



# Regulus



The Newsletter of the Royal Astronomical Society of Canada - Kingston Centre -- 2007 January

## Coming up...

### RASC-KC Meetings

Stirling Hall Theatre A, Baader Lane, Queen's University  
Kingston, Ontario.

**Friday January 12 7:30-10:00pm**

**Friday February 9 7:30-10:00pm**

### Regular Meetings

Meetings are co-sponsored by  
Queen's Physics and include  
astronomy lectures open to the public.

### KAON Public Observing

Queen's Observatory Ellis Hall, 4th  
floor from 7:30pm to 9:30pm

**Saturday January 13**

**Saturday February 10**

### List of contents:

President's Tidbits

Profile

Gleanings

Feature - Report from ATM

Target for Tonight

Home Observatories

Brief Notes from History

Cosmic & Events Calendar

Newt



The Gagnons' observatory was finally finished in November 2006. More photos on page 8.



Diane Torney and Joe Benderavage hold a form for creating a pitch lap, while Doug Angle pours molten pitch onto the form.

**See story,  
page 4.**

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President's Tidbits by Kim Hay

Happy New Year! Welcome to 2007! I hope you all received some wonderful astronomical toys for Christmas, and better yet were able to use them. If I have one wish for the New Year, it's that it will be clearer in 2007 so some observing can be done. Though we did have a couple of clear nights near the end of December, just enough to introduce ourselves to the sky again, we are always wanting more.

In November we elected a new executive, and in December the Executive voted and accepted Steve Hart for Secretary of the Centre. All folks that came forward to chair a committee were also accepted to carry on the tasks. However we do have some vacancies and it would be nice that these are filled, or else we may have to consider that these areas will not run in 2007. Below is the list of committees that need chairs. Please consider coming forward, and help to shape the committee and the Centre with some new fresh ideas. The Executive and last years Chairs will be glad to help you out if you have any questions, contact us at [kingston@rasc.ca](mailto:kingston@rasc.ca)

#### Committee

Observing

Publicity

Public Observing-KAON Coordinator

Astronomy Day

Special Events (Sky is the Limit, Relay for Life)

I would like to personally thank all members of last year's (2006) Executive and the people who chaired the Committees last year. Without our volunteers our Centre would not function at the level it is now, thanks again, I do appreciate all the work that has been done.

This year, we will have the introduction of earlier daylight savings time on March 11, continuing until November 4, 2007. This will no doubt effect our observing for the extended time, since the nights will be shorter, but we will adjust, and appreciate our time observing even more.

The Centre has new projects on the go, and we should be hearing about those in the next few months. The webpage will start going through some transformations over the next few months, so I would appreciate any suggestions on how to make our page

more user friendly, and appealing. Please contact me at [kim@starlightcascade.ca](mailto:kim@starlightcascade.ca) with KCWebpage in the subject line. I don't want your message to end up in the spam filter, since spam is on the increase.

Remember to go out and look up, share the view and appreciate the simple things in life, as they are often the most rewarding.

#### PROFILE

Ken Kingdon has been chairman of the Observing Committee for two years and a club member for ten years. His field trips have been outstanding and his articles in the Regulus immediately enjoyable. His love for his subject shines on through. But Ken is also a practical man: he is alert to the possibility of dark, clear nights far in advance, and he looks for patterns and trends of the weather to plan outings that would be beneficial for observers. He believes that the club was formed for observers so that is why Ken is stepping down as head of the observing committee: there is a dearth of observers now and has been for several years. "It's time for new blood," he claims.

Of course, Ken has been chairperson during a 2-year period of extremely poor climatic conditions. Long-term and short-term atmospheric conditions have conspired to make ideal dark skies the exception and not the rule. He took advantage of those exceptions when they did occur, as can be perceived through his monthly columns, but perhaps potential attendees were so benumbed by perpetual inclement weather that they expected it to be the norm.

Whatever the cause, on behalf of club membership, I thank Ken for his worthy participation and assistance in the past. The newsletter is proud to have been one of the vehicles for his valued explanations of the apparent and the not-so-apparent night sky. May his successor build upon Ken's triumphs.

#### Errata

In a December 2006 Newsletter article "Brief Notes from History," I neglected to make reference to the successful lunar landing of unmanned American spacecraft Surveyor 7. It landed on 10 January 1968, close to crater Tycho. I apologize for the omission.

Joseph Benderavage

## Gleanings From Regulus 25 Years Ago

by Leo Enright

## A Fascinating Letter From Gus Johnson Who Still Writes To Us

Following is an introductory note that I wrote concerning a letter we received from Gus Johnson in 1981 (in the period when I was newsletter editor) and the letter itself which appeared in the Dec. 1981/Jan. 1982 issue of Regulus. The contents of the letter may stimulate our current members, I hope, to a closer examination of an important part of the Pleiades Star Cluster, which currently in these winter evenings is riding high in the southern sky perched on the back of Taurus the Bull.

[Here, from the Regulus issue of 25 years ago is the first of a series of articles which I intend to entitle "Gleanings From Regulus —25 Years Ago." If you were a member in that era, please enjoy the reminiscences; if not, you will start to explore some of the history of your Centre. In undertaking this series, I am following a suggestion from Walter MacDonald, and am emulating Sky and Telescope's Editor Emeritus Lief Robinson, who writes in every issue a review of one, or several, of the topics covered in the issue of 25 years previous.]

OBSERVING A "NEWLY-SUSPECTED VARIABLE"

by Gus Johnson

Editor's Note: Again in this issue of Regulus, the second in a row, I am pleased to report having received a very welcome letter from Mr. Gus Johnson of Swanton, Maryland. In this letter, most of which is reprinted here because of the interest it may hold for many of our members, Mr. Johnson reports observing in the famous Pleiades cluster a star which has recently been suspected of being a variable.

December 2, 1981

Dear Mr. Enright,

Best wishes for clear skies and a joyous Christmas season to you and the other members of the Centre.

Little clear observing weather without moon was to be enjoyed in November, but some fairly clear nights for visual observing at least did occur so that I finished the month with over fifty variable star estimates. I and a few others are monitoring a suspected new variable star, and in a well-known area, like unto that bright eclipser found a few years back in the trapezium of the Orion Nebula. This one is in the Pleiades. The brightest Pleiad (Alcyone) has a little triangle of stars nearby, the closest star of which is the star in question. Burnham's CELESTIAL HANDBOOK calls it a triangle of 9<sup>th</sup> mag. stars, but if the dimmest is 9<sup>th</sup>, then the next is 7½ – 8 and the brightest between 6 and 7. Two old photos of mine show it at 6.0 but the husband of the director of the AAVSO made a photo showing it dimmer than usual. My visual estimates during last month were mostly 6.0 but 6.7 and 6.4 occurred. If it is a variable, two possible types come to mind: eclipsers or an R Coronae Borealis type. Assuming it to be a Pleiad, its colour and normal brightness tend to preclude its being an R CrB, so maybe it is an eclipser or one of the small-range irregulars with which I am less familiar. My short 2.4-in refractor is especially suitable for viewing this variable and the whole cluster with its 2 3/4° field at 25X.

The AAVSO accepts observations of careful observers even if not AAVSO members, so not only Warren Morrison could be in the vanguard of observers of this star. He could show any interested observers how observations are made and how the time is recorded. The assigned designation number looks wrong to me, and I have brought this to the attention of the director. The discoverer seems to be an observer from Tennessee, and a friend of George Kelley, with whom I have corresponded for years and visited on my occasional trips to Memphis to see relatives. George told me of the suspected star. I, too, have some suspected stars, but with variables of small range, the observer can sometimes wonder if it is rather his eyes that are playing tricks on him and not the star acting up. Red stars can cause mis-judgements of brightness due to the Perkinje Effect, and where possible, out-of-focus images make estimating better. The left eye may not give the same estimate as the right eye! One must be careful. Even with the same eye two equally bright stars, one above the other, can look unequal; so, side-by-side estimating, where possible, leads to greater accuracy. Possible inaccuracies notwithstanding, a variable star observer knows that he or she may be the only person in the world watching a given star that night, and they do sometimes "misbehave." Naturally dim stars are most in need of observing; yet sometimes a notice comes out for observations of variables that can be readily observed with binoculars or even the unaided eye, as in the case of Mira a year or so back.

Clear skies,  
Gus

Once again Mr. Johnson's careful observing is an inspiration to many of us and we wish him the very best of luck in all of his observing.

December 2006 Comments: Gus Johnson's observing and his observing reports, contained in his many interesting letters, continue even this year to be an inspiration just as they were in 1981 and over the intervening years.

It is interesting to read Mr. Johnson's 1981 statement that Warren Morrison might be able to instruct interested Centre members on procedures for properly observing variable stars. This, remember, was a full three years before Warren's famous discovery of RS Ophiuchi in outburst. Even then Warren's reputation was international. Of course, Gus did not realize that Warren did not regularly attend the meetings of the Centre to which he belonged, simply because of the distance between Kingston and his place of residence. L.E.

### Amateur Telescope Makers of Kingston Centre Report on the Construction of a 16" Telescope

### Grinding and Re-grinding



Joe Benderavage grinds with the future 16" mirror on top of the grinding tool. A grinding platform rests atop a plastic barrel containing lawn compost (but it doesn't smell at all). A sponge used to swab off spent grit and water indicates current grit size (#120). With a newer and finer grit size, a new sponge will be used so as not to contaminate finer grit with any coarse grit still caught in the #120 sponge.

The ground glass for our future 16" (400 mm) telescope mirror had, during the course of grinding with a very fine M305 emery abrasive, incurred unwanted scratches near its periphery. These scratches would have to be ground out. After more than an hour's effort, the use of #240 abrasive grit proved futile, so grinding with #120 grit was planned. This would mean that if the coarser grit was successful, the less coarse #240 would have to follow, to erase its effects. Then, grinding with a fine #400 grit was necessary to erase the #240 grit's "signature". And, of course, use of a more fine #600 grit was needed to erase the side effects of the #400.

As it turned out, a little more than an hour's worth of grinding with #120 abrasive did satisfactorily deal with the problem, but because of those quite deep scratches, nearly the entire grinding process as described above had to be repeated because coarse grit removes large chunks of material from the glass and leaves a more rugose "track" than does fine grit. To get the surface of the glass smooth again necessitates using finer and finer grits in steps as described above.

During my work with finer grades of abrasives, the mirror frequently "froze", or locked together with its tool. As I was "freeing" the mirror (most often it "froze" with mirror in top position), I would have to

slide it off the edge of the tool. Perhaps the mirror encountered a tile corner projecting, which may have scratched the mirror. I don't know exactly how the scratches occurred; I am taking a logical guess as to what happened.

During the sequence of original grinding, tiles set into the 35-pound (16 kg) tool (made from dental stone compound mixed with water) had gradually worn down. The tile surfaces were at the same level as the surrounding dental stone matrix in which they were embedded. This interfered with the cutting action of the abrasive, especially in the finer grades.

The exposed dental stone had to be shaved down to allow the tile plane to stand proud of its matrix, in order to present a surface amenable to grinding. I accomplished this with a rasp file, a masonry chisel and a cold chisel, but it was slow and careful work, because overenthusiastic misdirected application of the tools could cause tiles on the 35-pound (16 kg) grinding tool to crack,

endangering the whole project.

Once the shaving was accomplished successfully, the grinding process was haunted by fewer "frozen" predicaments, which principally occurred during grinding with the mirror on top.

Mirror-on-top grinding

removed more material from near the perimeter of the mirror, while tool-on-top grinding removed more material from the centre of the glass, thus deepening its focal length, perhaps more than desired.

Any contact that the dental stone periphery might make with the mirror now would be diminished. Projecting points and sharp edges of tile were carefully dressed to bluntness using a sharpening stone.

Simple tools such as a file and hand chisel are preferable to powered accessories when working this closely to highly polished tiles embedded in a relatively soft matrix of dental stone which forms the bulk of this sixteen inch diameter, 35 pound grinding tool. Scraping will allow the tiles to stand in higher relief and will increase their effectiveness. Notice the sharp corner of a tile near the very edge of the lower left margin in this photograph.





Diane Torney generously brushes a thin solution of cerium oxide and distilled water onto parts of a rubber doormat. It will receive heated pitch prepared by Doug Angle operating a Coleman stove in the background. The solution will embed itself in the pitch.

### Pouring the Lap

On Monday, 18 December 2006, our RASC-Kingston Centre Amateur Telescope Makers met for several hours to continue the project of constructing a telescope, utilizing a 16-inch (400 mm) future mirror. The goal of this meeting was to fabricate a pitch lap for that mirror.

Doug Angle, Diane Torney, and Joe Benderavage took part in the exercise, which began with firing up a Coleman stove outdoors in unseasonably warm 8° C weather. Optical pitch was slowly but surely melted on the stove to a viscid consistency. Diane had coated a rubber doormat that had many holes

with a solution of distilled water and Cerium Oxide polishing abrasive. The mirror glass had been soaking in warm water indoors for several hours. When all was ready, it was brought outside and placed, concave side up, on a newspaper-covered table

The glass was quickly covered with aluminium foil, which in turn was coated with cerium oxide. The flexible doormat was placed on the coated foil. Diane had coated the insides of the holes also, because hot pitch would be poured on top of the mat, and when the pitch cooled and hardened, it had to be easily removed from its holes.. The cerium oxide coating might help the pitch not to stick to the mat.

Getting this mat to conform to the concave surface of our previously-ground mirror proved to be somewhat difficult, and had to be done with two people holding adjacent corners of a free end of the mat. Finally, Doug poured the hot melted pitch into the holes of the mat to form the cells of the lap. We maintained our position holding the mat to match its curvature to that of the mirror, while the pitch cooled and thickened. It did not take long.

Doug had poured the pitch in such a way that it formed a base for the cells. When the pitch on the mat was of the right consistency, he poured a small amount onto the convex side of a 16" (400 mm) diameter aluminium disc which he had made and to which he had fastened a metal post bearing a screw thread holding a plywood rectangle. He then inverted that aluminium disk and pressed it against the previously poured pitch, which would later become the base of the lap cells. Once the pitch hardened, we all then flipped by hand the entire disc-mat-pitch-mirror assembly upside-down so that the mirror and pitch and rubber doormat were on top of the whole compilation. Then, with the greatest care, the mirror was slid off the aluminium foil that

FROM THIS . . . .



had once covered it, and the door mat was freed, hole by hole, from the hardened pitch. The protective foil, however, came off piecemeal, and slowly. “Anything bigger than half a micron that lands on the finished lap will scratch the mirror,” Doug said, so each little piece of foil had to be painstakingly removed.

The end product was a finished pitch lap that had a convex surface populated by an assemblage of about 125 circular mounds of pitch (the cells) that stood 15 millimetres high, with the base of this creation being attached to the aluminium disc.

In future, the mirror’s previously ground face, made opaque by all that grinding, will be sprinkled with polishing abrasive. The pitch lap tool, mounted to a platform, will be pressed against the mirror to make any irregular facets of

**To This :**



Cave Sixteen-inch Telescope

its cells come out even. Eventually, pressing against the mirror, they will be set to turning and polishing.

After perhaps ten hours of polishing, a glass will be produced, the concave surface of which will be so finely addressed as to be transparent instead of opaque, and ready to be coated by reflective material. It just may be on its way to becoming a telescope similar in size and design to the Cave 16" telescope shown on the previous page.

The ATM—Kingston Centre is currently building a 16" equatorially mounted Newtonian like the Cave telescope. If you would like to participate in the project, contact Doug Angle.

### Target for Tonight

By Susan Gagnon

#### *Perseus*

**ETU:** constellation and bright star Mirfak, Alpha Persei Group, Double Cluster, Algol (Beta Persei).

**Messier:** M76, M34.

**Finest NGC:** 869/884 (Double Cluster), 1023, 1491.

**Levy List:**

#### *Cepheus*

**ETU:** Delta 27(variable and double), Mu Cephei, S Cephei.

**Messier:** none

**Finest NGC:** 6939, 6946, 7129, 40.

**Levy List:** 112(NGC 7023)

#### *Andromeda*

**ETU:** Constellation and Star Alpheratz, M31.

**Messier:** M31, M32, M110.

**Finest NGC:** 7662, 891.

**Levy List:**

#### *Auriga*

**ETU:** constellation and bright star Capella, M37.

**Messier:** M36, M37, M38

**Finest NGC:** 1931.

**Levy List:** 1 (NGC 1931).

The photograph below, taken in May 2006, shows Susan Gagnon in front of the partially finished observatory. Notice the raceway (only one is visible) for supporting the displaced roof in back of the structure. The other side is partially visible in our front page photo.



This is a pier for mounting a telescope inside the Gagnons' observatory.

## RASC-KC Board of Directors

President: Kim Hay  
 Vice President: Arlyne Gillespie  
 Secretary: Steve Hart  
 Treasurer: Kevin Kell  
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 Editor: Joseph Benderavage  
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**2006 Committee Chairs**  
 Astronomy Day: TBA  
 ATM: Doug Angle  
 Awards: Kim Hay  
 Banquet: Diane Torney  
 Education: Steve Hart  
 Equipment Loan: Kevin Kell  
 Fall 'N' Stars: Arlyne Gillespie  
 KAON: Kevin Kell (until new person steps in)  
 OAFTN Instructor: Kevin Kell  
 Observing : TBA  
 Publicity : TBA  
 Relay for Life: TBA  
 Responsible Lighting: Kim Hay  
 Sky Is the Limit: TBA

### Brief Notes from History by Joseph Benderavage

14 January 2007 marks the second anniversary of the landing of a probe upon the surface of Titan, Saturn's largest moon. It had been delivered by the NASA/ESA mission to Saturn called Cassini. Huygens, the probe's name, was released on Christmas Day, 2004.

Cassini is still in the environs of Saturn. Its lifetime was originally set to end in 2008, but has now been extended to mid-2010, and will probably be extended again for another two years.

But there may be a use for it even farther into the future, for it may be programmed to deliberately impact Mercury by 2021. Its impact would be observed by the probe of Mercury, BepiColombo, planned by ESA and JAXA to arrive at Mercury in 2019 after a 2013 launch from Earth.

Giuseppe Colombo, nicknamed Bepi, was an Italian scientist who first devised the gravity-assist manoeuvre now widely used by interplanetary probes to gain impetus for their flight by passing close to a planet. This manoeuvre was used to great effect by the Cassini/Huygens mission in order to get to Saturn's vicinity.

You may currently see Saturn near Regulus, in Leo.

## The Royal Astronomical Society of Canada—Kingston Centre

### Newsletter Submission Info:

I can take most common formats, although I prefer plain text. Pictures should be sent as image files in attachments separate from the articles. Please avoid the use of capitals, asterisks etc for formatting, as I use the publishing software's formats for this kind of emphasis.

E-mail: lbenderavage (at) sympatico (dot) ca  
 Post: Joseph Benderavage, 147 Braemar Road, Kingston, Ontario, Canada K7M 4B7

### 2007 Publication Deadlines

#### For the month (Deadline)

February 2007 (January 26)

March 2007 (February 19)

**Subscriptions:** Members of the Kingston Centre receive Regulus as a benefit of membership. Advertisements are free to members of the Centre. Commercial advertising is \$20/quarter, \$40/half page, \$100/ full page and should be in electronic format. Contributions are more than welcome. Submitted material may be edited for brevity or clarity. Copyright 2007 All rights reserved. Permission is granted to other publications of a similar nature to print material from Regulus provided that credit is given to the author and to Regulus. We would appreciate you letting us know if you do use material published in Regulus.



JPL/NASA

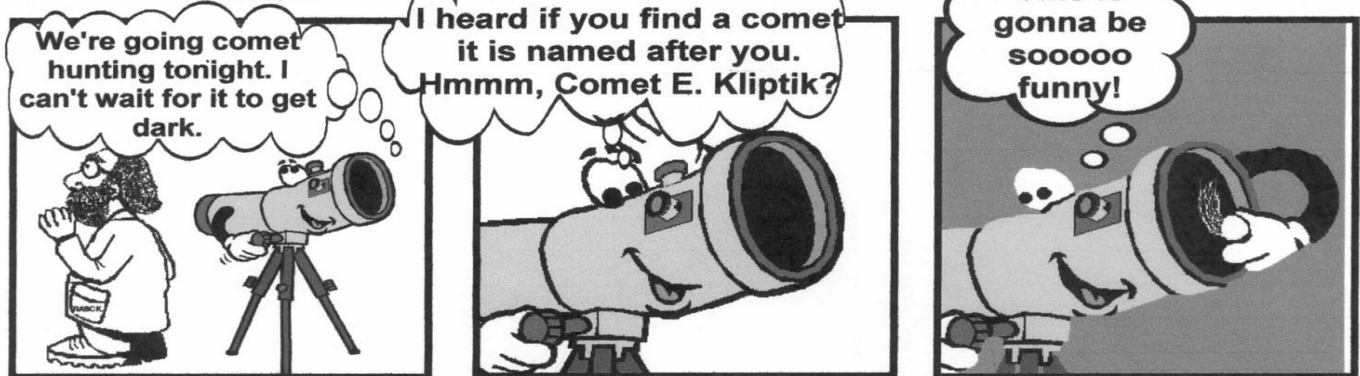


by Kim Hay

## Kingston Cosmic & Events Calendar January & February 2007

Date & Time	Events	Date & Time	Events
Jan 3 Wednesday	Quadrantid meteor peak 8:00 pm	Feb 2 Friday	Full Moon 0:45
Jan 3 Wednesday	Full Moon 8:57	Feb 2 Friday	Moon 0.8° E of Saturn
Jan 6 Saturday	Moon 1°N of Regulus, Saturn nearby 11 pm	Feb 5 Monday	Zodiacal Light visible in W after evening twilight for next two weeks
Jan 11 Thursday	Last Quarter Moon 7:45	Feb 7 Wednesday	Venus 0.7° to left of Uranus, visible after dark Mercury at greatest elongation e(18°) favourable evening viewing
Jan 12 Friday	Regular Meeting Stirling Hall Theatre A 7:30 p.m. Members Night	Feb 9 Friday	Regular Meeting Stirling Hall Theatre A 7:30 p.m. Speaker TBA
Jan 13 Saturday	KAON Observing Session- Ellis Hall Queen's Observatory 7:30-9:30 p.m. for more information visit <a href="http://members.kingston.net/rasc/pubobs.htm">http:// members.kingston.net/rasc/ pubobs.htm</a>	Feb 10 Saturday	KAON Observing Session- Ellis Hall Queen's Observatory 7:30-9:30 p.m. for more information visit <a href="http://members.kingston.net/rasc/pubobs.htm">http://members.kingston.net/ rasc/pubobs.htm</a>  Saturn is at opposition Last Quarter Moon 4:51
Jan 18 Thursday	New Moon 23:01	Feb 17 Sunday	New Moon 11:14
Jan 15 Thursday	Moon First Quarter 18:01	Feb 23 Friday	Moon 0.6°N of the Pleiades 7 pm
		Feb 24 Saturday	First Quarter Moon 2:56 Canadian Ian Shelton discovered Supernova 1987a, 20 years ago

### NEWT by E. Kliptik



some characters in this cartoon are adapted from The Print Shop Ensemble III