



SASKATOON SKIES

Volume 27, Issue 05, May 1996

Saskatoon Skies is published monthly by the Saskatoon Centre
of The Royal Astronomical Society of Canada

In this Issue



All sorts of great articles

Special Announcements

Please do not forget to mark on your calendar to attend the May meeting and bring your stuff to swap. Besides our regular meeting, this meeting will also be a swap meet.

So dust off those old eyepieces, load up all of those parts and eyepieces and head to the meeting. Please call Rick and let him know if you are bringing your scope so we can arrange help.

Executive Minutes

Minutes of the April Executive Meeting
7:00 PM, Apr. 15, 1996 Room B-10,
Health Sciences Building, U of S
Campus

Present: Ed Kennedy, Richard Huziak,
Al Hartridge, Jim Young, Merlyn
Melby, Eric Keser, Brian Friesen,
Gordon Sarty

1. Meeting called to order 7:08 PM. Mike Williams cannot attend.
2. Membership Report - Eric Keser
Eric has phoned about 1/2 of the people on the list who have not renewed. Most are not interested or are unable to join this year.
3. Astronomy Day is April 20. Advertising in the paper is a problem. Need people to work the mall display and at the Star Night.
4. Observing Session Report In March there were several groups out observing the comet. In April OG clouded out.
5. National Council News National office suggests each centre send some form of appreciation re retirement of the secretary. Jim Young suggests a plaque from our centre.
6. New Observatory land search update Will continue the search for an appropriate site.
7. MVA Programs at Beaver Peak. We've been requested to submit a proposal for a 4-season astro program. Beaver Creek would do all the advertising and split profits. A binocular program, lectures, etc. Sandy and Rick will work on the details.
8. MVA Chief White Hat park Rick has written a letter to MVA wishing to give a presentation on light pollution.
9. Light Pollution update See above.
10. Rystrom Observatory incident. A new member accidentally got stuck in a field and had to be pulled out.
11. Rystrom Obs Maintenance - red light. Merlyn will work on this. - C-8 power supply. Bill Hydomako will correct this.

12. Perseid Members Night at Diefenbaker Lake? - Eric Keser suggests a barbecue with families to watch the Perseids.

13. Temp membership/ Promotions guy needed

14. May's Meeting is May 13, not 20 to avoid Victoria Day.

15. New Business A Gastronomy Night has been suggested sometime before June. This will be organized by Al Hartridge and Eric Keser.

16. Meeting adjourned 8:00 p.m.

General Minutes

Minutes of the April General Meeting
8:00 PM, April 15, 1996 Room A-226,
Health Sciences Building, U of S
Campus

1. Meeting called to order 8:00 PM.
2. Next Month's Meeting involves a swap table in addition to other stuff. Bring stuff to swap!
3. Astronomy Day is April 20
4. Observing Session Report
5. Rystrom Observatory access. Remember to call ahead (before 8:30pm), drive slowly.
6. Perseid Members Night at Diefenbaker Lake? - Eric Keser
7. Temp membership/ Promotions guy needed
8. May's Meeting is May 13, not 20 to avoid Victoria Day.
9. New Business. A Gastronomy Night suggested before June. Al and Eric to investigate.
10. Programs: Jamie Thompson - Engineering the TPA Boom on the Japanese Planet B Mars Satellite
Comet Hyakutake - Centre Members Pictures and Stories
11. Meeting adjourned 10:00 PM.

Hubble Finds Thousands of Gaseous Fragments Around Stars

Resembling a bizarre setting from a science fiction movie, dramatic images sent back by NASA's Hubble Space Telescope have surprised astronomers by uncovering thousands of gigantic tadpole-shaped objects surrounding a dying star.

Dubbed "cometary knots" because their glowing heads and gossamer tails superficially resemble comets, they are probably the result of a dying star's final outbursts. Although ground-based telescopic observations have hinted at such objects, they have not previously been seen in such abundance, say researchers.

The knots were detected by Hubble astronomer C. Robert O'Dell and graduate student Kerry P. Handron of Rice University in Houston, TX, while exploring the Helix nebula, a ring of glowing gases blown off the surface of a sunlike star late in its life.

O'Dell expects the gaseous knots, which are each several billion miles across, will eventually dissipate and vanish into the cold emptiness of interstellar space. However, he speculates that if the objects contract to form permanent solid bodies, they may contribute to a fraction (less than ten percent) of the missing mass of our galaxy, simply because of their sheer abundance around a typical dying star.

The mysterious "space pods" came into view as O'Dell used Hubble's Wide Field Planetary Camera 2 to survey the Helix nebula, located 450 light-years away in the constellation Aquarius and the closest planetary nebula to Earth - so

How to Reach The Editor

If you have an article or an ad or picture that you want to submit to the Saskatoon Skies please mail them to the address below. If you have any questions please call. Check the last issue of the newsletter to find out when the deadline is to make sure you don't miss getting your submission put in the issue you want it in.

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close that its angular size is almost half that of the full Moon.

The most visible cometary knots all lie along the inner edge of the ring, at a distance of trillions of miles from the central star. Their comet-like tails, each stretching a hundred billion miles, form a radial pattern around the star like the spokes on a wagon wheel. Though previous ground-based observations show a spoke pattern in the Helix, and some structure, O'Dell emphasizes that the Hubble images reveal an underlying population of many more smaller objects.

O'Dell made the observation because he was curious if these objects were the result of the star's final outburst which would bring comets out of "cold storage" by boiling off the icy, solid comet nuclei. This is how comets behave as they swing near our Sun.

The knots have just the right appearance and are at just the right distance from the dying star to be a long-sought comet cloud -- much like the hypothesized Oort cloud encircling our solar system. However, each gaseous cometary "head" is at least twice the diameter of our solar system -- far too large for the gaseous shell, called a coma, that surrounds an active comet as we know it.

The most likely explanation is the objects have been formed during the final years of a star's life when it ejects

shells of gas into space. This "planetary nebula" formation happens in stages where, toward the end of the process, a faster moving shell of gas ejected off the doomed star collides with slower moving gas released ten thousand years before.

Standard models predict that the knots should expand and dissipate within a few hundred thousand years. However, dust particles inside each gas ball might collide and stick together, snowballing to planet-sized bodies over time. The resulting objects would be like Earth-sized copies of the frigid, icy planet Pluto. These icy worlds would escape the dead star and presumably roam interstellar space forever.

If this phenomena is common among stars, then our galaxy could be littered with trillions of these objects. O'Dell concludes. "Planetary nebulae have been formed in our galaxy for billions of years and about one new one is created every year since this is the usual ending for the billions of sunlike stars inhabiting our Milky Way galaxy."

Hubble will be used to search more distant planetary nebulae for similar features. O'Dell hopes to revisit the Helix in a few years and take more images which might reveal the outward motion of the knots.

The Space Telescope Science Institute is operated by the Association of Universities for Research in Astronomy, Inc. (AURA) for NASA, under contract with the Goddard Space Flight Center, Greenbelt, MD. The Hubble Space Telescope is a project of international cooperation between NASA and the European Space Agency (ESA).



Hubble Reveals Surface of Pluto for First time

For the first time since Pluto's discovery 66 years ago, astronomers have at last directly seen details on the surface of the solar system's farthest known planet from pictures sent back by the European Space Agency's Faint Object Camera aboard NASA's Hubble Space

Telescope.

Hubble's snapshots of nearly the entire surface of Pluto, taken as the planet rotated through a 6.4-day period, show that Pluto is a complex object, with more large-scale contrast than any planet, except Earth.

The images also reveal almost a dozen distinctive albedo features, or provinces, none of which have ever been seen before. They include a "ragged" northern polar cap bisected by a dark strip, a bright spot seen rotating with the planet, a cluster of dark spots, and a bright linear marking that is intriguing the scientific team analyzing the images. The images confirm the presence of icy-bright polar cap features, which had been inferred from indirect evidence for surface markings in the 1980s.

This historic new look at Pluto helps pave the way for a proposed Pluto flyby mission early in the next century. Pluto is the only solar system planet not yet visited by a spacecraft.

"Hubble is providing the first, tantalizing glimpse of what Pluto will be like when we get there," said Dr. Alan Stern of Southwest Research Institute's Boulder, CO, research office. Stern led the team who used Hubble to obtain the most detailed view yet of Pluto. The Pluto imaging team also includes Dr. Marc Buie of Lowell Observatory, Flagstaff, AZ, and Dr. Laurence Trafton of the University of Texas, Austin. This team of planetary scientists used the Faint Object Camera aboard the Hubble to obtain over a dozen high-quality visible and ultraviolet images of Pluto in mid-1994. These images have now been carefully reduced and analyzed.

"These results and the maps we constructed from them are much better than I ever hoped for," said Buie. "It's fantastic. Hubble has brought Pluto from a fuzzy, distant dot of light, to a world which we can begin to map, and watch for surface changes. Hubble's view of the tiny, distant Pluto is reminiscent of looking at Mars through a small telescope," said Stern.

Some of the sharp variations across Pluto's surface detected in the Hubble images may potentially be caused by such topographic features as basins, and fresh

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impact craters (as found on Earth's moon). However, most of the surface features unveiled by Hubble are likely produced by the complex distribution of frosts that migrate across Pluto's surface with its orbital and seasonal cycles. Pluto is so far from the Sun that even nitrogen, carbon monoxide, and methane gases partially freeze onto its surface during the long period (about 100 years) when it is farthest from the Sun.

The Hubble images reveal much more surface variety on Pluto than on other icy objects in the outer solar system, including Pluto's often-cited twin, Neptune's large moon Triton. According to Trafton, "The HST images are confirming Pluto's individuality. It isn't a twin of Triton after all."

During the short, warm season around Pluto's closest approach to the Sun, these ices sublimate (go directly back to a gas), thickening Pluto's atmosphere. "The light areas are as bright as fresh Colorado snow, and the darker areas are more reminiscent of the brightness of a dirty snow," said Stern. The darkest regions likely result from hydrocarbon "residues" from the effects of ultraviolet sunlight and cosmic rays on Pluto's complex chemical melange of surface ices.

Pluto is two-thirds the size of Earth's Moon, and 1,200 times farther away. Pluto's apparent size in the sky is so small (0.1 arcseconds, which equals 1/36,000th of a degree), that 18,000 Plutos would need to be lined up to match the diameter of the full Moon. This puts Pluto's surface below the resolution limit of the largest ground-based telescopes; as a result it has been impossible to directly see any significant detail on Pluto before these Hubble observations.

Viewing such a remote and small body has been so difficult that Pluto's moon Charon wasn't detected until 1978, despite the fact that Pluto itself was discovered by Clyde Tombaugh in 1930.

Shortly after its launch in 1990, the Hubble Space Telescope first peered at Pluto and clearly distinguished the planet and its satellite (which is only 1/3000-th of a degree away) as two separate objects. However, a detailed look at Pluto's

surface had to wait until Hubble's optics were improved during the 1993 servicing mission.

The Advanced Camera, planned to be installed on Hubble in 1999, will yield slightly better images of Pluto. This will be the best view of the distant planet until space probes eventually make the long trek across the solar system.

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Jupiter's volcano-pocked moon Io has been found by NASA's Galileo spacecraft to have a giant iron core that takes up half its diameter, scientists report in today's issue of Science magazine.

The spacecraft also has detected a large "hole" in Jupiter's magnetic field near Io, leading to speculation about whether Io possesses its own magnetic field. If so, it would be the first planetary moon known to have one.

These newly identified characteristics of Io may be related to the intense heating of the moon caused by the constant squeezing and distortion of Io in Jupiter's powerful gravitational grip, according to Galileo Project Scientist Dr. Torrence Johnson of NASA's Jet Propulsion Laboratory (JPL), Pasadena, CA. Io is the most geologically active body in the Solar System, and though it is less than a third of Earth's size, it generates twice as much heat as the Earth.

"Jupiter's massive gravity field distorts the shape of Io in the same way that tides are raised in Earth's oceans by the gravitational tugs of the Sun and Moon,"

Johnson said. As Io orbits Jupiter, these so-called "body tides" rise and fall due to subtle changes in Io's orbit which in turn are caused by the gravitational nudges from Europa and Ganymede, other moons of Jupiter.

As a result, Io is squeezed like a rubber ball. Friction created by this action heats and melts rock within Io to produce the volcanoes and lava flows seen all over its surface, and huge geysers that spew sulfur dioxide onto Io's landscape.

The large, dense core Galileo found within Io was deduced from data taken during the spacecraft's flyby within 559 miles of the moon last Dec. 7, as Galileo passed by the moon on its way to enter orbit around Jupiter. Precise measurements of the spacecraft's radio signal revealed small deviations in Galileo's trajectory caused by the effects of Io's own gravity field.

From these data, Galileo scientists have determined that Io has a two-layer structure. At the center is a metallic core, probably made of iron and iron sulfide, about 560 miles in radius, which is overlain by a mantle of partially molten rock and crust, according to JPL's Dr. John Anderson, team leader of Galileo's celestial mechanics experiment and principal author of the paper published in Science today. The core was probably formed from heating in the interior of the moon, either when it originally formed or as a result of the perpetual tidal heating driving its volcanoes.

Galileo scientists also are trying to determine the cause of the hole they found in Jupiter's magnetic field when the spacecraft was closest to Io. "Instead

Membership Info

Membership in the Royal Astronomical Society of Canada and the Saskatoon Centre is open to anyone and has many benefits.

Below are the prices for memberships. Should you require additional information please contact Rick Huziak at 665-3392.

- Regular membership (21 & up).....\$40.00
- Youth Membership (21 & under).....\$22.50
- Club Newsletter (12 issues).....\$10.00
- Observer's Handbook.....\$18.95

Note: Lifetime memberships are available on request for \$900.00

of increasing continuously as the spacecraft neared Jupiter, the magnetic field strength took a sudden drop of about 30 percent," Johnson said.

"It's an astonishing result and completely unexpected," said Dr. Margaret Kivelson of the University of California at Los Angeles, who heads Galileo's magnetic fields investigation team. Preliminary analyses of these data are currently being prepared for formal publication.

"The data suggest that something around Io -- possibly a magnetic field generated by Io itself -- is creating a bubble or hole in Jupiter's own powerful magnetic field," Kivelson said. "But it's not clear to us just how Io can dig such a deep and wide magnetic hole."

Possible explanations for this signature can only be sorted out using data from all the other space physics instruments onboard Galileo, Johnson said. "We're eagerly awaiting the return of data from the magnetospheric measurements taken during the Io flyby to see if we can resolve this mystery," he said. This data, recorded on board the spacecraft, will be transmitted back to Earth in June or July.

If analysis of this data eventually proves that Io indeed has a magnetic field of its own, it would be the first moon shown to have one. Io would join the Earth, planet Mercury and the outer giant planets as bodies in our Solar System that generate their own magnetic fields.

Other studies conducted by Galileo during its December flyby of Io have provided new evidence that Io is most likely the source of high-velocity dust

streams littering millions of miles of space around Jupiter.

In July 1994, Galileo's dust detector began sensing dust streams more powerful than those previously discovered by the Ulysses spacecraft. Dust detectors on Galileo sensed more and more particles during its approach to Jupiter, reaching a peak of 20,000 impacts per day during the longest and most intense interplanetary dust storm ever observed.

These fast-moving particles travel at speeds from 30 to 60 miles per second away from Jupiter -- fast enough to escape the Solar System. These dust impacts continued up to the time of Galileo's Io flyby and then ceased, said Dr. Eberhard Grun of Germany's Max Planck Institute in Heidelberg, principle investigator for Galileo's dust detector experiment.

"My preliminary interpretation of these observations is that they support the idea that Io is in some way the source of the Jupiter dust streams," Grun said.

One theory proposed after the NASA Voyager spacecraft flybys in the late 1970s is that dust particles emitted from Io's volcanoes could become electrically charged and then swept away by Jupiter's rotating magnetic field. Recent modifications to this theory suggest that the dust is subsequently accelerated in the magnetosphere and flung outward from Jupiter at high velocity, creating dust streams.

Galileo's next close encounter with a moon of Jupiter will occur June 27, when the spacecraft will pass about 530 miles above the surface of Ganymede. Larger than Mercury, Ganymede is the largest moon in the Solar System. Galileo will make repeated close flybys of Ganymede, Callisto and Europa during its two-year mission in orbit around Jupiter.

Galileo was launched aboard Space Shuttle Atlantis on Oct. 18, 1989. The mission is managed by JPL for the NASA Office of Space Science, Washington, DC.

One of the surest ways of rekindling your enjoyment of the skies is to observe at a new site with new people by travelling to a Star Party. It is a great opportunity to share observing skills and projects, to learn from others, and an excellent way to choose a first or a replacement telescope by actually trying out the same type or model under good seeing conditions (weather permitting!). And the Star weekend events listed below should even provide the necessary amenities to combine stargazing with a holiday for the whole family.

July 12th to 14th: the Regina R.A.S.C.'s annual outing to Cypress Hills. Cypress Hills provides the highest point in Canada between Ontario and the Rockies, with an elevation of nearly 1500 metres at the top of Lookout Hill, where stargazing will take place. Regina RASC member and past president Ross Parker, who has organized this event for half a dozen years, told me that last year's participants, and other campers for whom they held a Star Party, had a spectacular view of Comet Shoemaker-Levy's impacts on Jupiter.

Parker reports that there are three large campsites available; RASC members will camp at the the bushy edge area of the Pine Hill Campground and drive up to the ample parking and large field at the top of the hill to observe. For several years this event attracted about fifteen or more people, who shared a group camping area. Unfortunately, an unexpectedly low turnout a couple of years ago provoked the ire of the Camp Warden and, as a result, this annual outing has become a smaller and less organized event: participants are expected to book their own campsites.

Ross Parker reports that , all the campgrounds are well- serviced and even include free showers. There are ample recreation facilities, including a pool and sauna, and plenty of organized activities, including nightly programs for children. One of the campgrounds has power hookups (Parker warns that these must be booked well in advance), and there is even a hotel in the area for those who would rather not camp.

Important Info

The Rystrom Observatory

Members are welcome to use the observatory at any time but please phone ahead. Call Nelson or Gloria Rystrom at 955-2370 before 9:00 p.m. if you intend on going out. This lets them know that someone will be roaming around their yard. If they do not answer go anyway. Drive through the yard slowly, and dim your lights as a courtesy to others who may be observing.

**Star Parties This Summer
by Erich Keser**

The Saskatoon R.A.S.C. has talked about a Cypress Hills Star Party for at least as long as I have been a member and Sandy Ferguson has even made some preliminary enquiries. It is wonderful to find out that Regina members have been doing what we've long talked of doing! This is surely an event that we should do our utmost to support, for which we are likely to be rewarded by some great seeing, as well as a chance to finally get the two Saskatchewan Centres working together on a project. Ross Parker sounded excited about the idea of injecting some new life into this annual tradition. Park officials have proved amenable to our RASC activities in the past, and there is a meeting Hall, at which I suggested that we might give a slide presentation or two...and even as I was finishing this article, I received an electronic message from our first cross-border member, ace amateur astronomer John Leppert of Sarles North Dakota, that he is planning to attend. His excellent slides, some of which have been published in Sky and Telescope, coupled with the images our own Al Hartridge and Don MacKinnon, are sure to provide a wonderful supplement to what should be great skies for RASC members and interested campers.

Please consider the possibility of spending this weekend at Cypress Hills seriously. It is reported to be one of the most beautiful places in this province, and a sizable contingent of Saskatoon RASC members (including a smaller group travelling nearly twice as far, from Sarles, could make this one hell of an event! Ross Parker may be contacted via E-mail at RParker136@aol.com, or via the Regina Centre for further information. Or get in touch with me at 374-4262, or Rick Huziak so that we can either answer your enquiry, or forward it electronically.

The Regina Centre meets the fourth Friday of every month in the Saskatchewan Science centre's Imax Boardroom, at 7 PM. Rick Huziak and I will try to make their May 24th meeting, which are usually also attended by Father Lucien Kemble.

July 19-22nd, Northern Prairie Star Fest, (near) Sarles, North Dakota While

the Cypress Hills event looks promising, I feel I can guarantee the wonderfully dark skies and cozy, laid back friendliness of this event. It takes place on John Leppert's 1.75 hacienda, which is miles away from even the nearest little hamlet, and though camping is the obvious way to attend, there is plenty of power (I brought along an electric hot plate last year) and ready access to the two bathrooms, a shower and many of the other amenities of John and Jill's house.

The terrific BBQ banquet Jill treated us to last year will also be repeated, as will the day trips to the International Peace gardens and Manitobas incredible Dunes Park. This is another nice event for the whole family, as there should be other kids and a dog or two to play with. John Leppert own information for this event appears in this issue, (he will be posting an ad next month), please refer to it registration fees and other details, and don't hesitate to call me about NPSF, as all three of us intend to go!

OUR OWN STAR PARTY

-Aug 9-12th Family Barbecue & Perseid Watch at Lake Diefenbaker There will be a wonderful conjunction of a New Moon, a warm Summer weekend, and the beginning of the most spectacular meteor shower of the year. Our last General Meeting proposed that we take advantage of this opportunity to get families involved in by encouraging all interested parties to take part in an RASC campout at Lake Diefenbaker for a pleasurable evening of eating, gabbing, and meteor watching (and stargazing, of course!).

This form of scientific data gathering can be done lying back in a lawn chair, and is so demanding that Ariel was able to fully contribute two weeks after she turned five, so it definitely can involve your whole family.

The venue will likely be Douglas Park because it offers the possibility of group camping and rates, if enough of us are interested, and also offers a variety of organized recreational and nature activities. Precise details are still to be worked out, including the date of any group meal or meals, and possible

presentations, swap meets, or activities for children. Please contact Erich at 374-4262 with questions or suggestions...and start fixing those old lawn chairs!



Operating a newly installed electronic camera pointed at the night sky from atop Maui's Haleakala volcano, NASA astronomers have discovered four new Earth-crossing asteroids and a fast-moving comet, just months after initiating a new near-Earth asteroid and comet discovery program.

The camera - called NEAT, for Near-Earth Asteroid Tracking system - enabled astronomers at NASA's Jet Propulsion Laboratory (JPL), Pasadena, CA, to make their first discovery of a new long-period comet on March 15, the first night of the monthly observing program. The comet was officially designated 1996 E1, after confirmation was received from observers in Maui, Australia, Japan, the Czech Republic and Camarillo, CA.

"This relatively bright, magnitude 16 comet was discovered in the constellation of Cancer," said Dr. Eleanor Helin, principal investigator of the NEAT camera team at JPL. "It was diffuse, with strong central condensation, sporting a 15-arcsecond tail. Its closest approach to Earth, at about 30 million miles, occurred at the end of March."

The comet, which has a parabolic orbit highly inclined to the ecliptic plane, is on a long journey through the Solar System. Named NEAT 1, the long-period comet was discovered automatically by NEAT's software and was sighted, coincidentally, on the Ides of March, "a most auspicious beginning for a discovery program," Helin added.

Four unusual Earth-crossing asteroids also were discovered using NEAT, which is the world's first autonomous imaging system. These near-Earth asteroids have been designated 1996 EN, 1996 EO,

1996 FR3 and 1996 FQ3.

"All are noteworthy for different reasons," Helin said. "1996 EN is a large, 1.8 mile-diameter asteroid which moves in a very elliptical orbit and displays a high inclination of 39 degrees relative to the ecliptic plane. As a result of its brightness at magnitude 15.5, and its placement with respect to Earth, it will be accessible for observations through the end of the year."

Of the other Earth-crossers, 1996 EO has a diameter of a little more than 1/2 mile. It is not on a collision course with Earth, but asteroids of this size and larger have been identified by the scientific community as sufficient to cause severe damage over a large area of Earth should one impact the planet, Helin noted.

Significant because it moves in a long elliptical orbit extending well inside the orbit of Venus, 1996 FR3 is one of only a handful of asteroids that passes so close to the Sun. Astronomers speculate that this object may be an extinct comet, having passed close to the Sun enough times to have lost its gaseous atmosphere.

About 328 feet in diameter, 1996 FQ3 is a small near-Earth asteroid with an absolute magnitude of 21. Although small, Helin believes this asteroid may prove to be a possible candidate for a future spacecraft fly-by mission, given its very low inclination of one degree relative to the ecliptic plane.

The discovery of the four new Earth-crossing asteroids represents half of all the Earth-crossing asteroids discovered worldwide during the month of March. Two of the discoveries -- 1996 EN and 1996 FR3 -- are classified as "potentially hazardous asteroids," capable of coming exceedingly close to the Earth.

"These discoveries certainly suggest that we could face a surprise encounter with a large, unseen object," Helin said. "If these newly discovered Earth-crossing asteroids have not been seen before, then there is strong evidence that many others are near the vicinity of Earth and the inner planets, which NEAT and other programs are designed to discover."

March was the first "good weather" month for NEAT astronomers since the new electronic camera came on-line in December 1995, said Dr. Steven Pravdo,

manager of the project at JPL. The March observing run alone produced more than 1,000 asteroid sightings, including high-inclination inner-belt asteroids and a number of potential Mars-crossers. Total detections since NEAT went on-line in December 1995 have climbed to more than 2,400 objects, of which about 45 percent are known objects and more than 200 to date are new discoveries receiving new asteroid designations.

When the camera is upgraded later this month to use a very large 4,096 by 4,096-pixel charge-coupled device (CCD), astronomers expect to detect four times the number of comets and asteroids currently being observed.

Developed at the JPL, the NEAT system and its operation mark the beginning of a new era in observing programs focused on discovering and tracking asteroids and comets -- fleeting chunks of rock and ice -- as they enter the inner solar system from deep space. The autonomous imaging system contains a sophisticated computer controller and a highly sensitive CCD camera sensor.

"NEAT is next-generation technology that will significantly improve our capabilities to detect near-Earth objects," Pravdo said.

The NEAT camera is installed on a 39-inch telescope operated at the summit of Mt. Haleakala by the U.S. Air Force. With its short exposure time and fast electronics, NEAT is able to achieve wide-sky coverage and detect objects much fainter than was possible using the photographic Schmidt telescope at Palomar Observatory in Southern California.

Systematic searches for asteroids and comets destined to cross Earth's orbit have been the topic of renewed interest in recent years, especially in the aftermath of Comet Shoemaker Levy-9 and the recent arrival of Comet Hyakutake. Today charge-coupled devices -- light detectors made of silicon -- are emerging as a favored approach to asteroid detection because CCD sensors can record light 100 times more efficiently than the most sensitive

photographic film.

NEAT will be managed jointly by JPL and the U.S. Air Force. JPL manages its portion of the program for NASA's Office of Space Science, Washington, DC.



The second annual NORTHERN PRAIRIE STAR FEST is scheduled for the three night weekend of July 19-21. The young Moon will give us a brief chance to view our satellite bathed in earthshine near the end of astronomical twilight before weekend of July 19-21. The young Moon will give us a brief chance to view our satellite bathed in earthshine near the end of astronomical twilight before our black pristine 7 magnitude skies bring into view thousands of deep-sky objects, Comet Hale-Bopp, and seven planets. Extensive renovations of the office were completed last fall and a Sirius Instruments CWIP-1 2A CCD camera/autoguider were added to the telescope this winter. Planned presentations include CCD imaging, Comet Hyakutake's spectacular apparition, the Florida Winter Star Party, and a recently acquired video of the Bolivian solar eclipse. We will again have day trips to the International Peace Gardens (ND) and Spruce Woods Provincial Park (MB) and a barbecue at our farm's camp site.

Electricity for telescopes and camping, will be available, as will access to bathrooms and showers. Travel for the day trips will be the responsibility of all individuals; however, car pooling will be encouraged wherever possible. Entry fees for the Peace Gardens are \$7 per vehicle and will also be your responsibility; there are no entry fees for the Provincial Park.

If you would like to present a paper we would appreciate your limiting the presentation time to about an hour. We request that you advise us of any audio visual or computer equipment needed for

your presentation. The photo contest winner will have as his or her award all fees refunded.

A fee schedule, registration form, and local highway map is attached. You need not pay in advance; however, we would appreciate your sending the registration by post or E-Mail in order for us to plan the barbecue.

Contact us for more information (or with comments) by writing :

John Leppert, Deneb Observatory,
RR 1, Box 25, Sarles, ND 58372-9618, or
you may call us at (701) 697-5225.

E-mail may be addressed to
73424.3533@compuserve.com.

Of last year's Star Fest, an excited astronomer wrote this was the place for "great companionship, great food and great skies."

Ed. Note. Should you wish more information on this great party or would like an application form contact Erich Keser or myself and we will be glad to send you out a copy of the registration form. Thanks.



Don't miss what the most pleasant Observing Sessions of the year! The nights are becoming bearable, and the bugs won't be out yet. Stargazing is what we are really all about! If you are interested in the sky, you are welcome to come out and view a variety of celestial wonders for yourself Venus will be a high crescent, Ursa Major (the Big Dipper) and its half dozen bright Messier Galaxies will be ideal viewing position, as will the more challenging clusters of galaxies in Virgo, and we may even be able to catch our first glimpses of Comet Hale-Bopp on the southern horizon.

You don't have to have your own telescope, but Observing Sessions are an excellent place to choose or learn to use one. Most of us welcome the chance to demonstrate our own scopes and to help

you with yours. Binoculars very useful, so please bring them if you have them.

You are welcome to arrive at almost any time of evening. Come at dusk if you have to set up a telescope, or want to watch others do so. Come at nightfall to participate in a discussion of good "targets" for the night, and to do as much observing as possible. Come after the kids are in bed and after other activities are over for a peaceful and spiritually rewarding end to your day.

Please be sure to dim your lights and drive in slowly if you arrive after nightfall. It is a good idea to dress warmly, and you will quickly make friends by bringing something warm to drink. Soon, bug repellent will become essential, so come out NOW and look at the stars.

The date will be May 17/96 and the time of nightfall will be 9:00 p.m. The place will be Pitt Road Dark Site.*

*Alternate Date- * Sat. May 18*

* *Alternate date will be used in case Fri. date is "clouded out".* Pitt Road dark site will be used only if safely accessible. Please confirm with Erich Keser 374-4262 or Rick Huziak and the RASC message machine at 665-3392 if in doubt. We will decide by whether we are going out by 6PM on the relevant day.



Due to the fact that our regular meeting day of May 20th is a holiday our meeting day has been moved up to Monday May 13/96. This day is special as it happens to be what will the start of a great annual tradition, our Swap Meet.

All of us probably have boxes of stuff stashed in the garage or basement and even though it is not valuable to us it would be a great find to someone else, especially someone just starting out.

The only way that this swap meet will be successful is if we all participate in it.

So go into your garages and closets and dust of that old telescope or box of eyepieces and bring them to our very first "BRING WHAT YOU GOT AND LEAVE WITH A SWAP" PARTY.



By John Beingessner, KW Centre

Here are a few of the best Web sites I've found: try a few!
<http://www.kalmbach.com/astro/astronomy.html> (ASTRONOMY Magazine)
<http://www.demon.co.uk/astronomer/> (Astronomer magazine U.K.)
<http://cdsweb.ustrasbg.fr/astroweb.html> (Astroweb Resources)**
<http://encke.jpl.nasa.gov> (Comet Observation)
<http://ddo.astro.utoronto.ca> (David Dunlap Observatory)
<http://stdatu.stsci.edu/dss/> (The STSci Digitized Sky Survey)**
<http://http.hq.eso.org/eso-homepage.html> (European Southern Observatory)
<http://stoner.eps.mcgill.ca/bud/first.html> (The Face of Venus)
<http://zebu.uoregon.edu/messier.html> (The Galaxy Gallery: Messier Objects)
<http://www.digimark.net/galaxy/> (Galaxy photos - Jason Wam)
<http://www.gettysburg.edu/project/physics/clea/CLEAhome.html> (Project CLEA)
<http://www.jpl.nasa.gov> (Jet Propulsion Laboratory)
<http://hiypatia.gsfc.nasa.gov/NASA-homepage.html> (NASA)
<http://umbra.gsfc.nasa.gov/eclipse/> (NASA eclipse info)
<http://www.gsfc.nasa.gov> (NASA Goddard Space Flight Centre)
<http://imagesjsc.nasa.gov> (NASA Johnson Space Centre)
http://nssdc.gsfc.nasa.gov/nssdc_home.html (National Space Science Data)
<http://www.nrl.navy.mil/clementine.cli> (Naval Research Lab - Clementine)
<http://www.seti-inst.edu> (SETI Institute)
<http://www.skypub.com> (Sky Flublishing Corporation)** Telescope

Using the Rystrom Observatory

by Rick Huziak

Who Can Use the Observatory?

Any member of the Saskatoon Centre, their family and accompanied friends may use the Rystrom Observatory at any time. In order to obtain a key for the warm-up shelter and observatory, a short (one night) training session must be run through and a \$5 key fee paid. The \$5 is basically the cost of getting the key cut. Anyone who has already obtained their key can train others to use the observatory, so just give us a call! If you don't know who has a key, call Rick Huziak. **The observatory is there for you to use, so use it!** This year, the number of visits is down from 2.7 per week to about 1 visit per week. If you don't want a key for yourself, call a key member and coordinate the night you want to do some observing with you. This is generally not a hard task!

The observatory can be used at any hour of the day or night. Don't be shy about staying out very late or taking a daytime tour!

Getting There!

To get to the Rystrom Observatory from Saskatoon drive south on Highway 11 toward Regina until you get to the Grasswood ESSO station. Turn east onto Grasswood Road. Drive 1.5 MILES. There is an approach into a treed yard on the right-hand side - the ONLY approach on that quarter section. (If you miss the approach you will immediately cross a railway track). Turn in and drive SLOWLY. Once past the large machine shed and before the fuel tanks, turn immediately to the right and the observatory will be in sight. If you can, put your park lights on as not to bother anyone who's already there. Drive CAREFULLY as not to hit any farm machinery or Sadie the dog.

Call Before You Go

Before you go out, call Nelson or Gloria Rystrom at 955-2370. Call before 8:30pm, as they are farmers and they go to bed early. If you decide to go after 8:30pm, don't phone or you might wake them up. If you get the answering machine or no answer, go out anyway. Do not let this stop you from enjoying a wonderful night of observing. When you get there, drive slowly and quietly! If you don't know if anyone has phoned already or are unsure what to do, call anyway, or call Rick Huziak for advice.

Your Gracious Hosts

Nelson and Gloria Rystrom are the owners and operators of the farm that the observatory is on. They allow us to use the land as a courtesy. We are on private property, and although we have a written agreement to use the land, we also have to display courtesy and common sense. Nelson and Gloria are great. They have been known to come out and view cool objects with us now and then! Their dog, Sadie, is the unofficial watchdog and mascot of the observatory. Unlike Nelson and Gloria, Sadie never seems to sleep and always would like to chase anything you want to throw for her! GET USED TO IT!

Power, Lights, Action!

The observatory consists of a warm-up shelter, cold storage shelter and observatory. Each has a locked door, but all are keyed alike. Thus your key will open any or all doors. When you arrive, unlock the warm-up shelter. Walk through the entrance hall, then feel around on the right side wall for electrical panel boxes. Throw the main breaker in the first box. This switch provides power to the site. The red lights should come on. If you need heat in the shelter, open the second breaker box and throw the main breaker there as well. This turns on the electric baseboard heaters. Lights are controlled by the illuminated rheostat switch on the right wall. Set the lights at a comfortable level. White lights can be turned on (Heaven forbid!) by a bank of switches over the main table area. Outside flood lights are available as well (if you loose an eyepiece or something) by using the 4 switches well above the red rheostat. SIGN THE GUEST REGISTER. This lets us know the observatory use and allows us to contact the last user in case of a problem. When you are all done, set the red rheostat at a comfortable level, and turn off the main breakers ONLY in

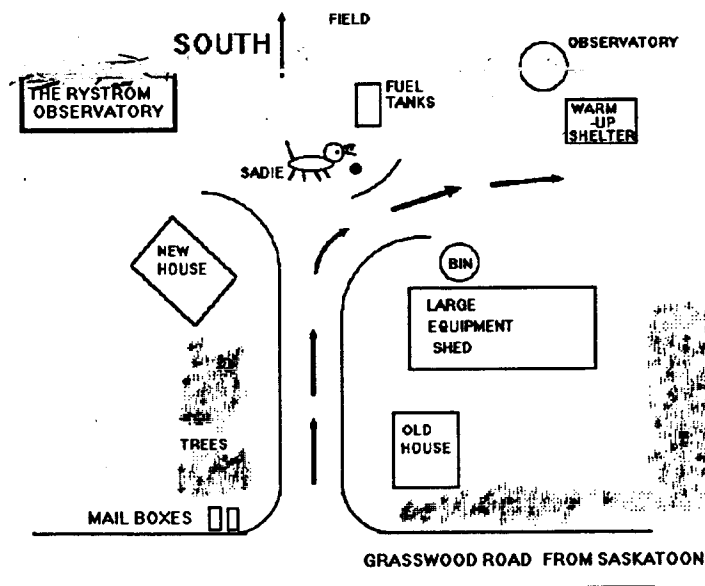
BOTH panels. Do NOT throw all the other breakers off as well! This drives everyone crazy! The two main breakers control all power to the site. Make sure all three doors are secure and locked. Drive out of the yard with your park lights on VERY slowly as not to wake Nelson and Gloria.

The Main Observatory

The main observatory contains an 8-inch Celestron. When you enter the observatory, you must first throw the 3 toggle switches located on the right-hand wall on the bottom of the metal power supply located a few feet from the door. The switches control the drive motors, power supply and light relays. Once all 3 switches are on, a faint hum will be heard. The main lights will now work, and a set of switches just by the door turns on the two banks of red lights. To open the slot, a key is required. There is one hanging in the warm-up shelter by the white lights. You **MUST be trained to open the dome**, or damage may result! Only the "old" drive controller works, so if the telescope drive does not seem to be functioning properly, make sure the switches on the pier are properly set. Once you leave the observatory for the night, make sure the telescope is stowed correctly! The main lights must be turned off BEFORE the three toggle switches are turned off (or there will be no power to trip the light control relays and you will not be able to turn the lights off). Properly close the dome and lock the door when you leave.

Other Equipment

The Rystrom Observatory also contains other equipment for you pleasure, such as a 12.5" Dobsonian scope, lots of telescope accessories, eyepieces, charts, books, etc. There are occasionally some smaller loaner scopes as well that can be signed out.



ASTROPHOTO CORNER

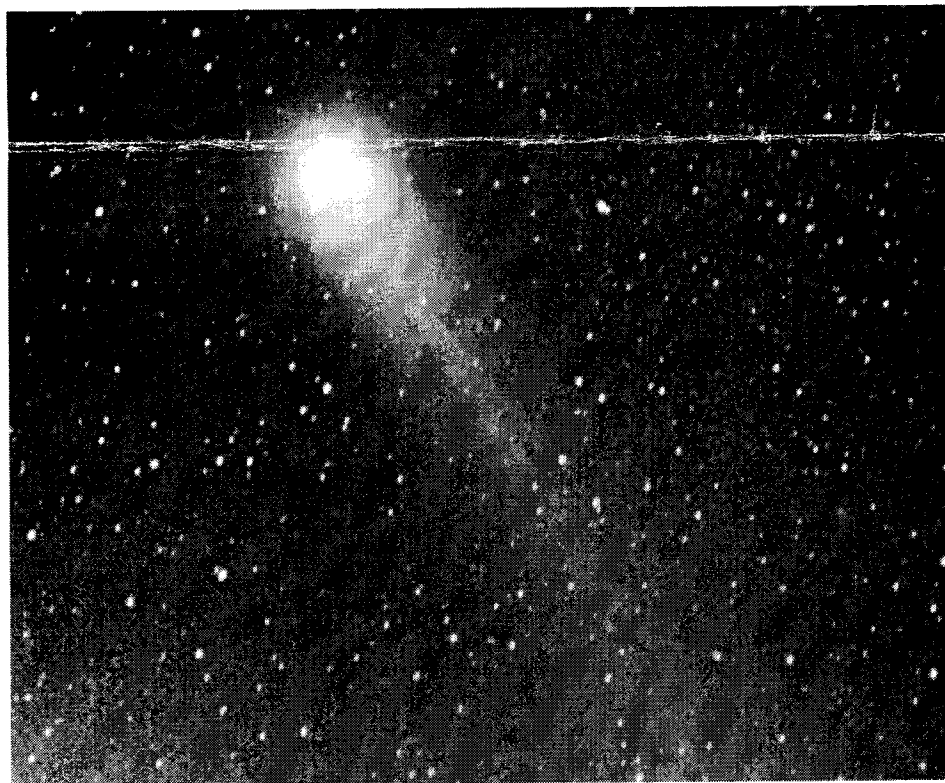
MAY 1996

RASC

SASKATOON CENTER

PHOTO OF THE MONTH

COMET HYAKUTAKE B2



Stan Noble

This month I am featuring another photo of comet Hyakutake B2.

This great photo was taken by our member from Aneroid, Sk. **Stan Noble**. This photograph was done in color originally but has served the photo editing and black and white laser printing nicely.

TECHNIQUE: This photograph was taken with a 135 mm. telephoto lens piggybacked on Stan's telescope. Exposure was 21/2 minutes on Fuji HG 400 color film.

I thank Stan for sending in his photographs and hope to feature more of his work in the future and again encourage all members to send in their photos.

Clear Skies and good guiding-----Al Hartridge