R E G U L U S

THE NEWSLETTER OF THE

ROYAL ASTRONOMICAL SOCIETY OF CANADA - KINGSTON CENTRE

DECEMBER 1982

AN EDITORIAL

As the year 1982, a successful one for our centre, draws to a close, I am reminded that I have acted as writer for or editor of Regulus (and its unnamed predecessors) for six years now. The newsletter and the centre itself have both undergone a number of significant changes in that time. It is quite an interesting exercise, in fact, to go back through the past copies of our publication and see the many events that have happened in the 1970's and the first couple of years of the 1980's.

It would be encouraging for the present generation of Kingston Centre members to read of the contributions to amateur astronomy made by many people of a number of years ago. Many of them have moved on to other parts of the country and it would be pleasant to be able to contact them or somehow hear from them. A decade ago a larger proportion than today of our members were Queen's University students and, of course, on graduation many left the area for other parts of Canada. The reader of the old newsletters is bound to wonder if all of them are still pursuing their interest in astronomy.

After spending some time recently going through those publications, I decided that it was time to provide our members with an index of the articles that have been published over the past decade--at least for the newsletters that are on file. Then all the members of our centre can have a chance to peruse them if they wish and perhaps realize in a better way some of the things referred to above. Perhaps an index of our major articles is long overdue: many publications provide one annually or every five years, not once a decade. For this reason, an index of past issues will be provided at the end of this issue, and any members who wish to make use of the copies on file should contact me at the address given at the end.

The reasons for which the past articles may appeal to our members could vary tremendously. Some will be seen to be very ephemeral and of interest only in "a historical sense"; others will appear as pertinent and relevant as when they were written. My hope is that at least some parts of the index may be useful to some of our members.

THE 1982 BANQUET AND ANNUAL MEETING

The Banquet and Annual Meeting of November 26th made that date a very memorable one for many members of the Kingston Centre.

It was "a veritable feast" at Aunt Lucy's Restaurant with perhaps more amateur astronomers in attendance than the place had ever seen before.

The meeting which followed gave an indication of the strength and vigour of our centre. The annual reports given by the members of the executive had been well written and showed a serious committment to serving the interests of the Kingston Centre. Rather than a time to be dreaded, the election of officers for next year was an occasion when more people than ever before offered to serve and represent the interests of the group. Under their leadership, 1983 is sure to be another very good year for astronomers in Kingston.

We also used the occasion to elect a number of new members to the centre - Mr. and Mrs. Sorensen, Jim O'Donovan, and Darcy Milino - and we hope they will feel very welcome at all our meetings. It was a delight to see Tim Gladwin in attendance for he had to drive a tremendous distance to be there and Jeff Fret once again is able to join our group. In addition there were several others whom we hope to welcome as members very soon.

Our Executive for 1983 is as follows:

Honorary President	: Dr. A. V. Douglas
President	: Terry Hicks
Vice-President	: David Levy
Secretary	: Gerald Schieven
Treasurer	: John Hansen
National Council Rep.	: Gerald Schieven
Alternate Reps.	: Marty McConnell Terry Hicks
Newsletter Editor	: Leo Enright
Librarian	: David Stokes

The gratitude of all our members is extended to Angelika Hackett who has been a tremendous president for a number of years, and who had to resign because she and Rob are moving to Edmonton. Alberta will be receiving two wonderful people. We wish them the very best and hope our centre can keep in touch with them.

THE HOLLEFORD CRATER - PART III

(Note: This is the third and final part of a paper which examines the research of various kinds which has been done on the Holleford Crater located near Kingston. The first two parts of the paper are found in the two previous issues of Regulus.)

Analysis of the Drill Cores

An analysis of the drill core taken from Drill Hole Number One showed not a distinct, clear division between the sedimentary rock and the breccia. Rather, the sedimentary limestone began to contain some interbedded explosion breccia at the 650' level and it continued down to the level of the breccia. Similarly in Drill Hold Number Two, rock fragments began to appear at the 354' level and increased down to the 440' level. This material may have been washed back into the crater from the surrounding area prior to the later sedimentation. Below the 600' level numerous cracks were found in the Precambrian rock -- cracks which may have been caused by shock waves from the meteorite impact.

After examining core samples from the breccia regions, Dr. K. R. Dawson of the Geological Survey of Canada reported them as being "a polymict... of fragments of four rock species--crystalline limestone, biotite and biotite-pyroxene gneiss, lime silicate, and rarely amphibolite." This was consistent with the assumption that the impact explosion had caused a thorough mixing of rock types.

The Search For Meteoritic Material

After a search, no metallic iron or iron oxide fragments were found.

Magnetic tests of the core samples showed very small amounts of magnetism generally--entirely consistent with the rocks in the area. There was no evidence of nickel.

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There are at least a couple of reasons why the evidence of the original meteorite in the form of these metals should not be expected to have been found. In the first place only an extremely tiny area of the total crater was covered with drill holes. It was only 2.2 x 10^{-10} of the entire area! The Barringer Crater would also have probably given negative results, if it had been covered over, and it had been necessary to investigate it by the drilling method.

In addition, the original meteorite may have been a stone meteorite with little or no nickel-iron content. Being extremely ancient, it may not have been like many of the more recent ones which contain nickel. No material identified as meteoric has been found, but if the meteorite were of the stoney variety, it could be similar to other rocks in the area, and it could be quite undetectable.

Conclusion Regarding The Age Of The Crater

A study of Drill Hole Number One's sedimentary core revealed about 400' of quartz sandstone above the breccia limestone identified as Cambrian. Since the crater had already been greatly eroded especially on the rim, it is reasonable to accept Frarey's conclusion that it was formed in Precambrian time. On page 139 of the Publications of the Dominion Observatory, Volume XXIV, Dr. C. S. Beals concludes, "...therefore, ...the impact which formed the crater occurred in late Precambrian time anywhere from 500,000,000 years to 600,000,000 years in the past."

The Energy Of The Explosion

Various calculations have been made to determine the energy of the impact explosion required to form a crater the size of the Holleford Crater. The calculations are not in total agreement with each other regarding the amount of energy but there is a consistency in that all the scientists who produced the calculations agreed that the energy represents six times that of the explosion which produced the Barringer Crater and less than one-third of the energy that created the New Quebec Crater.

The values for the energy of the impact explosion range from 20 x 10^{21} to 31 x 10^{24} ergs. Assuming the meteorite's velocity to be 20 kilometers per second and assuming a spherical stone meteorite of density 3.0, calculations show that the diameter of the object must have been about 100 metres.

Simply stated, an enormous rock travelling at blinding speed created an incredible explosion one day in the very remote past.

Bibliography

C. S. Reals. Publications of the Dominion Observatory, Ottawa. Volume XXIV Number 6

Queen's University. - Geology Department. One page summary of information on the Holleford Crater

Sky and Telescope. Navember, 1951. The Holleford Crater In Ontario by C.S. Beals, G. Ferguson, and A Landou.

Sky And Telescope. May 1956. A Probable Meteorite Crater of Great Age by C.S. Beals

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TWO LETTERS FROM NOTED AMATEUR ASTRONOMERS

This is the fifth newsletter in a row in which I am very pleased to report having received from Mr. Gus Johnson a letter, part of which I wish to share with our readers. In its first paragraph you can see that he is an exceptionally skilled observer from his ability to see stars considerably fainter than predicted by the formula for the limiting magnitude of a telescope. Little wonder that we are proud to count Mr. Johnson a member of our centre.

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Swanton, M.D.
October 28, 1982

Dear Mr. Enright:

We have had a prolonged and beautiful autumn here. Many nights now have frost and even some clear moonless ones for observing occurred on Oct. 17 and 19th, permitting me to do a lot of observing to make up for the previous weeks' lack. One was exceptionally clear; so I saw my faintest star for the 6-in., of mag. 14.4, and my new 2.4-in. f/15 Unitron now has also reached mag. 13, like its shorter brother.

I hope the joint meeting of the AAVSO & RASC is affordable next spring. It sounds like a fine opportunity to see the beautiful Canadian forest and have scientific fellowship on the same trip. The article in "Sky and Telescope" about Mont Megantic was fascinating.

As for the aurorae, I had cloudy skies those nights but I recall having seen slides of recent aurorae at the Pittsburgh meeting. That area is warmer and drier than here and once one gets away from the city lights observing can be good.

While my latitude, and to a much greater extent, the woods north of me cut off my skies, my being able to see into the far south is a great consolation, if the skies are clear. Oct. 19th was such a rare night and I just chanced to go after RU SGR, which I found out later, was predicted to be at a 7.2 maximum that very night. I estimated it at approx. 7.0 and it is at declination -42°. But you Kingston observers can scan M81 and M51 as they approached a lower transit beneath the pole, a worthwhile endeavour.

Winter birds are showing up and summer birds are leaving. Snowbirds (Juncos) have been here for over a week and two days ago I saw the first White-throat Sparrow, back from Canada and some possible White-crowns. My friendly chickadee has started hand-feeding, and there has hardly been any laying snow yet.

Clear (warm) skies,
Gus.

The second letter is from Warren Morrison, our member in Peterborough and former winner of the Chilton Prize of the R.A.S.C. for his discovery of Nova cygni 1978. With his letter he sent along a copy of an article which appeared in the Toronto Star on October 11th of this year, a very sobering, in fact shocking, account of a NASA study concerning the possibility of putting into orbit giant (half-mile wide) mirrors in order to illuminate North American cities at night. The prospect is frightening and disgusting, but it has been considered. In fact, the article states that the study said that "such a project is economically feasible." It is a pleasure to reprint Warren's entire letter.

955 Ford Street,
Peterborough, Ont.,
Oct. 14, 1982.

Dear Leo:

Since I don't get down to the Kingston Centre's meetings, I'm writing this letter to let you know what I've been up to. You may find some of this material suitable for inclusion in Regulus.

I've sent along a copy of a newspaper clipping in case you haven't heard of this matter. It is needless to point out that a system of orbiting mirrors illuminating parts of the night side of the earth would be the ultimate in light pollution.

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This isn't the first time that this idea has been toyed with. In 1966, the U.S. Dept. of Defense and NASA conducted a study known as Project Able, which involved examining the idea of placing mirrors in synchronous orbits to light up areas of the earth. This was to enable military operations at night, and was prompted by the Vietnam War.

The study was abandoned a year later. References may be found in Sky and Telescope, Oct. 1966, p. 183, Nov. 1966, p. 265, Jan. 1967, p. 33, and Sept. 1967, p. 137.

In addition to its effects on optical astronomy, there would also exist a threat to certain biological functions in both the plant and animal kingdoms, that depend on the day-night rhythm, and the seasonal change in daylight. I'm sure numerous other arguments could be found against the idea. I think it is important that members of the Kingston Centre, and amateurs elsewhere be made aware that this idea is being talked about.

The rather cool summer has resulted in less humidity than normal, and as a result I've had a fairly good summer of observing.

I've observed Comet Austin on numerous nights since Aug. 17. It has faded from magnitude 4.7 on that date to 9.4 on Oct. 10. I was able to glimpse it with the naked eye on a few evenings but the tail was so faint that the naked eye showed the comet only as a dim star.

My best view was on the evening of Aug. 21. Using my 15 cm. f/5 refractor at 31x, at my uncle's farm, outside Peterborough I was able to trace the dim tail to a length of 80'. The head of the comet was teardrop shaped, brightest on the sunward side, and gradually narrowing to a diffuse spine on the opposite side, which extended out into the tail. It was a beautiful sight!

I have also been able to glimpse periodic comet d'Arrest, but it has been rather low down in the evening sky, and hard to see. Furthermore, I was not able to see it except when at my uncle's farm. I saw it at mag. 10.5 on Sept. 8, brightening to 9.5 on Oct. 10. However, it wasn't much easier to see on the later date because at its highest, it was only 12° above the horizon.

There have been many colourful evening and morning twilights this summer. You've probably seen them. I assume these colourful effects have been caused by dust from that Mexican volcano of last spring.

The weather has been quite cloudy lately, which is a sure sign that autumn is here.

Yours truly,
Warren Morrison.

FOR YOUR COMPENDIUM OF ESOTERIC FACTS

This month's fact is one that may be unknown by many amateur astronomers but will be far from unknown by the serious observer of asteroids (that is, by those who have been bitten by what we call 'roid fever).

Do you know who is the all-time world-champion asteroid observer? Do you know how many asteroids he has observed? Would you guess that it would be about a hundred or maybe even 150?

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Mr. Frederick Pilcher of Jacksonville, Illinois, in the U.S. has observed over 1100 minor planets!

Mr. Pilcher is an associate professor of physics at Illinois College and has done a great deal to promote interest in the observation of minor planets. He observes with a C-14 telescope from the roof of the college and on September 8th of this year, he saw his 1105th asteroid. It was during August with his observation of Adalberta that he passed the 1100 mark. (It must be emphasized that this is not 1100 observations of asteroids; it is observations of 1100 different asteroids. Repeated observations are not counted.)

It is little wonder that I.A.U. Commission 20, which is responsible for the nomenclature of minor planets, has named one of them Asteroid Pilcher. Asteroid 1990 Pilcher (formerly called 1956EE because its discovery was in early March 1956) will bear witness to the remarkably ambitious observing program of Frederick Pilcher.

ERRORS DETECTED IN SKY ATLAS 2000.0

Some of the finest publications in the world carry errors which may be detected by the very careful reader or user of the publication.

Tirion's Star Atlas has been acclaimed as one of the very best and it is gradually replacing others as one of the finest sets of star maps available. Yet a few errors have been detected. In an article recently published in Deep Sky Monthly, Brian Skiff of Flagstaff, Arizona has pointed out a number of flaws. Here is a brief explanation of what he has pointed out.

- On Map 1, the object listed as NGC 358 (R.A. 1^h 3.6^m, Dec. +61°), an open cluster, should not be listed as such (a non-steller object) since it is only a group of stars in Cassiopeia.
- On Maps 1 and 3, the object listed as NGC 133 (R.A. 0^h 29.7^m, Dec. +63°) an open cluster should not be listed as such since it is only a star or number of stars.
- On Map 12 the elliptical galaxy NGC 2967 in Hydra (R.A. 9^h 39.6^m, Dec. +05°17) should be called NGC 2962. The error also appears on Map 13.
- On Map 12, the elliptical galaxy NGC 3067 (R.A. $9^h40.8^m$, Dec. + 0°27) should be called NGC 2967. The error also appears on Map 13.
- On Map 16 and Map 22, the open cluster listed as NGC 6003 (within M24) (R.A. 18^h 17^m, Dec. -18°) should be called NGC 6603.
- On Map 16 the open clusters NGC 6682 and NGC 6683 have been located at R.A. 19^h 40^m. They should be moved westward by 1^h R.A., and located at R.A. 18^h 40^m.
- On Map 22, the object listed as open cluster NGC 6227 (R.A. 16^h 49^m, Dec. -41) should not be listed as such. The Revised NGC states that it is not a cluster.
- Finally, the planetary nebula plotted as IC 1298 should be called IC 1295.

It is hoped that pointing out these errors can be helpful to our members who use Tirion's Sky Atlas 2000.0.

(If any other R.A.S.C. newsletter editors wish to copy this article, they are asked to give credit, not just to Regulus, but especially to Deep Sky Monthly and Brian Skiff of Flagstaff, Arizona.)

REPORTS AND OTHER ITEMS

1. The month of November brought us cloudy weather night after night, and sometimes the rain and overcast skies became rather depressing. However, I did manage to see a few things. On November 7th, I saw six Herschel Objects,

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four of them for the first time, and on the 9th, I observed Comet Churyumov-Gerasimenko in Gemini and north-west of M35. On the 19th in the early evening, I photographed the conjunction of Mars and the cresent moon. Although there may have been many Auroral displays above the clouds, the best one I saw was on November 24th and it lasted for several hours. There were several bright meteros seen during the month and a friend told me of seeing a very bright one which split into three parts and produced a colourful trail. It was on the 17th of the month and may have been a member of the Leonid shower.

2. Membership fees are due for 1983 and anyone who still has not done so, should pay our treasurer, John Hansen, as soon as possible. Besides the publications, there are many other benefits of membership and 1983 promises to be an excellent year for our centre. Those who still have not paid by January 15th will not be able to receive the 1983 publications.

3. I hope that everyone is starting to get acquainted with the 1983 Observer's Handbook which is bigger (by 8 pages) and better than ever and was available earlier in the year probably than ever before.
In order to assist you in getting to know this wonderful observing aid just a little better, your editor is once again offering a prize to the member of the centre who can spot the most errors in the Handbook, if indeed there are any. It seems to me that this year there will probably be very few errors, but I would appreciate hearing about any that you find.

4. Damien Lemay has informed me that plans are well underway for the 1983 General Assembly to be held in Quebec City from May 20th to May 23rd. I have a schedule of events and other information about what is certain to be an excellent gathering of hundreds of astronomers. Not only members of the R.A.S.C. but also members of the A.A.V.S.O. (American Association of Variable Star Observers) and A.G.A.A. (Assocation Des Groupes D'Astronomes Amateurs) will be present. Let us have a good representation from the Kingston Centre. I hope to hear of your G.A. plans very soon.

5. On Saturday, November 6th, I had the pleasure of visiting with John Kidner in Toronto and seeing the new showroom which he has opened in order to display some of the products which he sells. John calls his company Perceptor and he handles products from Questar, Celestron, Meade, Coulter, Lumicon, Daystar, Astro-Computer Controls and others. The showroom is at 1048E Kingston Road, near Victoria park. The prices are quite competitive and John would be happy to see any members of the centre who would like to drop in.

6. In the coming months there are a number of events that observers should plan to see or photograph:
(1) The Geminid Meteor Shower peaks on Dec. 14th. This shower has been very reliable and produced large numbers of meteors. If the weather is good, it should be worth watching because the new moon will not interfere. The Ursid Shower peaks about a week later--actually on Dec. 22nd, but viewing it may be slightly more difficult because of the first quarter moon. The Quadrantids, peaking on January 3rd, may also be worthwhile.
(2) As was the case in January and July of this year, we again enter the eclipse season in the month of December. This eclipse season produces two eclipses--a partial solar eclipse on Dec. 15th visible in the Eastern Hemisphere but but not in the West, and on December 30th a total lunar eclipse. This one will not be as spectacular as the one of July 5th-6th for several reasons. Though total the moon is not as near the centre of the earth's umbra and for most Canadians

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the moon sets before the end of the eclipse. Try to watch in the early morning hours of December 30th as the moon makes first contact with the umbra at 4:50 a.m. E.S.T. and is totally within the umbra at 5:58 a.m. E.S.T. Mid-eclipse occurs at 5:29 a.m. E.S.T. and by then the moon will be fairly low in the western sky. Third coitact of the lunar disk with the umbra is at 6:59 a.m.and in this area of Ontario the moon sets at approximately 7:30 a.m., well before it has left the umbra. Let us hope we have good weather to catch a glimpse of the second total lunar eclipse in less than six months.

(3) By the end of the month of December, Mercury has reached greatest eastern elongation from the sun and should be seen low in the south-west after sunset for the last week or so of 1982 and for the first few days of 1983. After a long sojourn in the morning sky, Venus is now in the evening sky and for a few days the two innermost planets of our solar system are not far apart in the southwestern evening sky. Conjunction occurs on January 7th. Be sure you have a good south-western horizon when trying to locate this pair of planets.

(4) Another conjunction of Mars and the thin crescent moon occurs in December and it may be possible to photograph the event again since the closest approach occurs in the evening at 9:00 p.m. E.S.T. The date is Sunday, December 19th.

6. We hope that in the next issue of our newsletter a schedule of topics for talks and discussions at future meetings may be published, as was done for our fall series of meetings. The talks given by members in previous series of meetings have been well received and we look forward to them again. Perhaps among them we may have a few talks by professionals as well.

The dates for our meetings in 1983 are January 14th and 28th, February 11th and 25th, March 11th and 25th, April 8th and 22nd.

Remember the meetings are at 8:00 p.m. in Room 222 in Ellis Hall on University Avenue.

As usual your editor would be happy to receive material for these pages. Our address is:

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Box 141, Station A,
Kingston, Ontario K7M 6R1

CLEAR SKIES!

GOOD OBSERVING.

Happy holidays and all the best for 1983!

Leo Enright