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BULLETIN

La Société Royale d'Astronomie du Canada

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Reflections: Names and Lists

Alister Ling
Edmonton Centre
reprinted from *Stardust*

The December 1995 issue of *Sky & Telescope* carried an article: "Beyond Messier: The Caldwell Catalog". I was really looking forward to reading what objects Patrick Moore would select. I made it past the title and the first three and a half sentences of his introduction before stumbling on a long fall into the pits of distaste. Although it is very laudable of him to encourage amateurs to look past the Messiers into the greater—and occasionally more interesting—depths of the night sky, his method is quite inappropriate. If it was simply "Moore's Favourites" or "Moore's Top 100", I would not have written so sourly below.

My disbelief grew as I read on. "Caldwell 11, the Bubble Nebula..." Who is ever going to remember the Bubble Nebula as a new number? Who needs to? "The Hyades... appears here as C41." The Hyades sparkle just fine by themselves thank you very much.

It is a great idea to popularize some lesser-known objects, but did Roger Tory Peterson rename birds after himself in his field guides? It appears presumptuous and conceited to rename parts of a well-known catalogue as Moore's own: "Moore, like Messier, begins with 'M'. Fortunately, my surname is actually hyphenated—Caldwell-Moore. So let us use C for my catalog." Note in the *RASC Handbook* how Alan Dyer created a list entitled "The Finest NGC Objects". He organized it in order to promote observing, not himself.

Moore took most of your favourite non-Messier NGC objects, like the North American, the Eskimo, the Cocoon, the Rosette, the Veil, and rechristened them with C-numbers. Even Hubble's Variable Nebula has been renamed! Thirty-one objects on that list have familiar names. Twenty-five other objects have well-known NGC numbers, like 891, 2419 and 4565 or IC entries like 342. You do not see Houston, MacRobert, Webb, or Smyth objects just because they happened to like deep-sky observing and could publish! William Herschel did not recatalogue the Messier list when he published his catalogue of 1,000 new objects—he left the Messiers with their rightful names.

While Moore may be a veteran amateur astronomer and a dynamic television personality, I have to wonder how much deep-sky experience he really has. He lists IC 405, the Flaming Star Nebula, as "bright", at sixth magnitude! Obviously it looks interesting in pictures but I am forced to wonder if he has seen it visually.

I am surprised that Moore (and the editors at *Sky & Telescope*) perpetuated an historical myth by stating "Yet there are many other objects of equal or greater interest that Messier did not include, perhaps because there was little chance of confusing them with his beloved comets." The Messier catalogue is not a "could be confused with a comet" list, although non-comets were certainly the driving force behind Messier's compilation. The title under which it was originally published is "Catalogue des Nébuleuses et des Amas d'Etoiles" or "Catalogue of Nebulae and Star Clusters." Messier correctly identified all open star clusters as such.

Moore seems unaware of the poor optical quality and light grasp of Messier's telescopes: the Great Hercules globular cluster was described by Messier as a "nebula without a star." All the northern objects in the C-list (except for the Hyades) are too faint for Messier to have found with his little telescope. Moore's idea appears to be to present interesting objects for the observer that are neglected because they are not on the Messier list. Southern hemisphere observers must be shaking their heads in disbelief since magnificent objects like Eta Carinae and Omega Centauri on "his" list make any Messier object pale by comparison. All southern objects in Moore's list would have been easy targets for Messier. Southerners hardly need to be told by a northerner to seek out "neglected" objects of which thirteen of the thirty-two that are below Canada's horizon are visible to the naked eye! After that insult, imagine how they must feel to see both Magellanic Clouds missing from the Caldwell Catalog; the Large Magellanic Cloud alone contains more interesting stuff in it than all of Cygnus but packed into an area the size of the Scutum starcloud!

The Caldwell Catalog as originally published also contains errors too numerous to mention here. A couple of examples will suffice: the very bright Eta Carinae Nebula is given a magnitude of 6.2, while the Tarantula Nebula is listed at first magnitude! The size column, labelled arc-minutes at the top, contains a hodgepodge of degrees, arc-minutes, and arc-seconds. Anyone who has observed NGC 7006 (C42) will be able to tell you that it is not 0.05 arc-minutes across,

(continued on page 8)

BULLETIN

is a publication of the Royal Astronomical Society of Canada and is distributed together with the society's *Journal*. It contains articles on current activities of the RASC and its centres across Canada, as well as articles from members and non-members which are of general interest to members of the society. Inquiries about the society should be directed to its national office at 136 Dupont Street, Toronto, Ontario, Canada M5R 1V2 (416) 924-7973.

Cover Picture: Looking like an alien spaceship, the Edmonton Space and Sciences Centre is one stop that those attending the G.A. will not want to miss.

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Letters to the Editor

You're a Great Fellow, Ed!

I am writing as a long-time colleague and close friend of Professor Ed Kennedy, well known to you, it goes without saying, not least as a former president of the RASC. To make sure that Ed does not, out of modesty, manage to hide his light under a bushel, I thought I should write and let you know that he has recently been honoured by induction as a Walter Murray Fellow at the University of Saskatchewan. This is in recognition of his great generosity to the university, notably through donations of book collections in science and the history of science, particularly, of course, in astronomy.

Ed's certificate of induction reads "In recognition of your significant support to the University of Saskatchewan, the Chancellor and President welcome Prof. J. Edward Kennedy to the Walter Murray Society as a Walter Murray Fellow." The society takes its name, by the way, from the founding president of the university.

I would like to add as a personal note, that the University of Saskatchewan's Museum of Antiquities, with which I have long been associated, has also been one of Ed's beneficiaries. Ed has recently made a gift of many art books to the museum, drawn especially from his late wife Carol's collection. In Carol's lifetime she and Ed also donated a handsome marble bust to the museum, a copy of a Hellenistic original from Capua in Italy. This piece, which had belonged to Carol's father, greets visitors as they enter the museum.

P. M. Swan
Department of History, University of Saskatchewan
9 Campus Drive, Saskatoon SK S7N 5A5 ✪

The earth conceives by the sun, and through him becomes pregnant with annual fruit.
Nicholas Copernicus
Polish astronomer (1473-1543)

Officer Nominations

The terms of president, first and second vice-presidents and secretary will all expire at the time of the Annual Meeting, June 30th, 1996. The nominating committee will prepare a slate, but members should be aware that they also may nominate candidates for these offices. According to clause 6.05(2) of the national by-law:

Any eligible member of the Society may be nominated for any elected office for which an election must be held. Such nomination (in writing, signed by at least five voting members of the Society, and confirmed by a written statement of acceptance from the candidate) must be delivered to the Secretary of the Society [Randall Brooks, 136 Dupont Street, Toronto M5R 1V2] at least sixty days before the Annual Meeting. [This year's deadline is therefore May 1.] ✪

Event Horizon

June 18th-21st: Lucerne, Switzerland

Congress on "Amateur Astronomy Today"

The congress will be held in conjunction with the general assembly of the International Union of Amateur Astronomers (IUAA) and the general assembly of the European Section of the IUAA. Contact:

A. TARNUTZER
HIRSTENHOFSTRASSE 9
CH-6005 LUZERN
SWITZERLAND

July 8th-12th: London, England

New Trends in Astronomy Education. Contact:

DR. D. MCNALLY
UNIVERSITY OF LONDON
OBSERVATORY
MILL HILL PARK
LONDON NW7 2QS
Phone 44-(0)-181-959-0421 ✪

Canada-Sweden Space Probe to Launch in '97

Canadian Space Agency

ODIN is a Swedish-led space science mission, with partner participation by Canada, Finland and France. ODIN will be implemented on a small (approximately 235 kg) 3-axis stabilized satellite in a circular Sun-synchronous orbit at 600 km altitude and has a design lifetime of two years. Launch is planned for November 1997 with the Russian Start-1 as the launch vehicle. ODIN will carry two complementary and co-aligned instruments: a Gregorian radio telescope system and an **o**ptical **s**pectrograph and **i**nfra-**r**ed imaging **s**ystem (OSIRIS).

The principal elements of Canadian participation are: provision of the OSIRIS instrument; mission preparation support to Canadian astronomy and aeronomy science teams; conduct of an altitude control system functional test program; provision of the mechanical cryogenic cooler for the radio telescope system; and sharing of mission launch and other common costs.

The principal Canadian investigator is Dr. E. J. Llewellyn, University of Saskatchewan. ✪

General Assembly 1996 June 27—July 1 Edmonton, Alberta

The Edmonton Centre is hosting this year's GA on the University of Alberta campus from June 27th to July 1st, 1996. Eleven years have passed since the society last met here, and Edmonton has gone through major changes in that time. We would like to take this opportunity to invite all members of the society to Edmonton for the General Assembly.

The Helen Sawyer Hogg Memorial Lecture will be given by Dr. Werner Israel. Dr. Israel's lecture is entitled "From White Dwarfs to Black Holes" and will address the evolution of relativistic astrophysics in the twentieth century.

Numerous tours will be available on Canada Day, as well as functions at the Edmonton Space & Sciences Centre on Friday—including access to the Challenger Centre. Sunday morning we will be at Fort Edmonton Park—a historic theme park that recreates life in historic Edmonton, and the annual banquet on Sunday night will be featuring an Alberta speciality.

Registration packages were sent to all centres in early January and your centre's executive should have it by now. If you are interested in obtaining a copy of the 1996 General Assembly delegate's package please get in touch with us via snail-mail:

RASC GENERAL ASSEMBLY '96
c/o 8831 - 93 STREET
EDMONTON AB T6C 3T2

We can also be reached by phone at (403) 469-9765; by E-mail at either howardg@ibm.net or linda.forbes@ualberta.ca. People with access to the World Wide Web can download application packages (without brochures!) from the following site: http://valis.worldgate.edmonton.ab.ca/~banonay/RASC/index.html ✪

RASC To Be Privatized

Guy Nason
Toronto Centre

A consortium consisting of CITY TV's Moses Zniper, the CHUMP Group and an undisclosed telescope manufacturer (TASCO) have applied to the CRTC (the Committee to Register all Telescopes and CCD's) and, if successful, will acquire the Royal Astronomical Society of Canada. In an effort to reduce redundancy and duplication (not to mention competition), they will consolidate the 23 "centres" scattered across the nation into a single new organization, based in Oakville, Ontario, which will lobby the federal government to enact legislation requiring that all telescopes be registered, and that non-TASCO brands be declared illegal. (There may be a special provision to allow current collectors of very rare telescopes, like really good SCT's, to keep their instruments, provided that all eyepieces are kept under lock and key at a separate location.)

"We think that the RASC has outlived its usefulness.", said Zniper. "Who ever heard of an organization with twenty-three centres? Branches, maybe, but centres? That's ridiculous. And their publications committee has no imagination whatsoever. Their journal is called 'The Journal', their bulletin is called 'The Bulletin' and their observer's handbook is called 'The Observer's Handbook'! If we're successful, we'll scrap these boring periodicals with boring titles and replace them with a specialty pay-TV channel called 'MuchSky'."

"In these 'leaner and meaner' times, non-profit organizations are no longer profitable", said Zniper's associate, Ron Keester, formerly of Vision TV and Hearing Radio. "Holding free public star parties and failing to charge school boards or the Boy Scouts of Canada for services rendered is a one-way ticket to financial ruin. It'll definitely be pay-per-view from now on."

Mary Anne Harrington, president of the RASC's Toronto Centre, said she thought that CRTC stood for Chocolate Raspberry Truffle Cake. She also stated that she was not surprised at this turn of events. "Now we see why they closed the McLaughlin Planetarium", she said. "It's a cleverly insidious move to discourage people from leaving their homes. I predict that the consortium will pressure other provincial governments into closing all planetaria across Canada. With such big-screen facilities no longer available, people will be forced to subscribe to MuchSky for their astronomical entertainment."

Kirsten Vanstone of the Ontario Science Centre said that there is no truth to the rumour that the OSC might also be affected, and that they will proceed with construction of the Omni-Max theatre as planned. "The McLaughlin Planetarium's loss is our gain", she quipped.

CRTC chair Keith Spicey had no comment except to say that the society would lose its royal charter, but in light of recent happenings at Buckingham Palace, that might not be such a bad idea. He was more concerned that Canadian content be preserved. "As long as we keep the North Star in Canada, I'm all for it", he said.

Long-time member Fred Troyer is outraged. "I've been a member of the RASC since that other Moses got lost in the Middle East", he said. "It's just not fair. I paid my 50 cent life membership fee back in 1867 and that should continue to cover the cost of all publications **and** MuchSky forever. Harrumph! I would also like to point out that back in paragraph 1, line 7, the phrase 'redundancy and duplication' is redundant. Strike 'and duplication'."

Prime Minister Jean Chretien is expected to support the plan with only two minor amendments: that the headquarters of the new organization be established in his home riding of Shawinigan and that a parallel French network, 'Ciel-Plus' be created as well. "This will encourage Quebec to stay in Canada", he said.

Quebec's Lucien Bouchard, poo-pooed Chretien's remarks and said that we cannot afford two networks. He said "that would be a case of unnecessary redundancy and duplication. Only Ciel-Plus should be approved, which would then be indivisible, and will remain in Quebec when we gain independence (but retain the use of your money, armed forces, federal structures, natural gas and Moosehead Beer)."

The Canadian astronomical community awaits the CRTC's decision. ✪

Astronomy Week 1996

This year International Astronomy Week occurs the week of April 15-21, with International Astronomy Day being celebrated on Saturday, April 20th. This is the twentieth year in which Astronomy Day will be held in Canada. It provides an opportunity for all centres of the RASC to promote astronomy and our society, as well as to educate and inform the public. This year, centres are encouraged to organize public events and activities with the theme "Canadian Discoverers". This is an opportunity for the society to make the public aware of the valuable contributions made by Canadian astronomers and space scientists, both amateur and professional.

For an information package to assist your centre in organizing Astronomy Day events in your community, including how your centre can apply for the Astronomy Day Award sponsored by *Sky and Telescope* magazine, contact :

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Fed on the dry husks of facts, the human heart has a hidden want that science cannot supply.
Sir William Osler
Canadian physician/anatomist (1849-1919)

A Clock Out of Time

Nat Cohen
Halifax Centre

The year is 1641. Galileo is an old man of 73, with some five years left to live when he first set out his ideas on using a pendulum to measure intervals of time, not as applied to clockwork but by using a pendulum; kept in motion by occasional impulses delivered by hand, to drive a toothed wheel geared to others to indicate or count, the pendulum's oscillations. The story that the idea occurred to him whilst watching a lamp swinging when he was at church may be apocryphal, but it adds a nice touch. During the

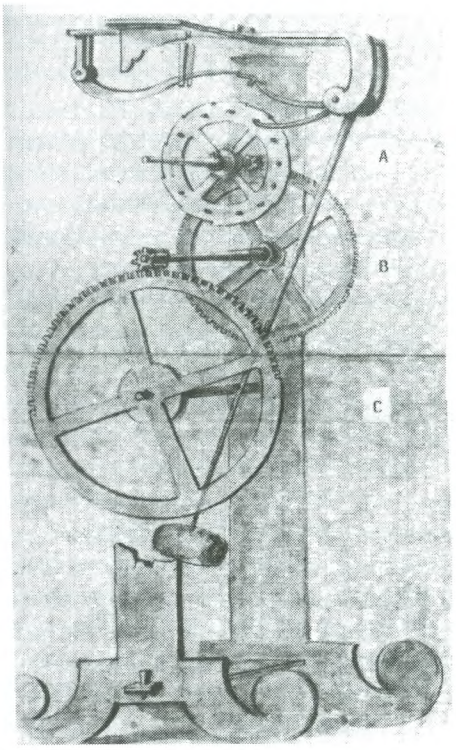

Figure 1: The only surviving original drawing of Galileo's design.

following years, when Galileo had become blind, he discussed with his son Vincenzio the project of making a clock controlled by a pendulum, something hitherto that had not been attempted, and in a letter written by his assistant Vincenzo Vivani they... "decided upon the style of which the accompanying drawing is a copy: and they agreed to proceed at once with its execution, being aware of the difficulties, which as a rule a merely theoretical design does not foresee in the construction of machines."

At this point Vincenzio decided to construct the model himself, but was shortly interrupted in the project by his father's death on January 8th, 1642. He took up the matter again in 1649, after a lapse of seven years, encouraged by Vivani who was anxious for posterity to acknowledge his teacher's achievements. Vincenzio engaged a young locksmith, Domenic Balestri, to make the basic parts, "leaving the cutting of the wheels and other details to be done by himself".

The letter quoted above indicates Vincenzio had completed the cutting of two of the wheels and was in the process of cutting the third when he contracted a fever and died on May 16th, 1649. It had been thought that before his death Vincenzio may have destroyed the model, but "an incomplete clockwork model" was recorded in a list of his effects and in the inventory of his widow's estate, dated January 1669, is listed "An iron clock, incomplete, with pendulum, the first invention of Galileo".

From our point of view today the most important documents to survive concerning Galileo's pendulum clock are (a) the drawing, Figure 1, which Vivani drew, or had drawn, sometime after Galileo's son's death, and (b) the letter written by Vivani to Prince Leopold de Medici, already quoted in part. In this letter Vivani described how Balestri had made the iron frame and the uncut wheels, arbors and pinions:

...The rest of the work he (Vincenzio) did with his own hands, forming in the upper so called notched wheel (Ruota delle tache—the escape wheel) twelve teeth with the same number of pins spaced between the teeth: and to the pinion on the (same) arbor he gave six (leaves): and to the other wheel which drives the above mentioned he gave ninety (teeth). He next fixed to one side of the plate which form the cross piece (at the top) of the frame the detent or lifting piece (Scatto), which acts on the aforesaid upper wheel: and on the other side he pivoted the pendulum, which was formed of an iron rod, to which was threaded a leaden bob which could be moved by screwing, so that it could be raised or lowered as might be necessary to adjust it with the driving weight (i.e. for regulation).

When the pendulum was at rest it prevented the fall of the (driving) weight: but, when raised and given free play, as it swings past the perpendicular, the longer of the two tails (code) mounted on the pivot of the pendulum raised the detent which acts on and engages the escape wheel, which latter being pulled by the weight revolved with its upper side towards the pendulum, so that one of its pins pressed on the shorter tail from above, giving it at the commencement of its return an impulse in such a way as to convey a definite motion to the pendulum, causing it to rise to the height from which it started: so that when it swung back naturally and passed the perpendicular position it once again raised the detent: the notched wheel (escape) then at once, through the force of the weight, resumed its movements, continuing to revolve and to impel the pendulum by the next following pin. And thus in regular action the to and fro (motion) of the pendulum was maintained until the weight had run down.

The above which I have quoted is from a translation in the book, *The Story of the Pendulum Clock* by Earnest L. Edwardes. It describes most eloquently the action of this movement. To me horology is a natural extension of astronomy; in fact for very many years this was the raison de être for astronomy, so combining the two hobbies makes both more enjoyable, and continuing on from this leads to the study of position finding both at sea, or on land. In addition, I

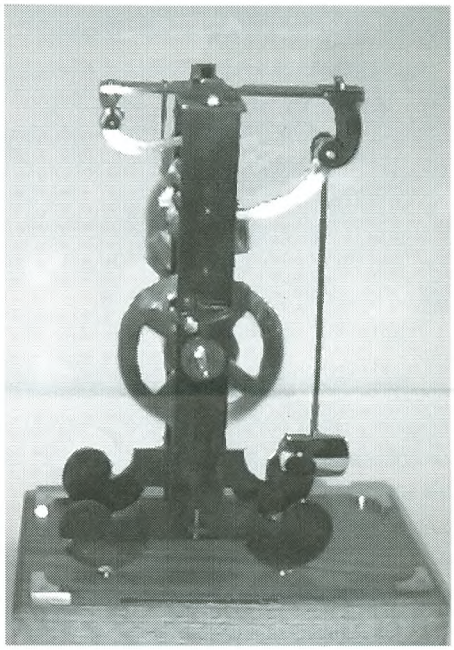

Figure 2: A front view of the replica.

never cease to marvel at the sheer genius of the early astronomers, Galileo in particular, wherein he exercised extraordinary foresight when he conceived the principle of applying the pendulum to clockwork in a manner quite unlike the convoluted method patented in 1657 by Christiaan Huygens. In the first place Galileo's escapement works **in the same plane** as the rest of the wheel works, creating direct interaction between the escape wheel and the pendulum, whereas Huygens (who was also disparaging of Newton's theories on light, in which, much later, Newton was shown to be correct) employed a crutch mounted on an arbor bearing a half cut contrate wheel engaging with a pinion mounted on the verge staff! This labyrinthine method (which was much simplified later, but still required contrate gearing to bring the escape wheel at right angles to the main train)

virtually ensured the continued use of the verge escapement in European clockmaking for almost 150 years.

In his basic principles Galileo, in fact, foresaw the development of the detent escapement with its impulse coming directly from the escape wheel to the vibrator and unlocking the escape wheel at every alternate vibration by releasing a detent. In much modified and more sophisticated form, this is exactly the action of the detent escapements used by chronometer makers well over a century after Galileo died and which continues in use at the present day.

Galileo's escapement was truly prophetic. Had he not been near to death when he devised

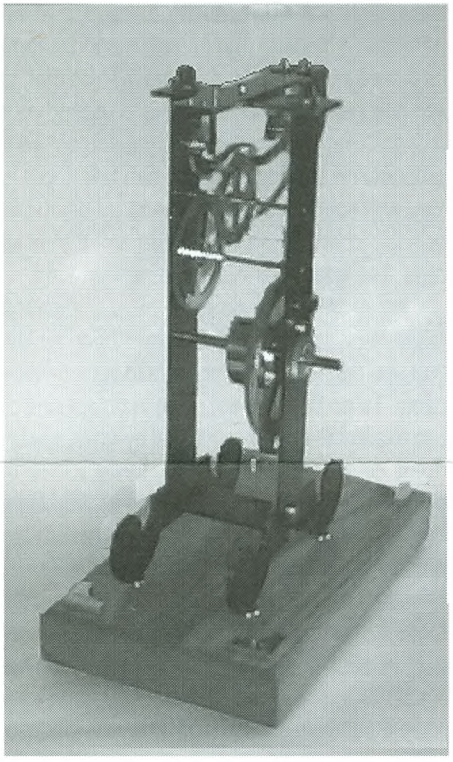

Figure 3: A side view of the replica.

it; had his son Vincenzio not neglected to proceed with the model until seven years after his father died, and then died himself; had Vivani been more enterprising than he was in promoting the idea with clockmakers, instead of the nobility, and; had Christiaan Huygens not been so ready to patent his ideas and put them into commercial production, then the history of European clockmaking might have been entirely different. Of course this is very fascinating to horologists, and possibly quite arcane to others, although with the way our lives are now totally regulated by time it should not be.

Having recently acquired a new Emco 5 compact lathe for my clock repair activities I thought it would be a very pleasant exercise to make this model. The inspiration for so doing was occasioned by an article in the *British Horological Journal*, and a publication by John Wilding FBHI. At the beginning of 1995, I commenced making a model of Galileo's escapement, staying as close to the design concept of the drawing as possible. Instead of using a weight as the main motive power, I opted for a spring for reasons of portability.

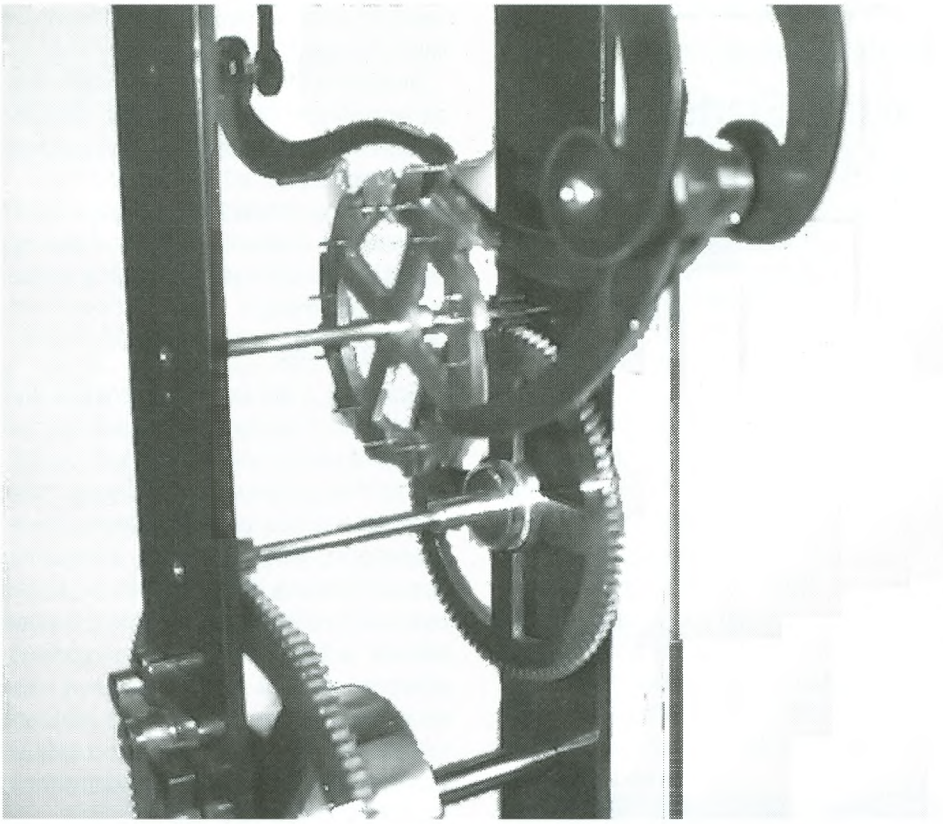

Figure 4: A close-up view of the toothed wheels in the centre of the clock.

I used brass for the frame, wheels, etc. and steel for the pinions, arbors, mortise pins, click and springs. The completed model was first demonstrated last November on members night at the Halifax Centre. I do think it caught their attention, mind you I had also dressed in proper astronomical attire in honour of the occasion.

I am by no means the first to make such a model as one exists in the Museum of History of Science in Florence, Italy; the Science Museum of London in England; and in the Smithsonian, in Washington D.C. I believe that the one that I have made is the first in Nova Scotia, and possibly Canada. One may exist in the Centennial Centre of Science & Technology in Toronto, as the British firm of Thwaites & Reed Ltd. was commissioned by the federal government to make twenty-nine reproductions of historically significant clocks from 1000 B.C. to December 1967 as a centennial project. All they were paid for this herculean effort was a measly £14,000. They were robbed, but then Pearson never did like the poor Brits.

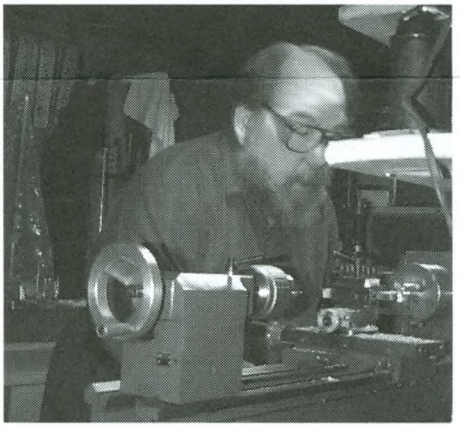

Figure 5: The author working at his lathe, turning parts for his next project.

Biographical Note: Nathaniel Cohen, a native of London, England, emigrated to Nova Scotia in 1966. At 70 years of age, he is a retired mechanical engineering draughtsman/technologist. He repairs and makes clocks, and watches, besides other mechanical things. He enjoyed astronomical observing for twelve years until a minor stroke last year caused the loss of most of the sight in his right (observing) eye, (not too good for repairing watches either)! He hates Be stars and wouldn't dream of looking at 'em! ✪

The great tragedy of Science—the slaying of a beautiful hypothesis by an ugly fact.

Thomas Henry Huxley
English biologist/evolutionist (1825-1895)

Lightwaves: Getting Started as a Light Pollution Activist

Bill Broderick
Chair, National Light Pollution Committee

Human beings have a strong aversion to two things:

1) Sticking their necks out, and;
2) Rocking the boat.

Not only is it much easier and more pleasant to "...suffer, while evils are sufferable..." (according to the U.S. Declaration of Independence), but if something must be done, to let "George" do it. It is probably safer too!

Every so often, though, someone gets so bothered and annoyed and upset over some aspect or another of this crazy world we live in that they stand up and declare: "I'm mad as hell—and I'm not gonna take it any more!" Then what? What does our annoyed, frustrated, railer against the "iniquity of it all" do next? Well, if the object of his/her rage is light pollution, turning to drink or kicking the telescope is not going to help much. Maybe it is time he/she changed his/her name to "George" or "Georgina."

So, George and/or Georgina, if you are reading this and you really are mad and you really do not want to take it any more (light pollution, that is)—your course is clear: become an activist.

Activists Are Nice People Too

When you think of activists, you probably think of crowds of noisy people milling around chanting catchy slogans and waving placards—doing their best to draw attention to themselves and their cause. Some activists are like that. I can tell you, though, from personal experience—more than 25 years—that the foregoing does not describe all or even most of them. The great majority of activism is carried on quietly, with dignity and grace. The great majority of activists are fairly quiet, unassuming people, whom you would have no problem whatever inviting into your home. People just like you. You probably know a few activists already and are not even aware of it!

Activist Defined

The word "activist" is derived from "active", as you might expect. My trusty Oxford dictionary defines "active" as follows: "Given to outward action; working, effective; energetic, diligent; acting of one's own accord, acting upon others."

An activist, then, is someone who is acting and working energetically (and diligently, too, we hope!) on other people, to bring about some desired condition or result; that is, in a particular cause (i.e. light pollution).

Another word for "activist" is "advocate", which my ever-at-hand Oxford defines as: "One who pleads for another; one who speaks in behalf of (proposal, etc.)..."

So take your pick: activist or advocate or both. My personal choice is advocate. I describe myself as an advocate for better and more responsible lighting.

Getting Started

First of all, if you are ever to convince other people to make the changes you want, you have to become very knowledgeable about your subject: lighting and light pollution. Municipal councillors are, for the most part, business people, accountants, lawyers, doctors, professional types who have a little time to devote to their community—often in hopes of making the local "climate" a little healthier for their particular enterprise. A lot of them do not know much about astronomy and; what is very important, most of them are not antagonistic towards astronomy; at least not unless you do something to rouse their antagonism.

Most of them will likely see streetlights, parking lot lights, security lights, and all other kinds of lights, as something to help reduce crime and make the city and its streets and parks, etc. safer for people. They do not know about the alternatives. They do not know about shielding. They do not know about directed lighting. Many of them would not know a full cut-off fixture from a "formofrheostat". As an activist or advocate, your job is to change their perceptions and help them to see that what you are asking for is in their best interests too!

So, my dear "George" and "Georgina", you have got to do your homework. You have to become much more knowledgeable than any city councillor you will ever talk to and at least nearly as knowledgeable as the city engineers and such that you may get to talk to. This may sound like quite an undertaking but, believe me, it is not as formidable as it seems. If you have reached the point in your career as an amateur astronomer where you feel you want to try and do something about light pollution, you have certainly got what it takes to become an effective activist or advocate for better lighting.

So what to do? Simple! Join the IDA (the International Dark-sky Association). If you do not want to do that, at least get your hands on the IDA information sheets—all 102 of them (or however many there are by the time you read this; more are being added all the time).

Read them! You do not have to read them all at once, or in any particular order, or in any particular time frame. Light pollution will be with us for some years to come, so you do not have to rush the reading. The important thing is to become knowledgeable about the issues—and the IDA info sheets are about the fastest, easiest and least expensive way to help you do that.

If you have a computer and access to the World Wide Web, a number of the IDA Info Sheets are as close as your computer screen or printer. The IDA's Web Site is: http://www.darksky.org.

Get On a Committee

You cannot solve the light pollution problem alone, so the next step is to join your centre's light pollution committee. If your centre does not have a light pollution committee, stand up at the next centre meeting and move a motion to form one. It might be helpful, if you have to do that, to arrange in advance for someone to second your motion. That way you ensure that you get your proposal on the floor and you can talk about it. You and your seconder may end up being the only members of the committee, but that is all right. The important thing is to make a start.

One of your first projects as a committee might be to draft a model light pollution by-law that you can eventually present to your municipality. To do that you will need to obtain one or two examples of your municipal by-laws, say on noise or smoking (two other nasty forms of pollution), so that you can see how such by-laws are framed. Some of the IDA info sheets also present by-laws and ordinances from different cities and states in the U.S. Also, Richmond Hill, Ontario now has a by-law to regulate light pollution. In addition, by the time you read this, the RASC's national light pollution committee may have a model by-law that you can work with.

Trying to get a local by-law passed is a long-term undertaking. Your first two or three attempts may result only in having your proposal "received" by your city's council. Essentially, that means it is filed away and everyone forgets about it. If and when you are successful in getting a by-law committee struck to seriously examine your proposal, you can expect to wait for many months before anything happens. Typically, it takes about fourteen to eighteen months to get a new by-law.

Take On Some Projects

While you are working on your draft by-law, there are other things that you can also do as a light pollution committee. Doing these things will help to hone your skills as a light pollution activist and may even produce some positive results. Here are some projects that your committee can take on:

1. Write letters to editors of local newspapers. Keep them as short as possible, no more than a single page—half a page is a good length.

2. Write letters to local businesses which you feel are contributing to the light pollution problem. These should be short, tactful, and very polite. Ask if you can have an interview to talk in person with them about possible solutions. Enclose one or two IDA info sheets, such as "Astronomy's Problem With Light Pollution" and maybe the Ontario Hydro fact sheet entitled "Light Pollution".

3. Arrange to present "Responsible Lighting Awards" to deserving recipients in your area. Make sure the media know about the award. Everyone likes good publicity.

4. Design a light pollution display. You could make this part of your centre's Astronomy Day display or other activity or enter it in a local environmental concerns exhibit. You might even be able to use it when you make your City Hall presentation.

5. Design a pamphlet about light pollution. You can enclose it with the letters you write and you can use it whenever you set up your display. Besides explaining about light pollution, your pamphlet can also advertise your "Responsible Lighting Award" program, hopefully enticing more businesses to follow suit.

In Conclusion

So you see, being an activist does not mean you have to be noisy and undignified. As a light pollution activist, you will be representing your fellow amateur astronomers, professional astronomers, and the oldest and largest astronomical organization in Canada. There is no way you want to be anything but positive and constructive in all your dealings. What is wonderful is that there is hope for positive results. Others are obtaining results, so can you!

Some men see things as they are and ask: Why?
I dream of things as they might be, and ask: Why not?
John F. Kennedy ✪

Readers are invited to share their news and views on this subject. Send correspondence to:
BILL BRODERICK
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SHANNONVILLE ON K0K 3A0

Men do not live in the same place in which they are born. They look for further worlds... And another thing, the spaceman is the only person who can travel without a visa, cross frontiers without a passport, and see the world in ninety minutes!

Georgi Beregovoi
Soviet astronaut (1985)

Total Lunar Eclipse: April 3rd, 1996

Who? You can see the lunar eclipse if the Moon is in the sky and if the sky is clear. The total phase of the eclipse will be visible, in whole or in part from Winnipeg east, with more of the total phase visible the further east you are.

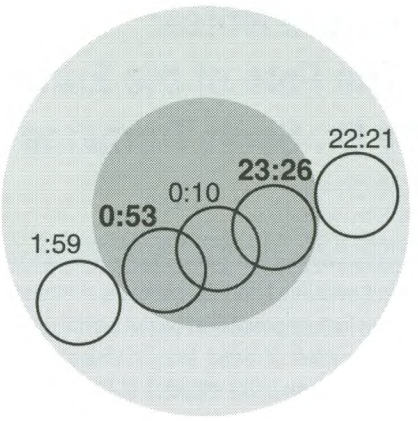
What? There is a Full Moon twelve or thirteen times a year, when the Sun, the Earth, and the Moon nearly form a straight line. Sometimes the Moon enters the Earth's shadow and there is an eclipse of the Moon. If all of the Moon's disk is shadowed, it is a total lunar eclipse.

When? The eclipse takes place on the evening of Wednesday, April 3rd. It is especially well-timed for children to watch, as it takes place in the early evening. The figure shows the location of the Moon within the Earth's shadow. All times given are in Universal Time so they have to be converted into local time. The table shows the circumstances at moonrise for major cities. For some locations, the earlier phases of the eclipse occur when the moon is still below the horizon.

How? It is easy to watch a lunar eclipse. You can watch outside (dress warmly!) or you can watch from inside, if you have an east-facing window. The view would be greatly enhanced by using a pair of binoculars.

Why? Share the evening of April 3rd with a child. A total lunar eclipse is an uncommon and beautiful celestial event, happening perhaps only once in a clear early evening sky during a child's formative years. Even though we know exactly when the eclipse will happen, we cannot predict exactly what it will look like. The Moon may totally vanish or it may turn copper-red, depending on the amount of dust and cloud in the Earth's atmosphere.

Safety! Watching a lunar eclipse is absolutely safe. The Moon will be no brighter than a Full Moon, and even extended viewing is harmless. In fact, the Moon will be moving into the Earth's shadow, and will be dimmer than usual. (In contrast, viewing an eclipse of the **Sun** can be harmful without special filters.) ✪



The passage of the Moon through the Earth's shadow. All times are in Universal Time. This figure was adapted from the RASC Observer's Handbook.

The following cartoon was created by Thomas Hu for some of the Halifax Centre's information sheets regarding the eclipse.

An unexpected eclipse of the Moon suddenly turned Werewolf Bob back into human form in front of his hungry friends. ©Thomas Hu

City	Moonrise (local time)	Eclipse Status at Moonrise
St. John's	6:45	penumbral; totality about to start
Halifax	7:00	totality in progress
Québec	6:30	totality in progress
Montréal	6:30	totality in progress
Toronto	7:00	totality in progress
Thunder Bay	7:30	totality in progress
Winnipeg	7:15	Moon halfway out of umbra

Lecture Notes: "The Fate of the Earth" by Dr. Scott Tremaine

Doug Pitcairn
Halifax Centre
November 9th, 1995 Saint Mary's University

That evening, I had the pleasure of attending another lecture presented by the visiting speakers committee of Saint Mary's University. Dr. Scott Tremaine is the director of the Canadian Institute for Theoretical Astrophysics, a national research institute at the University of Toronto. Here is a summary of his main points.

If we ignore the various ways mankind might cause a major ecological catastrophe, we find that the greatest risks to our precious planet in the long term are astronomical in nature. These can be roughly divided into four possible areas of concern. To help understand the long time frame for these discussions, Dr. Tremaine introduced a compressed time scale where the age of the universe (assumed to be about 13 billion years) equals one day, and each second counts as 150,000 years.

The first threat is the consistency of our star's output. Astrophysical theories regarding stellar evolution, especially the evolution of dwarf stars such as the Sun, are very well developed. Thus we are confident that our star will remain relatively stable for many more millions of years. However, the slow but steady increase in the Sun's output in response to the increasing amount of helium in its core will eventually mean the Earth will suffer the same fate as Venus. In our compressed time scale, this will render the Earth uninhabitable by 7:00 the next morning, and by 3:00 PM, the Sun will have swollen to almost the Earth's orbit. If we have survived to this point, we would have to deal with Earth surface temperatures over 1000 C°!

The second threat to our planet's ecology is the possibility of instabilities in the Earth's orbit. Our planet is held in a tug of war between the Sun, Jupiter and, to a lesser extent, all the other planets. Even Newton suspected long term instabilities might develop in planetary orbits. (He found no cause for alarm, however, as he believed God was watching and would merely intervene and set things right again.) Modern computations suggest that this is not a problem, at least not for a very long time. It appears that the planet Mercury is the only planet to get into trouble over the next two billion years. Planets the size of the Earth are quite stable in their orbits. An interesting sideline to this research was that it revealed that the early solar system may have held thousands of Moon-sized and smaller bodies, which were either ejected, or swallowed up by larger planets long ago.

The Northern Lights, photographed in February by Douglas Oneschuk from a location 150 kilometres north-east of Yellowknife, N.W.T. The temperature at the time was -45°C. He used a Pentax SP with a Soligor 28-80 zoom lens and a 10 second exposure using 200 ASA film.

A third danger to life on Earth would be a possible change in the planet's obliquity, or axis tilt. It appears that our planet's axis tilt is a result of complex dynamic forces between the Earth, Moon, Sun and the other planets. Again, modern computer calculations suggest that although the Earth will eventually tilt over as far as 60°, the time frame for this catastrophe is on the order of billions of years, or four hours or so in our compressed scale.

The fourth and most pressing concern is the possibility of a collision between the Earth and another body, say an asteroid or a comet. The destructive force unleashed on our world would be considerable, and as we suspect has happened in the past, the ecology of the planet would be severely mauled. If one plots the expected rate of asteroid/meteorite collisions with the Earth (based on both theory and observation) we find that bodies with energies of a million megatons or more are expected something like every hundred thousand years. Objects of this size present humankind with a very real threat. Using the methods of calculating "lives per year" lost, as an insurance company would do, one finds that asteroid impacts are just as dangerous to individuals as are airplane crashes. This led Dr. Tremaine to conclude that perhaps we should be spending as much effort and money on preventing asteroid impacts as we currently are spending globally on airline safety measures. It makes sense to me. ✪

Reflections: Names and Lists

(continued from page 1)

but it is 0.05 degrees wide. Similarly, the Bug Nebula's size is not 50 arc-minutes, but 50 arc-seconds. Many of the planetary nebulae have two sizes listed. The second size comes from *Sky Catalogue 2000.0*, and is (unexplained in the text) the angular size as measured on long exposure photographs. This outer nebulosity is invisible to visual observers, even those using large scopes. I am at a loss as to how this shoddiness happens with the current quality and accessibility of astronomical data.

The goal of getting observers to look past the Messiers is a good one, but I am disappointed in Patrick Moore for renaming well-known objects and in *Sky & Telescope* for trying to hype it and make money. Of course it is easy for me as an amateur to take pot shots at Moore and *Sky & Telescope*—I do not have to make a living through astronomy. Can you hear the comments drifting along the midnight air? "Hey! I found the well-known Helix nebula, also called the lesser-known C-something or other." Let us bury and forget the Caldwell Catalog and promote the already excellent list compiled by Alan Dyer in the RASC's *Observers Handbook*. ✪

Fancy may take its flight far beyond the ken of eye or of telescope. It may expiate in the outer regions of all that is visible—and shall we have the boldness to say, that there is nothing there?

Thomas Chalmers
Scottish theologian/author (1780-1871)