

# Stargazer

The Newsletter of the  
Royal Astronomical Society of Canada – Regina Centre

January/February 2005

Vol. 7 Issue 3

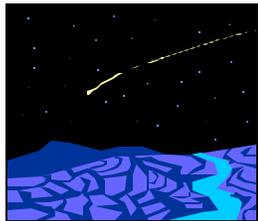
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There are public events coming up where  
YOU can get involved!

It's a great way to share your  
enthusiasm for astronomy!!

Talk to any of the executive if you're  
interested in helping out.

## 2004-2005 RASC Regina Centre Executive

<i>President</i>	Lorne Harasen
<i>Vice-President</i>	Michael Holzer
<i>Treasurer</i>	Darcy Kozoriz
<i>Secretary</i>	Alden Foraie
<i>National Rep</i>	James Edgar
<i>Past President</i>	Vance Petriew

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## Regina Centre Public Meetings:

Public meetings take place at **7:00 PM on the 4th Friday of the month** at the Saskatchewan Science Centre Imax Theatre Boardroom, 3rd floor.

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## Ways to contact the club:



By email: [info@ras.sk.ca](mailto:info@ras.sk.ca)

By phone: (306) 751-0128 [please leave a message]

By mail: Regina Centre – RASC, P.O. Box 20014, Regina, SK, S4P 4J7

In person: Come to one of our public meetings.

Please visit our website for more information: <http://www.ras.sk.ca>

Also, visit the new website of the Saskatchewan Millennium Telescope at <http://telescope.ras.sk.ca>

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Stargazer is the publication of the RASC Regina Centre and is published bi-monthly.

### *Note from the editor:*

*Thanks to all who have been sending me articles – please keep them coming! If you haven't put something in the newsletter previously, I hope you will consider sending some stories, articles or pictures from your own astronomy interests and adventures!* - Jennifer

Article submissions may be sent to the editor by email ([editor@ras.sk.ca](mailto:editor@ras.sk.ca)) or given to a member of the Executive to forward.

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# Winter Club Events:



***For more information about any of the events listed below, please contact one of the Executive members.***

<b>JANUARY</b>	
Friday, January 7th	Kalium Observatory open to the public 7:00 PM – 9:00 PM.
Friday, January 21st	Kalium Observatory open to the public 7:00 PM – 9:00 PM.
Friday, January 28th	Public general meeting. Meet in the IMAX Boardroom at the Science Centre, 7:00 PM
<b>FEBRUARY</b>	
Friday, February 4th	Kalium Observatory open to the public 7:00 PM – 9:00 PM.
Friday, February 18th	Kalium Observatory open to the public 7:00 PM – 9:00 PM.
Friday, February 25th	Public general meeting. Meet in the IMAX Boardroom at the Science Centre, 7:00 PM
<b>MARCH</b>	
Friday, March 4th	Kalium Observatory open to the public 7:00 PM – 9:00 PM.
Wednesday, March 16th	Sunrise Library Presentation – Introduction to Astronomy 7:00 PM
Friday, March 18th	Kalium Observatory open to the public 7:00 PM – 9:00 PM.
Friday, March 25th	Public general meeting. Meet in the IMAX Boardroom at the Science Centre, 7:00 PM
<b>APRIL</b>	
Friday, April 1st	Kalium Observatory open to the public 7:00 PM – 9:00 PM.
Friday, April 15th	Kalium Observatory open to the public 7:00 PM – 9:00 PM.
Saturday, April 16th	International Astronomy Day
Friday, April 22nd	Public general meeting. Meet in the IMAX Boardroom at the Science Centre, 7:00 PM

# Remembering Ed Matheson

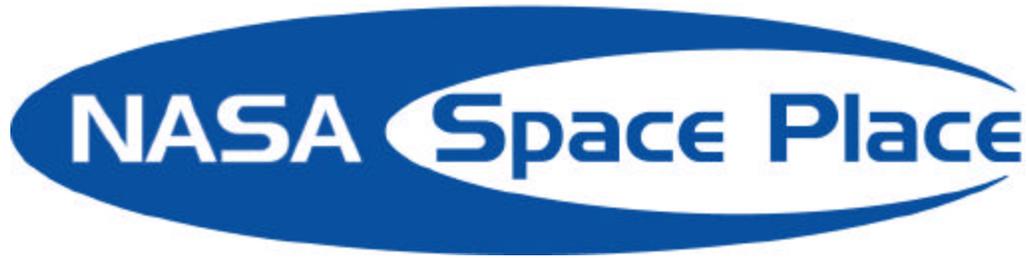
By Steve Szuta

Ed Matheson, 87, a long time and dedicated member of the RASC-Regina Centre passed away on December 27, 2004.

Ed enjoyed being a part of our club for almost forty years; he served on executive committees, and was always willing to help out with club events. Ed was a friend to me and many other members. For several years, I drove Ed to numerous astronomy events held by our club and really enjoyed this because I had a chance to hear his stories. I learned a great deal from his experience and knowledge of astronomy. I remember Ed as being always wanting to learn - he had a curiosity about science, and would delve deeply into anything that caught his interest. During his retirement, I remember Ed talking about the numerous lectures he attended at the university and the scientific books he read. He continued his interest in astronomy and knew about the latest astronomical discoveries.

All of us who knew Ed will miss him. Anyone wishing to provide an expression of sympathy is encouraged to visit the web site <http://www.saskobits.com/> and sign the guest book for Ed. His family is planning a memorial service in the spring in remembrance of him.





## **Stardust Up Close**

by Patrick L. Barry and Dr. Tony Phillips

Like discarded lumber and broken bricks around a construction site, comets scattered at the edge of our solar system are left-over bits from the "construction" of our solar system.

Studying comets, then, can help scientists understand how our solar system formed, and how it gave rise to a life-bearing planet like Earth.

But comets have long been frustratingly out of reach -- until recently. In January 2004 NASA's Stardust probe made a fly-by of the comet Wild 2 (pronounced "vilt"). This fly-by captured some of the best images and data on comets yet ... and the most surprising.

Scientists had thought that comets were basically "rubble piles" of ice and dust -- leftover "construction materials" held together by the comet's feeble gravity. But that's not what Stardust found. Photos of Wild 2 reveal a bizarre landscape of odd-shaped craters, tall cliffs, and overhangs. The comet looks like an alien world in miniature, not construction debris. To support these shapes against the pull of gravity, the comet must have a different consistency than scientists thought:

"Now we think the comet's surface might have a texture like freeze-dried ice cream, so-called 'astronaut ice cream': It's solid and can assume odd, gravity-defying shapes, but it's basically soft and crumbles easily," says Donald Brownlee of the University of Washington, principal investigator for Stardust.

Scientists are currently assembling a 3-D computer model of this surface from the photos that Stardust took. Those photos show the sunlit side of the comet from many angles, so its 3-dimensional shape can be inferred by analyzing the images. The result will be a "virtual comet" that scientists can examine from any angle. They can even perform a virtual fly-by. Using this 3-D model to study the comet's shape in detail, the scientists will learn a lot about the material from which the comet is made: how strong or dense or brittle it is, for example.

Soon, the Stardust team will get their hands on some of that material. In January 2006, a capsule from Stardust will parachute down to Earth carrying samples of

comet dust captured during the flyby. Once scientists get these tiny grains under their microscopes, they'll get their first glimpse at the primordial makings of the solar system.

It's heading our way: ancient, hard-won, possibly surprising and definitely precious dust from the construction zone.

Find out more about the Stardust mission at [stardust.jpl.nasa.gov](http://stardust.jpl.nasa.gov). Kids can read about comets, play the "Tails of Wonder" game about comets, and hear a rhyming story about aerogel at <http://spaceplace.nasa.gov/en/kids/stardust/>.



*The Stardust spacecraft used a grid holding aerogel to capture dust particles from comet Wild 2. In this test, high velocity dust particles are stopped unharmed at the end of cone shaped tracks in a sample of aerogel*

*This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*

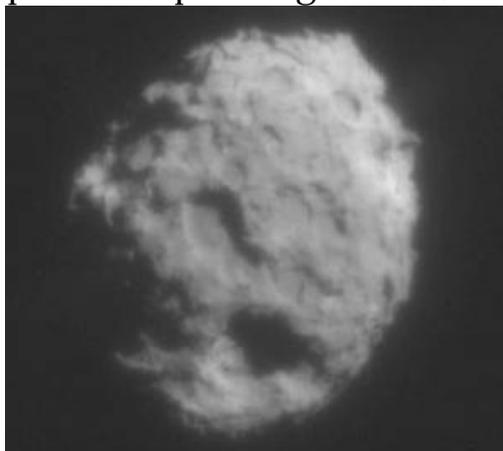
## Amateur Cometary Science

by Michael Holzer

### How large are comets?

According to the information we currently have, the sizes of comet nuclei are generally in the range of one to ten kilometers in diameter. Many comets that are discovered and observed within our planetary system tend to have modest dimensions of roughly one kilometer on average. Great comet Hale-Bopp of 1997 had a nucleus estimated to be approximately forty-plus kilometers in diameter! As a large comet approaches the Sun in its orbit, there is always a chance that the resulting dust or ion tail may subtend many degrees across the night sky. While a rare event, bright naked eye comets can be the observational experience of a lifetime. On some occasions, an incoming comet may break up into fragments, having been ripped apart by the Sun's gravity. The result is a string of cosmic pearls that begin a long journey back to the abyss of deep space.

Countless times, comets meet their fiery doom as they are literally swallowed up by the Sun after playing a deadly game of "gravitational roulette". Every so often Jupiter or one of the other gas giant planets pull in a passing comet, thereby taking one for the team, as it were.



Comet Wild 2's Nucleus from Stardust.  
Image courtesy of NASA.

There are known larger icy bodies within the Kuiper Belt known as "centaurs". These are apparently composed of the same icy materials that comets are made of, and hence, are giant comet nuclei. The total population of centaurs is currently a hot scientific debate, and research continues to learn more about these intriguing objects of our Solar System. One such object was discovered in 2002 and named Quoar. It has a diameter of 1250 kilometers and lies over

1.5 billion kilometers more distant than Pluto in its own orbit around our star. Pluto is thought to be a captured Kuiper Belt object as our

current theoretical evidence might suggest. Since 1992, astronomers have discovered almost one thousand objects within the Kuiper Belt of about one hundred kilometers in diameter, and some several times that size. While we are sure there will be more mysterious icy bodies discovered, until we thoroughly search the Kuiper Belt with increasingly powerful instruments, it will remain difficult to know with absolute certainty if even bigger objects than Pluto exist within the remote Outer Solar System. It remains a difficult task to determine any size statistics of the countless billions of the Oort Cloud comet population.

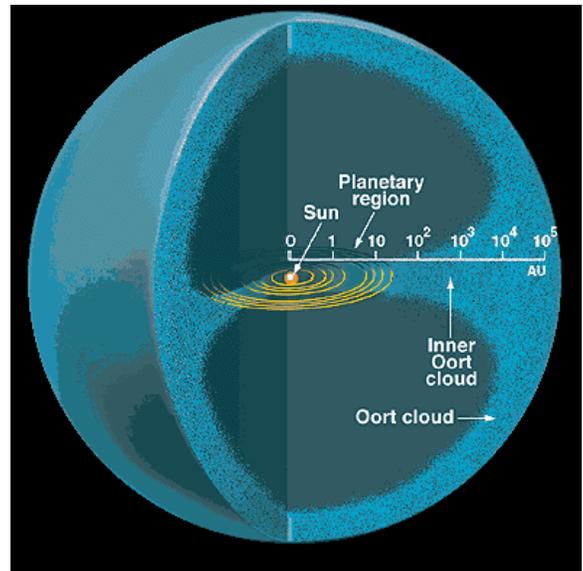
### How many comets are there?

It is fair to say that no one knows for sure. However, we can estimate that the Kuiper Belt alone contains at least 100 times the mass of all the known asteroids in the main asteroid belt. The extreme remoteness of the Oort Cloud prevents direct observation of its resident objects, so science must rely more heavily on statistics and hypotheses. With confidence, we believe there are trillions of comet nuclei within this distant population. By employing basic deduction, for any single comet observed directly whose orbit predicts

its origin in the Oort Cloud for example, it is reasonable to deduce millions of other comets for every comet seen by our telescopes. The fact is the Solar System really is unimaginably vast by human standards. Every comet observed traveling through our planetary system might be compared to the proverbial needle in the haystack, except one has much less chance of discovering a given comet in the night sky!

### Have there been cometary impacts on the planets?

Let us pause for a moment to try and visualize this concept as it has taken place in our own "cosmic backyard". We know from much



The Oort Cloud. Image courtesy of The Electronic Universe Project

geologic evidence that there have been cometary and asteroid impacts here on Earth, for example. Life on our planet suffered several mass extinctions due to such immense impacts, steadily throughout its history. To become familiar with one of the most essential lessons about impact events, we look to the stark beauty of Earth's Moon, which stands as a clear and convincing testament to meteorite bombardment in the inner Solar System. Earth is geologically active and thus sheds light on why much fewer craters are to be found or preserved on Earth, intact. Since the Moon had only brief volcanism due to major impacts, was not large enough to hold an atmosphere, and has no plate tectonics, most of its craters are indeed very well showcased. To go a step further, one can assume that because of Earth's size relative to the Moon, it probably got hit by comets and asteroids more often than the Moon (our Moon was always in a close proximity to Earth). Though there seems to have been a decline in globally catastrophic impacts, it might be scientifically viable to recognize the possibility of another future extinction-level impact. It is really only a matter of time before this may happen again in the future. A terrific example of a cometary impact was the smashing of comet Shoemaker-Levy 9 into Jupiter in 1994. For the first time ever in history, humans witnessed the awesome power released by a comet colliding with a planet in our Solar System.

### How accessible are comets to amateur observers?

Bright comets are fairly easy to observe with binoculars and small telescopes. It is fascinating to note a comet's movement relative to the backdrop of stars from night to night. If an experienced observer becomes inclined to study faint comets, larger telescopes and other advanced equipment become a necessity for this purpose. The annual RASC Observer's Handbook includes a small number of known observable comets with an excellent comet observing article written by Canadian comet hunter extraordinaire, David H. Levy. A list of useful links for comet observation is provided for your convenience on the links page. You will find these links invaluable in preparing to observe your chosen comet.

## General Information for all Comet Observers

To find a comet in the night sky you will need to plot its location using the Right Ascension and Declination coordinates provided by a reliable source, such as NASA's Ephemeris Generator online. Taking a few minutes to plot and study the comets position in the night sky with a quality star atlas ensures that your observation will be successful. As an observing aid, making a good finder chart is possible using the several available computer planetarium programs on the market. Due to the diffuse appearance of comets, it will be beneficial to know the general appearance of deep sky objects such as galaxies, nebulae, and faint star clusters. To any comet observer, quality time spent learning the constellations proves invaluable during a pleasant evening out under the stars. A working familiarity with your optical equipment is also paramount. The point is to enjoy the profound beauty of the Cosmos and have a lot of fun at the same time!

## Choosing comets to observe

As mentioned above, there is no substitute for taking one's time, enjoying and learning the night sky. Observing comets can be done with practice using a chart with the visual magnitudes of the stars clearly indicated on it. The following should be considered as a generalized guideline for various instruments. If ever in doubt, never hesitate to ask more experienced observers in the RASC. They will be happy to assist you and help you reach your goal!

**Binoculars and Small Telescopes:** There are usually 2 or 3 comets per year bright enough to be seen through small instruments. Generally, but with some exceptions, 10x50 binoculars can see a diffuse fifth magnitude comet and small aperture telescopes can see a diffuse eighth magnitude comet easily under dark rural skies.

**Medium Sized Telescopes:** With greater light gathering capability, one can comfortably seek out comets in the range of tenth magnitude using ephemerides that are readily available from NASA.



NexStar 5i  
Item #11034

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Some preparation is highly recommended before trying to locate more difficult comets. The use of additional finder charts becomes a welcome observational tool at the telescope eyepiece.

**Large Sized Telescopes:** For those who have access to large amateur telescopes, a greater number of comets can be observed during favourable conditions. To find faint comets down to twelfth or fourteenth magnitude, a pre-printed finder chart will be vital, as well as a detailed star map such as Uranometria. A pre printed chart of a faint star field usually represents a very small field of view that would otherwise be challenging to find in the night sky without this aid. By using the regular charts and progressing from large to smaller fields of view, it will be much easier to find the comet you are looking for. Computer programs such as Earth Centered Universe and others can print custom finder charts containing stars of fifteenth magnitude or fainter.

NOTE: As with any comet observation, sky conditions, optical quality, and the amount of experience are taken into consideration. Enjoy!

If you have become absolutely certain during any observation that you may have discovered a comet, then you must contact the Central Bureau for Astronomical Telegrams (CBAT) with all the appropriate information. The preferred method for reporting a comet discovery to CBAT is via e-mail: [cbat@cfa.harvard.edu](mailto:cbat@cfa.harvard.edu), or go to its Web site. CBAT requires the following information regarding your candidate comet discovery:

- your name, complete address and telephone number, fax number, and e-mail
- the precise date and time of your observation in Universal Time
- your observing location and telescope used
- the object's precise coordinates (in equinox 2000.0)
- its rate and direction of motion
- its estimated magnitude
- its physical description - a sketch of the object and any other stars in the eyepiece field of view is highly desirable for these reasons

Make sure to remember these things for success:

- Scrutinize the object thoroughly. This is where one's observing skills and methodology play a great role. Knowing deep sky objects is important in that often some may look surprisingly similar to comets.
- Use a star atlas or planetarium program to identify the object's position.
- If nothing is plotted on the chart, then it may be time to take another step.
- Get the suspect object confirmed privately by trusted fellow astronomer. Multiple independent observations to follow as soon as possible after a discovery is very important and lessens the chance for error by a single observer.

Use Internet Resources. The World Wide Web is an extremely useful tool to the novice to the most seasoned professional. Find out if a comet is in the area you may have conducted your comet search.

### A Future RASC Comet Observing Program

It will be the intention of the RASC Observing Committee to promote hands-on visual observation of comets as an educational and worthwhile experience. The study of comets and other interplanetary bodies promote a standard of excellence in the amateur community and makes us true custodians of astronomy - the noblest of the sciences. Likewise, future observers may benefit tomorrow from the knowledge we gain today.



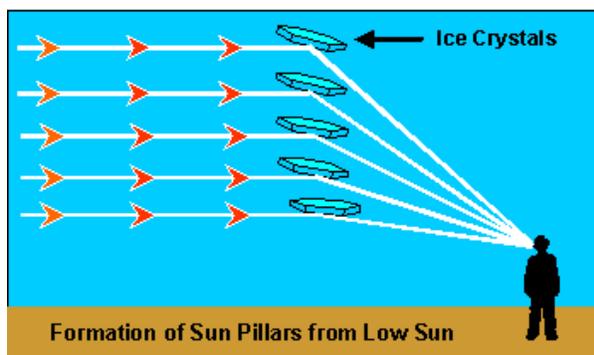
## Notes from a Backyard Astronomer

by Vance Petriew

The weather in Saskatchewan has been all over the place this winter. It's pretty tough to write an observing article when the logs are empty. However, I did observe a "pretty" phenomenon on my way to work on Saturday night. Below is a picture of mine showing some light pillars.



Light pillars are produced by upward shining light off plate-shaped ice crystals in the air. A similar effect called sun pillars, can also be seen during winter sunsets. The crystals reflect the light rays and focus them towards the observer. While most people enjoy seeing these light pillars, one must consider how these pillars are formed. The orange pillars are produced by upward shining sodium vapour street lights. The blue pillars are created by upward shining metal halide lights. Unshielded lights like these are main reason why the stars are not visible within cities anymore. It's called **light pollution**.



The solution to this problem is simple: **direct lights down on the ground where they can do some useful work**. So the next time you see some light pillars while you're out for an evening stroll, think about the energy that is being wasted and what you can do to help solve this problem before it's too late.