

The *Prairie Astronomer*

The Official Newsletter Of The Prairie Astronomy Club, Inc.

December 1999

Volume 40 Issue #12

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DECEMBER'S PROGRAM:

Larry Stepp

The December speaker will be Larry Stepp, former president of the Prairie Astronomy Club and currently the Optics Manager for the Gemini Project, which is building twin 8-meter new technology telescopes: one atop Hawaii's Mauna Kea and the other atop Chile's Cerro Pachon.

PAC-LIST: Mark Dahmke maintains an e-mail list server for PAC. If you have an e-mail address and are not on the PAC List, you may subscribe by submitting an e-mail to list@4w.com. Write "Subscribe PAC-List" in the body of the e-mail.

GETTING TO KNOW OUR CLUB OFFICERS: This issue includes an article on our club Vice President, Mr. Larry Hancock. To learn more about Larry, read the article on page 6.

OTTEWELL ITEMS ARE IN: Erik has received the Ottewell Astronomical Calendar and the RASC handbook for the year 2000. Those of you who have placed orders can pick them up at his house if you want them right away or else he will have them all at the December PAC meeting. If you have not pre-paid, please have your money ready when you pick up your book(s).

RASC Observers Handbook: Reg. \$20.95 your cost: \$13.00
Ottewell Calendar: Reg. \$22.00 your cost \$13.50

Erik Hubl, 624 South 51st, Phone 488-1698

KANSAS COMET: Farpoint's Asteroid Search Team (Fast) now has 67 asteroid designations, including an Amor type NEO, and now a Comet. Information on the comet can be obtained in the IAU circular #7331. On a quick note the comet has a 7.01 year period, is roughly 18.5 magnitude and will remain brighter than 19th magnitude for the next couple of weeks, then gradually fade. It was found during an attempted recovery of an asteroid, (1998 RX60) 2nd opposition. This is the only comet ever discovered from the State of Kansas. *Thanks to Gary Hug of the FAST TEAM for providing us with this information.*



MEETINGS & EVENTS

PAC MEETING

TUESDAY, DECEMBER 28, 1999, 7:30 PM
at Hyde Memorial Observatory

CLUB STAR PARTY

FRIDAY, JANUARY 7, 2000
OAS Observing Site
(see map on back page)

NSP 7 PLANNING MEETING

THURSDAY, JANUARY 13, 2000
Mahoney State Park

HYDE VOLUNTEER MEETING

SUNDAY, JANUARY 9, 2000, 7:30 P.M.
At Hyde Memorial Observatory

PAC YOUTH GROUP MEETING

SUNDAY, JANUARY 9, 2000, 7:30 P.M.
At Hyde Memorial Observatory

PAC MEETING

TUESDAY, JANUARY 25, 2000, 7:30 PM
at Hyde Memorial Observatory

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The Prairie Astronomer is published monthly by the Prairie Astronomy Club, Inc. Membership expiration date is listed on the mailing label. Membership dues are: Regular \$20/yr, Family \$22/yr. Address all new memberships and renewals to: The Prairie Astronomy Club, Inc., PO Box 5585, Lincoln, NE 68505-0585. For other club information, please contact one of the club officers listed on the last page of this newsletter. Newsletter comments and articles should be submitted to: Jeff King, 4018 South 83rd Street, Lincoln, NE 68506-5973 or jeffrey892@aol.com, no less than ten days prior to the club meeting. The Prairie Astronomy Club meets the last Tuesday of each month at Hyde Memorial Observatory in Lincoln, NE.

Secretary's Report

By: Willa Penney

Prairie Astronomy Club
November 30, 1999

President Dave Knisely opened the meeting by having guests introduce themselves.

Dave reported that there was a major flare on the sun yesterday; it was an "X Class" flare, which is the largest classification. Jupiter and Saturn continue to show lots of detail.

About 20 people showed up for the Leonid star party; they reported seeing about 40-60 meteors per hour. The next shower will be the Geminids. Best viewing should be Monday night – Tuesday morning, December 13-14. The radiant will be high up and 50-60 meteors are expected per hour.

The next NSP Planning meeting will be Thursday, December 9, at the Mahoney State Park Lodge. Doug Bell, this year's coordinator, invited everyone to come the flyer-stuffing "Jamboree". The Nebraska Star Party will be July 29-August 5, 2000.

The next club Star Party will be Friday, December 10, at the OAS site. It was suggested that we have a star party on New Year's Eve.

The Mahoney Star Party dates have not been set for next year yet. The OAS/PAC Fall Banquet will be October 20.

Jack Dunn reported that April 3-9 will be National Astronomy Week; Astronomy Day will be Saturday, April 8. Lincoln's Space Day will be May 12-13, with Astronomy Day set for Saturday, May 13, at Morrill Hall. Jack said that more participants than last year are being scheduled.

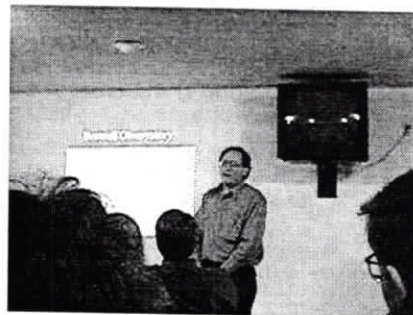
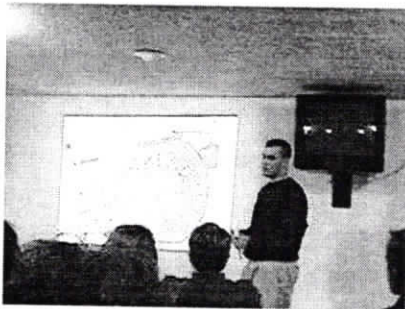
Dave reported that the Mid-States Region Astronomical League meeting will be June 9-11 in Kansas City.

Erik Hubl reported on the status of the billboard ordinance. Downlighting was removed from the proposed wording. He strongly urged everyone to write to their City Council members and, if possible, to attend the next public hearing on this issue. It will be Monday, December 13th, at 1:30 p.m.

Mark Fairchild, Hyde Volunteer Coordinator, reported that the 2nd meeting of the Hyde Youth Group will be at 7:30 on December 12th. The Hyde Volunteer meeting will be the same night. Please turn in the program survey that was in last month's newsletter. Those who return the survey will be eligible for a prize drawing at the December meeting.

It was announced that Brent Kasl has been awarded a Lunar Club certificate and pin.

Mark Plano Clark and two of his students presented our program on the Boswell Observatory at Doane College in Crete.



Ring in the New Year with some sparkling star clusters and a total lunar eclipse.

by Martin Ratcliffe and Alister Ling

The New Year opens with North America's first total eclipse of the moon in more than three years. This spectacular event occurs on the evening of January 20 - perfectly timed for the whole family to view it. Make the most of this lunar eclipse, since the next one visible from the entire United States will not occur for another three years, on May 16, 2003. (Europe, however, will be treated to another total lunar eclipse on January 9, 2001.) This year's eclipse is also visible from Central and South America, Hawaii, and most of Africa and Europe.

The transition from a fully illuminated moon when only the brightest stars are visible in the sky to a dark-orange moon in a splendid, starry sky is a sight not to miss. A little understanding of what is actually happening enhances the event. During a total eclipse of the moon, our satellite passes into Earth's shadow, which at the distance of the moon happens to be close to three times the moon's diameter of half a degree. To imagine how this works, shine a flashlight onto an orange - the illuminated side represents the daytime side of Earth, and the dark hemisphere represents the nighttime side - notice that if you have a nearby wall, a circular shadow of the fruit appears on the wall. This represents Earth's shadow. Anyone living on the nighttime side of Earth can observe the eclipse, unlike a total solar eclipse that is only visible from a very narrow but long track.

However, unlike our orange, Earth is enveloped in an atmosphere that acts like a lens and bends rays of light from the sun, enabling them to reach the moon. Red light, one component of the spectrum, is the only wavelength of light bent enough to reach the moon, hence the moon appears to be bathed in a copper glow. If viewed from the moon, the dark Earth would be surrounded by an ethereal, glowing red ring - a majestic sight for future lunar dwellers.

If the moon's orbit lay in the same plane as Earth's orbit around the sun, we would see an eclipse of the moon every month as the full moon passed through Earth's shadow. But the moon's orbit tilts almost 6° relative to the ecliptic. Usually the moon passes above or below Earth's shadow. Only when the moon is crossing a node (the intersection of its orbit with the ecliptic) and coincidentally is full does an eclipse occur.

Shortly after 9 p.m. EST, the eastern side of the moon will begin to darken as it enters the penumbral shadow (from the moon the sun would appear partially eclipsed at this stage). The action really begins an hour later, at 10:01 EST, when the moon dips into the dark shadow. It takes a full 63 minutes for the moon to become fully enveloped in the shadow, during which time the sky will slowly darken, and more and more stars will become visible. Totality lasts 78 minutes - allowing plenty of time to take a variety of pictures with a camera, either wide angle or through a telescope. Watch also through binoculars - the moon takes on a peculiar 3-D appearance during totality. Notice through the binoculars the open cluster M44, the Beehive in Cancer, just 6° to the east of the eclipsed moon. The moon leaves the umbral shadow at 1:25 a.m. Hope for clear skies.

The eclipsed moon offers a mid-month opportunity for a tour of the constellations currently visible. The brilliant winter constellations dominate - Orion stands majestically in the south at 9 p.m. local time. The sun resides on the inner section of the Orion arm - one of the spiral arms of our Galaxy. As we look toward Orion we are looking directly away from the center of our Galaxy. It's only the near proximity of the Orion arm that results in the brilliant stars in the winter sky.

Circling Orion are five constellations, each containing luminous gems. Gemini lies to Orion's northeast, housing the 1st-magnitude stars Castor and Pollux. Canis Minor lies south of Gemini and contains Procyon, the eighth brightest star in the sky and a relatively close 11 light-years distant. Sirius, the brightest star in the sky and 3 light-years closer than Procyon, leads Canis Major the Great Dog. Swinging high above Orion lies Auriga the Charioteer, home of Capella - a yellowish-colored star 70 times the luminosity of the sun. And finally, to the northwest of Orion is the famous V-shaped Hyades star cluster with the foreground 1st-magnitude red giant Aldebaran, chief star of Taurus the Bull. These brilliant stars are the first objects to appear as the sky darkens during twilight. Twilight occurs in three stages - each allowing dimmer objects to be visible. Civil twilight begins when the sun dips 6° below the horizon, and the colors of sunset are still warming the western sky. Nautical twilight starts when the sun descends to 12° below the horizon, when the navy-blue sky drowns the more vibrant sunset hues. As the sun reaches 18° below the horizon, it marks the onset of astronomical twilight with its inky-black skies, and full nighttime officially begins. During January, astronomical twilight starts roughly 95 minutes after sunset and is latitude dependent. All the bright stars mentioned above are visible shortly after civil twilight begins, and they may be the only stars you can see during astronomical twilight if you live in a major metropolis.

The western sky has two brilliant additions, however, and they are planets. Both can be found soon after the onset of civil twilight. At magnitude -2.5, Jupiter is the most brilliant object. Jupiter stands high in Pisces the Fish, a sparse region of the sky. Since Jupiter sets after midnight, most of the early evening can be set aside for fine viewing of the largest planet in our solar system, some 12 times the diameter of Earth. Only an hour of viewing through a telescope makes for enough time to notice that features in the turbulent atmosphere of Jupiter have moved, carried by the rapid rotation of the planet.

On January 7, 1610, Galileo Galilei took a new device called the telescope out into the chilly night air. He aimed it at Jupiter and became the first person to observe moons around another planet. That night he discovered Io, Europa, and Callisto, and 6 days later he found a fourth in their midst, Ganymede. These four inner, largest moons of Jupiter are now known as the Galilean satellites, in his honor.

This month, on January 7, 390 years after Galileo, you can venture out into the chilly night air and discover them for yourself. If the skies are clear on this Friday night, you can

find all four of the Galilean moons spread evenly on either side of Jupiter. A decent pair of binoculars is all the visual aid needed. The satellite farthest west from Jupiter is Callisto, the second largest but outermost of the four moons. With a relatively low albedo (reflectivity), it's the faintest Galilean moon.

Between Callisto and Jupiter floats Io, the third largest and innermost of the four moons. When the Voyager spacecraft flew by Io in 1979, it returned pictures to Earth of a volcanically active surface, where sulfur spewed across the land, creating yellowish deposits.

Moving to the east side of Jupiter you'll find Ganymede, the largest moon in the entire solar system. Due to its size and icy-covered face, it has a high albedo and therefore should be easy to pick up in binoculars.

The last of the Galilean satellites, Europa, ranks as the fourth largest and can be found the farthest east on the night of January 7. Europa's fame in recent years comes from an important finding that it has an icy-smooth surface, with hardly any craters. Some researchers believe that a subsurface ocean exists on Europa, heated from below by internal activity.

When you tire of your Galilean gazing, turn to Jupiter's equally worthy neighbor. Saturn sets an hour later than Jupiter and shines at magnitude 0.3 by month's end. It reaches a stationary point among the stars of Aries on January 13 - a point that simply represents the fact that Earth now moves directly away from Saturn. Its direct eastward motion against the background stars will resume within a few days. As we loop around the farside of the sun, Saturn will appear to sink into the evening twilight - a slow event that takes a few months to complete.

The evening sky also houses Mars, now shining at magnitude 1.1. During January, Mars traverses the stars of Aquarius the Water-bearer and gets passed by a young crescent moon on January 10, when Mars lies 3° northwest of the 4-day-old crescent. Mars sets shortly after 9 p.m. local time. Compared to its appearance last spring, the Red Planet is disappointing now through telescopes, its scant 5" diameter hiding any detail. But outstanding detail should be pouring in to us from

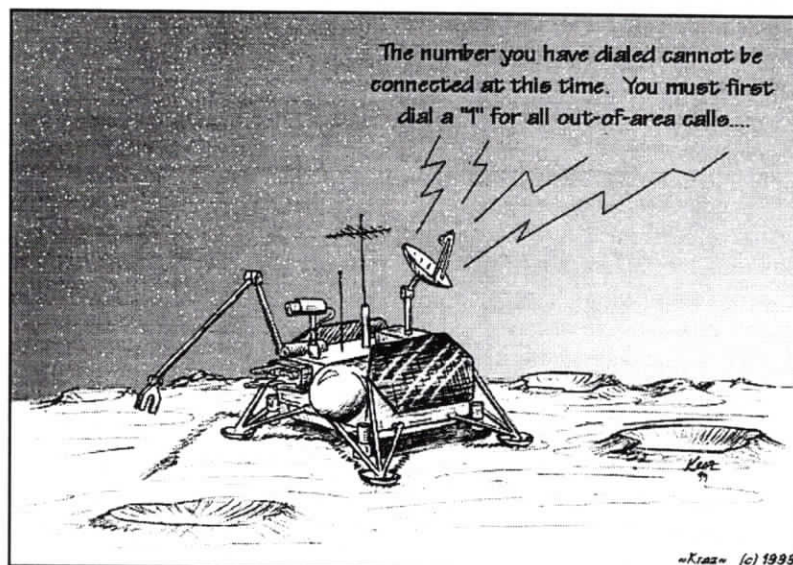
Mars Polar Lander, which is scheduled to touchdown on December 3, 1999.

Another fine red object makes its presence felt during these gray winter evenings. Mira (Omicron Ceti) was originally believed to be a nova when it was discovered. But this star, with a diameter 300 times that of the sun, was correctly identified as periodic in 1638 and has since become the prototype for variable stars. Mira passed its maximum brilliance in December. Try to determine its magnitude. Perhaps it's now shining at 3rd magnitude as it begins to fade slightly. You can follow the dimming by observing Mira in Cetus the Whale every couple of weeks and comparing its brilliance to neighboring stars. Mira floats 6° southwest of the magnitude 4.1 star Delta Ceti. To acquire useful results you should get an accurate magnitude of each comparison star using guide charts obtainable from the American Association of Variable Star Observers (AAVSO; <http://www.aavso.org>).

After midnight, winter stars move to the western sky and stars of spring enter the eastern sky. By 5 a.m. in early January, the dazzling magnitude -4.1 Venus can be seen rising in the southeast as the dawn's light begins to sprinkle its rays upon the horizon. Check out the lovely waning crescent moon positioned 5° east of Venus and due north of Antares in Scorpius early in the morning of January 3. This is also the best morning to watch for the Quadrantid meteor.

Two nonvisible, but nonetheless interesting, events in January include Mercury reaching superior conjunction on January 16, and therefore it is not visible all month. It moves into the evening sky and will become visible in early February. Last but not least, Earth reaches perihelion on January 3 at midnight Eastern Standard Time.

Martin Ratcliffe is Director of Theaters at the Exploration Place in Wichita, Kansas. Alister Ling is a meteorologist working for Environment Canada in Alberta.



When programming the Mars Polar Lander, JPL software engineers overlooked the fact that long-distance tolls apply to interplanetary calls as well.

Astronomy Events

Last Minute News on the Billboard Ordinance:

12/20/99 In true political fashion, the City Council chose to delay their vote on the billboard issue until January 10th, 2000. *Thanks to Erik Hubl for the update.*

(I realize this is old news now, but it explains it pretty good) BRIGHTEST FULL MOONIN 133 YEARS? NO!

Suddenly a lot of people are asking this question: Will the full Moon of December 22, 1999, be the brightest full Moon in 133 years? They're asking, apparently, because of an article from the Old Farmer's Almanac that is being widely circulated by e-mail.

According to Roger W. Sinnott, associate editor of *SKY & TELESCOPE* magazine, the answer is unequivocal: No!

It is true that there is a most unusual coincidence of events this year. As *S&T* contributing editor Fred Schaaf points out in the December 1999 issue of *SKY & TELESCOPE*, "The Moon reaches its very closest point all year on the morning of December 22nd. That's only a few hours after the December solstice and a few hours before full Moon. Ocean tides will be exceptionally high and low that day."

But to have these three events -- lunar perigee (the Moon's closest approach to Earth during its monthly orbit), solstice, and full Moon -- occur on nearly the same day is not especially rare. The situation was rather similar in December 1991 and December 1980, as the following dates and Universal Times show (to convert Universal Time to Eastern Standard Time, subtract 5 hours):

Event	Dec. 1999	Dec. 1991	Dec. 1980
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Full Moon	22, 18h	21, 10h	21, 18h
Perigee	22, 11h	22, 9h	19, 5h
Solstice	22, 8h	22, 9h	21, 17h

What is really rare is that in 1999 the three events take place in such quick succession. On only two other occasions in modern history have the full Moon, lunar perigee, and December solstice coincided within a 24-hour interval, coming just 23 hours apart in 1991 (as indicated in the preceding table) and 20 hours apart back in 1866. The 10-hour spread on December 22, 1999, is unmatched at any time in the last century and a half.

So is it really true, as numerous faxes and e-mails to *SKY & TELESCOPE* have claimed, that the Moon will be brighter this December 22nd than at any time in the last 133 years? We have researched the actual perigee distances of the Moon throughout the years 1800-2100, and here are some perigees of "record closeness" that also occurred at the time of full Moon:

Date	Distance (km)
------	---------------

1866 Dec. 21	357,289
1893 Dec. 23	356,396
1912 Jan. 4	356,375
1930 Jan. 15	356,397
1999 Dec. 22	356,654
2052 Dec. 6	356,421

It turns out, then, that the Moon comes closer to Earth in the years 1893, 1912, 1930, and 2052 than it does in either 1866 or 1999. The difference in brightness will be exceedingly slight. But if you want to get technical about it, the full Moon must have been a little brighter in 1893, 1912, and 1930 than in either 1866 or 1999 (based on the calculated distances).

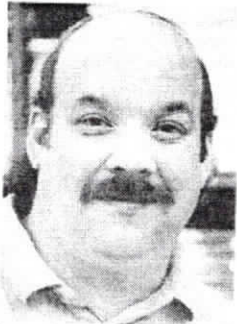
The 1912 event is undoubtedly the real winner, because it happened on the very day the Earth was closest to the Sun that year. However, according to a calculation by Belgian astronomer Jean Meeus, the full Moon on January 4, 1912, was only 0.24 magnitude (about 25 percent) brighter than an "average" full Moon. In any case, these are issues only for the astronomical record books. This month's full Moon won't look dramatically brighter than normal. Most people won't notice a thing, despite the e-mail chain letter that implies we'll see something amazing.

Our data are from the U.S. Naval Observatory's ICE computer program, Jean Meeus's *Astronomical Algorithms*, page 332, and the August 1981 issue of *SKY & TELESCOPE*, page 110.

From *Sky and Telescope's Website* at: http://www.skypub.com/news/pr_991217brightmoon.html

Larry Hancock, Our Vice-President

Larry Hancock has been a space and astronomy enthusiast since he was a kid. He joined the astronomy club about 10 years ago to increase his understanding of astronomy. His first telescope was a Tasco department store sale special. He says "Although basically useless for technical reasons, I did get nice views of the moon and planets, especially Saturn, and this inspired me to get a much larger 12 1/2" Orion dobson telescope."



Larry Hancock

Larry's favorite club memory is the first Atlas site party he attended. The pad site was covered with telescopes, with club members looking at all kinds of sky wonders. His most interesting observing adventure was when he had his "dob cannon" aimed to the south when a Sheriff's patrol car came into his viewfinder. "When a Sheriff thinks you're aiming a

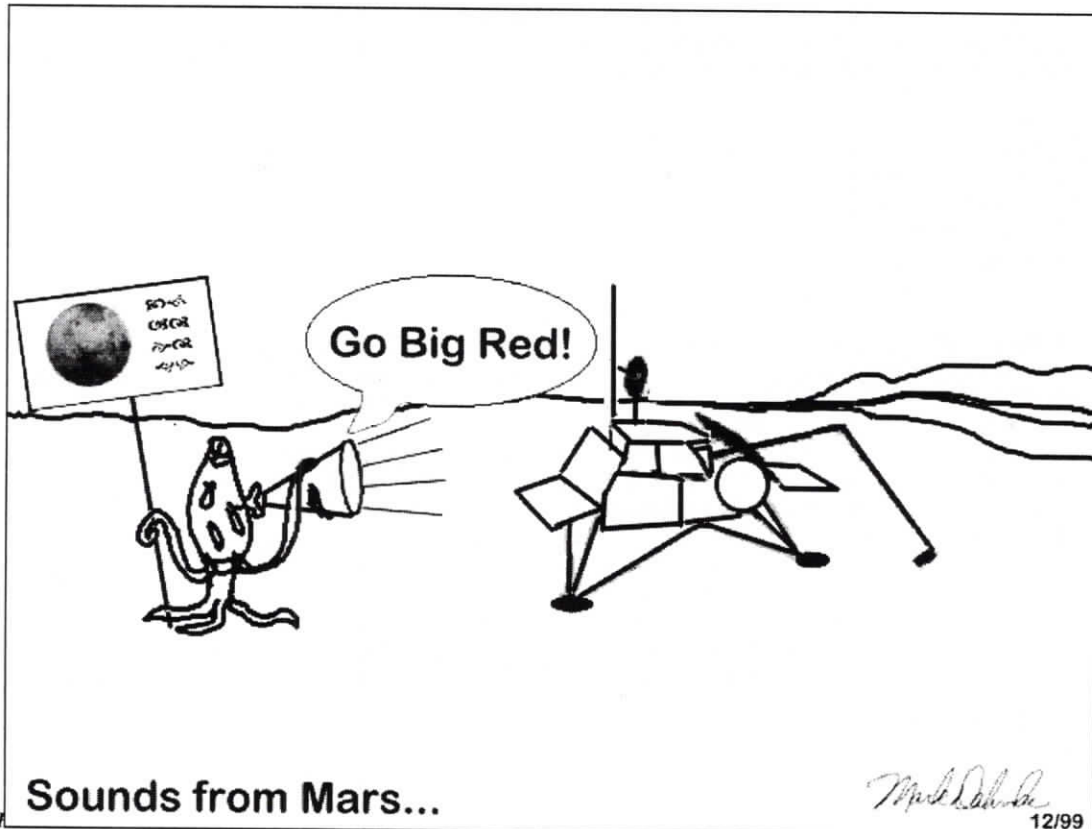
canon at them they tend to get a bit excited." Larry convinced the deputy to turn out all of his nice colored lights and the Sheriff gave his dispatcher a code to investigate the situation. They spent almost an hour looking at the sky together!

When Larry ran for Club Vice President he had some personal goals in mind for the club. Getting the club library located at Hyde, ordering club shirts and hats, getting snacks for the club meetings, give out interesting handouts and set up an annual banquet. With the help of Dave Knisely, he's been able to achieve these goals.

But don't give up on him yet. Larry still has goals for the clubs' future. Getting the club members interested in star parties once again is high on his list of things to do. This means the club needs a good viewing site and an offer we can't refuse. A microphone for guest speakers and some comfortable chairs for club members are other goals he has set. Stay tuned!

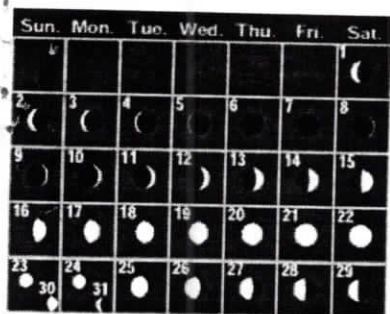
Larry is currently helping to set up a private observatory at a real dark site on a farm in Nemaha County. When the buildings are finished being constructed the owner plans to install a very large equatorial telescope with full CCD capabilities making this one of the premier observatories in the state. Since he'll have a key, he plans to take members of the club to the observatory for some serious sky viewing.

After a tour of duty with the U.S. Air Force, Larry received his degree from Allan Hancock College of Santa Maria, California. He currently lives and works in Lincoln and is a Supervisor in the Department of Distance Education at the University of Nebraska.







THE PRAIRIE ASTRONOMY CLUB CALENDAR

For January 2000

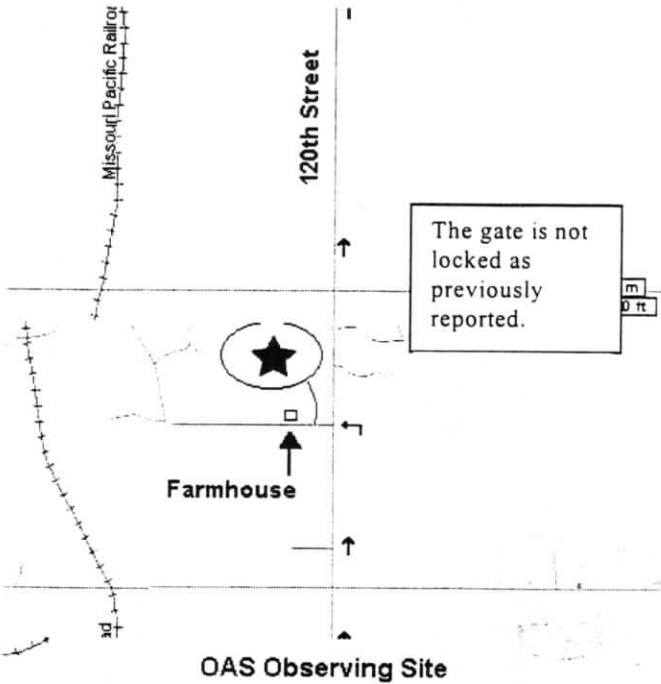


Sun
Mon
Tue
Wed
Thu
Fri
Sat

						1 HAPPY NEW YEAR! Hyde Observatory is closed
2	3	4	5	6 NEW MOON 	7 Club Star Party at the OAS Viewing Site	8 Hyde Observatory open to the public 7-10 PM
9 Volunteer Practice Night; 7 p.m. to 10 p.m. @ Hyde <i>PAC Youth Group 7-8:30 p.m. @ Hyde</i>	10	11	12	13 NSP 7 Planning Meeting, 7:30 @ Mahoney State Park	14 1 ST QUARTER 	15 Hyde Observatory open to the public 7-10 PM
16	17	18	19	20 FULL MOON 	21	22 Hyde Observatory open to the public 7-10 PM
23	24	25 PAC Meeting 7:30 PM Hyde Observatory	26	27	28 3 RD QUARTER 	29 Hyde Observatory open to the public 7-10 PM
30	31	Quadrantids This meteor shower is generally visible between December 28 and January 7, with a very sharp maximum of 45 to 200 meteors per hour occurring during January 3 and 4 (J2000 solar longitude=283.2 deg). The radiant is normally located at RA=229 deg (15.3 hours), DECL=+49 deg, but there seems to be an occasional variation-possibly due to Jupiter's influence. The meteors tend to be bluish and possess an average magnitude of about 2.8.				

Directions to OAS Observing Site

From Lincoln, take Highway 34 East approximately 29 miles to 120th street. Then go North about 2 1/2 miles.



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First Class Mail

Next PAC Meeting
December 28, 1999
7:30 PM
Hyde Observatory

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