with centres having the option of presenting an Astronomy Week from May 1st-7th. The theme this year was "Light Pollution: A Serious Problem" and centres were encouraged to provide displays and plan activities around this theme. The deadline for Astronomy Day reports from all centres was June 15th, 1995 and reports from only three centres were received:

Kingston Centre

Clear skies! That is what the Kingston Centre had on Saturday, May 6th for Astronomy Day! This year, our centre's sixty members hosted public mall displays in two different cities, Kingston and Belleville, with evening observing held jointly with the Queen's University Astronomy Group. These events were coordinated by Peggy Torney, Cathy Hall, and Dr. Judith Irwin respectively. The Kingston Centre is one of the few in Canada with a large percentage of active women observers. The Belleville Astronomy Club was also well represented, with President Dan Rombough of Marmora, Ontario assisting with

displays and organizing an evening observing session in Belleville.

Our theme for this year was "The Stars Belong to Everyone", after the book of the same name by Dr. Helen Hogg. The auxiliary theme was light pollution. Bill Broderick, one of the Canadian activists against light pollution, had an excellent freestanding display on lighting and its effect on astronomical pursuits. Many people stopped to read through it in detail.

Detailed observations and astrophotographs for the displays were provided by Leo Enright, editor of the *Beginner's Observing Guide*, and by Walter MacDonald, the centre's president.

We had a variety of telescopes at our displays; an AstroPhysics refractor, a 13" bright red Odyssey Dobsonian, several Schmidt-Cassegrains, and an Astroscan. The children were enamoured of the telescopes, and the other 'hands-on' items. The inflatable star globes and solar system models were a real hit. One of our members, Steve Manders, demonstrated Dance of the Planets on his computer. Overseeing the activity at Kingston was a life-size cutout of Jean-Luc Picard, from *Star Trek*, suitably attired in an RASC toque!

All those who helped out for Astronomy Day enjoyed the opportunity to talk to the public and provide them with information on our society and astronomy in general. We had the opportunity to show them telescopes by day, and the sky

by night—and to let them know that, yes, the stars really do belong to everyone!

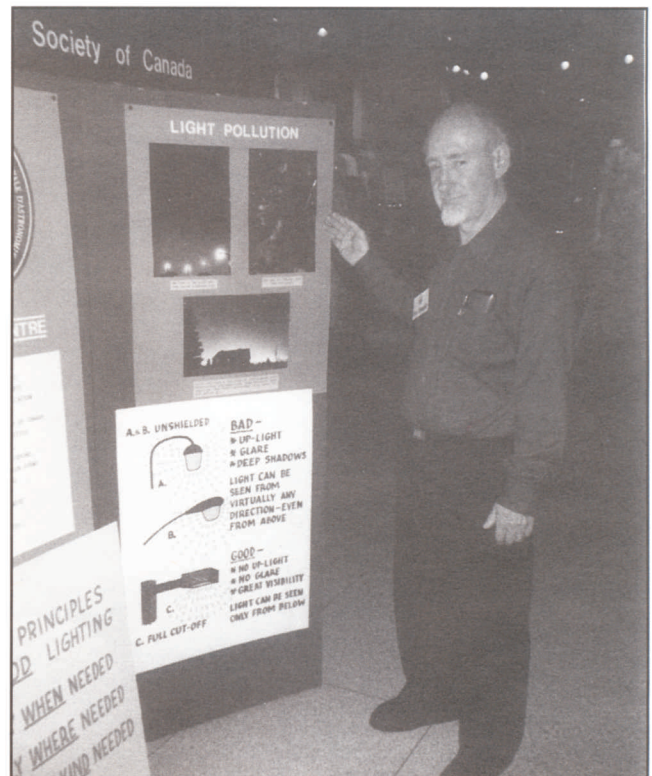
Regina Centre

The weather on Astronomy Day was not good, with broken cloud cover in the morning, rain in the afternoon and cloud in the evening. For this reason both daytime and nighttime viewing of the sky was cancelled. The centre set up a display in a shopping mall in the city, with telescopes, planispheres and various publications and other astronomical items of interest on display, together with videos of planets and deep sky objects. The theme of light pollution was also addressed. The centre also had a set-up at the Science Centre in Regina.

Saskatoon Centre

This year's Astronomy Day was moderately successful for the centre, although there were not as many visitors to the centre display as in previous years. Astronomy Day was competing with a number of other events going on around the city and it resulted in a relatively quiet day for the event.

The day dawned sunny and mild but gradually hazed over during the day, with cloud moving in toward evening. Display tables, telescopes and other equipment were set up at the Market Mall, with the theme being "Light Pollution: A Serious Problem". Slide presentations on light pollution and general astronomy were presented



Left: Joe Shields, from the Belleville Astronomy Club, amid their Astronomy Day display. Right: Bill Broderick of the Kingston Centre with part of his display on light pollution.

and resulted in a fair audience from shoppers. Many were very interested in the RASC and the centre expects to get new members as a result. Shafraz Iqbal set up his award-winning science fair display on last summer's encounter between Comet Shoemaker-Levy and Jupiter, which attracted a lot of attention.

Although Rick Huziak's solar scope was on hand to check out the Sun, haze prevented solar observing. There was one brief moment around noon when a clear patch revealed the Sun, but a quick look revealed no sunspot activity. A free draw was held, with the prize being a copy of the book "The Astronomers: The Companion Guide to the PBS Series".

The planned annual Astronomy Day public starnight at Diefenbaker Park fell through as it was clouded out. Saskatoon Centre's Astronomy Day starnights are getting to be very disappointing, as there has been only one successful starnight in the last four Astronomy Days!

As usual, the centre is fortunate in having a lot of great members who made the day a success. Thanks to Rick Huziak, Amy Huziak, Al Hartridge, Jim Young, Scott Alexander, Don Friesen, Shafraz Iqbal, Kim Mysyk, Gord Sarty and Garry Brett for making the day happen and to many members who dropped by to lend support.

From the Montreal Centre Newsletter

SKYWARD reported that the centre had four locations for its Astronomy Day events—Place de la Cathedrale, Cavendish Mall, Fairview Mall and the centre observatory in the evening, where members and guests viewed a special presentation of space art, followed by an observing session. Reports from the individuals responsible for setting up the three mall displays indicated a great deal of interest throughout the day at all displays and a good crowd at the observatory at night, where space artist Jean-Pierre Normand exhibited his artwork.

Next Year

Astronomy Day 1996 will be celebrated on Saturday, April 20th, with Astronomy Week running from April 15th-21 st. A theme for has not yet been chosen. ☪

Correction

There were two typographical errors in the article, "A Planetary Periodic Table" which appeared in the February issue. In Table 1, the range of BTL III should read $1 \leq n \leq 5$, as stated in the commentary for Table 2, not $1 \leq n \leq 4$ on page 7, near the bottom of the column, it should read "...all orbits from Saturn outward are almost equal: 31, 35, 30 and 31 respectively." ☪

Reflections: The Magic of f-Ratios

(continued from page 1)

complex wide-field designs, will do quite nicely for an 8" Schmidt-Cassegrain.

I have often wondered why all those people with 8" Schmidt-Cassegrains would hand over the kind of money a Nagler demands. Inertia? Marketing? I do not know. Less complex designs have a number of advantages over their sophisticated cousins. Fewer lens elements means more light throughput, a lighter eyepiece, and most importantly—less cost! My message to Frank, and others blessed with a slow optical design, is simple: take advantage of your f-ratio! Let the kindness of your slow optical system work for you. ☪

Burke's Blunders

Dan Collier
Vancouver Centre
reprinted from NOVA

The redoubtable James Burke, creator of the television series *Connections*², made two earlier series which are favourites of mine. The original *Connections* series combined breath-taking editing, painstaking research and some very thoughtful writing. *The Day the Universe Changed* followed up with even sharper techniques. What stood out in particular was Burke's narration. It was so fresh and down-to-Earth that every minute was a pleasure to look forward to.

Burke's recent offering, *Connections*² (shown on The Learning Channel) has damaged my confidence in him and the BBC. Since *Connections*² was produced by "the Beeb", I took it for granted that if Burke said "boo" it must be true. Well, was I ever in for an attitude adjustment! During one episode, Burke rang up no fewer than eight astronomical gaffes, almost in consecutive sentences. I was so shocked that I wrote them down to share with you.

1 "The stellar magnitude scale was based on the minimum perceptible change in the brightnesses of stars. One magnitude is the smallest such change." Complete tyros can easily see differences among the first magnitude stars and experienced observers can perceive a difference of a tenth of a magnitude. Even Ptolmey assigned fractional magnitudes to some stars that clearly did not fit into a six-level system.

2 "The difference in brightness between first and fifth magnitude stars is 100." Oh yes, he definitely said "fifth" and not "sixth". In truth, a difference of five magnitudes, not four, is equivalent to a ratio of 100.

3 "The smallest perceptible change in the brightness of a source of light is equivalent to adding one candle to fifty others." This is only 0.022 magnitudes, well below a human's ability to distinguish changes in stellar brightness. Furthermore, Burke had just stated that the minimum perceptible change was one magnitude, equivalent to adding three candles to two.

4 "John Herschel measured the brightness of stars by comparing a star with a standard star magnified until the two were of equal brightness." It is difficult to condemn this statement out of hand since the first photometers worked something like this. On the other hand, John Herschel should not be credited with inventing the photometer.

5 "Variable stars are used for measuring the distance to galaxies." In the program, a cartoon shows a white star with a larger, fainter blue star circling and eclipsing it. As the animator pulls back to simulate a great distance, we are told that this system constitutes a variable star suitable for distance measurements. Of course, intrinsic variables known as Cepheids are the famous yardsticks, not the eclipsing binaries.

6 "The distance to this galaxy, the Large Magellanic Cloud, was determined using variable stars." True, but what flashes up on the screen is a slide of the more attractive Andromeda Galaxy.

7 "The period-luminosity relationship was discovered by Hubble." No historian today would dare credit this to anyone other than Henrietta Leavitt. Hubble applied Leavitt's discovery to determine the distance to the Andromeda Galaxy.

8 "Keffid variables are used to determine the distances to the galaxies." For as long as I can determine, "C" before "e" has been sounded as "S" by scholars of ancient Greek. Perhaps Burke had a mistaken Greek teacher... If you say "Keffid" around other astronomers they will look at you strangely.

In fairness, *Connections*² runs in a thirty minute time slot, with commercial breaks. It does have a virtue or two—it is one of the few science programs that my wife will watch (and she does not even like science). While it does not stoop to the level of supermarket tabloids, however, it may come to represent to pay-TV viewers what "The Three Tenors" have come to represent on the PBS network. ☪

Knowledge is a matter of science, and no dishonesty or conceit whatsoever is permissible.

*Mao Tse Tung
Chinese political leader (1893-1976)*