

The Prairie Astronomer

July 2017 Volume 58, Issue #7

Great Red Spot



Night Sky Network



The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer

NEXT PAC MEETING: August 29, 7:30pm

PROGRAM

We will not have a July meeting due to overlap with the Nebraska Star Party. The August meeting will be a review of NSP and the eclipse. Send us your photos!

FUTURE PROGRAMS

July: NSP - no club meeting

August: NSP & Eclipse review

September: Hyde's 40th Anniversary

October: Club viewing night at Hyde

November: How to Buy a Telescope

December: Holiday Gathering

January: How to Use Your Telescope

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Cover Photo:

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*This is an early
processed version of an
image created by
Gerald Eichstädt*



**Buy the book! The Prairie
Astronomy Club: Fifty Years
of Amateur Astronomy.**

Order online from [Amazon](https://www.amazon.com) or
[lulu.com](https://www.lulu.com).

EVENTS



Nebraska Star Party, July 23-28

July PAC Meeting canceled due to overlap with NSP

PAC Meeting
 Tuesday August 29, 2017, 7:30pm
 NSP and Eclipse Review (send us your photos!)

PAC meeting
 Hyde Observatory's 40th Anniversary
 Friday, September 29, 2017, 7:30pm

2017 STAR PARTY DATES



Photo by Brian Sivill

	Star Party Date	Star Party Date	Lunar Party Date
January	Jan 20th	Jan 27th	
February	Jan 17th	Feb 24th	
March	Mar 17th	Mar 24th	
April	Apr 21st	Apr 28th	
May	May 19th	May 26th	May 5th
June	Jun 16th	Jun 23rd	Jun 30th
July	Jul 14th	Jul 21st	
NSP	July 23rd - July 28th		
August	Aug 18th	Aug 25th	
September	Sep 15th	Sep 22nd	Sep 1st
October	Oct 13th	Oct 20th	
November	Nov 10th	Nov 17th	
December	Dec 15th	Dec 22nd	

Dates in **BOLD** are closest to the New Moon.



PAC E-MAIL:

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Subscribe through [GoogleGroups](#).
 To post messages to the list, send to the address:

pac-list@googlegroups.com

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WEBSITES

- www.prairieastronomyclub.org
- <https://nightsky.jpl.nasa.gov>
- www.hydeobservatory.info
- www.nebraskastarparty.org
- www.OmahaAstro.com
- Panhandleastronomyclub.com
- www.universetoday.com/
- www.planetary.org/home/
- <http://www.darksky.org/>



Night Sky Network

Meeting Minutes

President Jim Kvasnicka called the meeting to order at 7:29 p.m.

Because members of the public joined the meeting after solar observing, the Eclipse Trailer was run, followed by a Q&A. Public was then invited to stay for the business meeting if they wished.

Jim noted upcoming star parties.

The club library was discussed, and it was determined that a committee would be formed to examine what is in the library and consider what to keep. Material of historical significance would be archived, and everything else would be given away.

There will be no July club meeting because the last Tuesday of the month date conflicts with Nebraska Star Party, which most members will be attending.

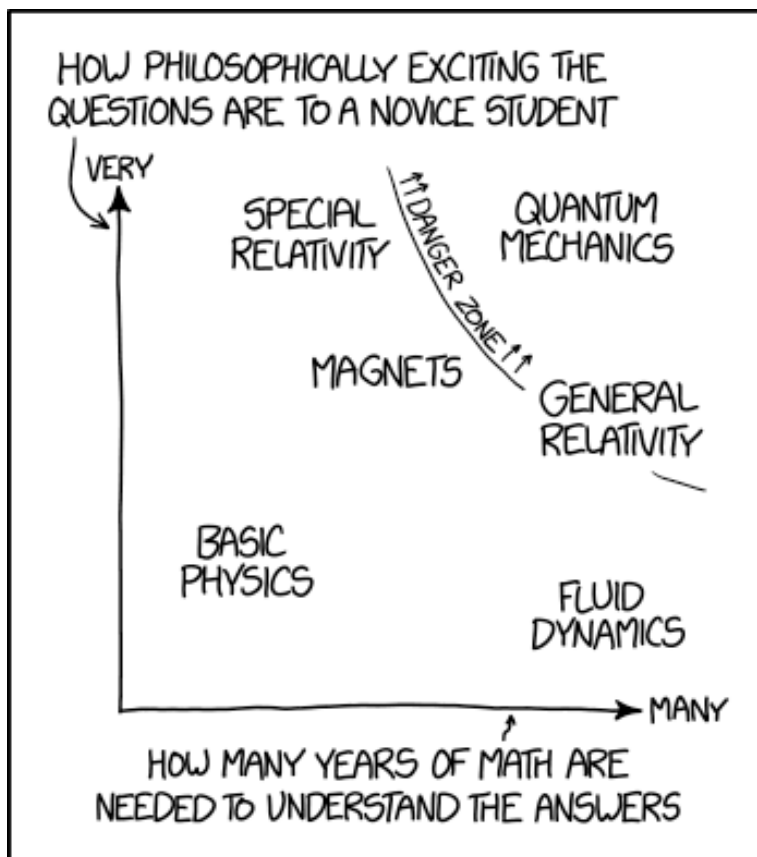
The next meeting will be August 29, after NSP and the August 21st Eclipse. Program will be member photographs documenting both events.

A telescope pad for use by PAC members at Branched Oak Observatory was discussed. A motion was passed unanimously to spend up to \$2,000 for a concrete pad of precise dimensions to be determined, but a minimum of 20 x 40 feet.

The expenditure is to be treated as a donation to Branched Oak. Access to the pad on observatory grounds would be available to club members with prior notification.

Jim noted that nominations for club officers would be made at the August meeting, with the election at the September meeting. Several incumbent officers have decided not to run for re-election. Jim encouraged everyone to consider running for office, especially newer members.

Meeting adjourned at 8:15 p.m.



xkcd.com

WHY SO MANY PEOPLE HAVE WEIRD IDEAS ABOUT QUANTUM MECHANICS

The PAC Solar Star Party, June 27



*Above and left: photos by Brett Boller.
Right: photo by Mark Dahmke*

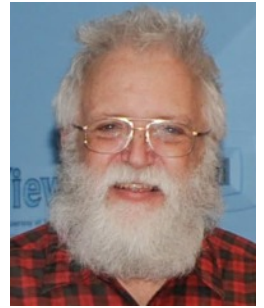
Observatory Update: NGC5698 and Interacting Pair LEDA

Rick Johnson

NGC 5698 is an SBb spiral in Bootes one degree east of Seginus (Gamma) Bootes. It has a rather strange ice cream cone shape with a faint drawn out arm or plume on the eastern side. Usually, such distortion is due to an interaction with another nearby galaxy. NGC 5732 is the nearest candidate with a similar redshift but is perfectly normal looking so probably isn't the culprit. I checked a few others in the area but they were either the wrong distance and/or undisturbed. It could be due to a merger but I

found no papers discussing anything to do with its distorted shape or suggesting it has interacted with anything. So how it ended up looking like it does is still a mystery to me. If anyone knows more please let me know. Ignoring the plumes I get a size of 85,000 light-years. Including them I get 135,000 light-years for a size assuming it is 180 million light-years from us as NED's redshift using the 5 year WMAP data shows. It was discovered by William Herschel on May 16, 1787 but didn't make either H400 observing program.

The other interesting object in my image is LEDA 097532 a pair of obviously interacting galaxies with a plume appearing to connect the two though it could be in front of or behind the other galaxy. Again, I found nothing on their interaction. They are about 480 to 490 million light-years distant. I get a size for the



[14" LX200R @ f/10, L=4x10' RGB=2x10', STL-11000XM, Paramount ME, Annotated](#)

northern galaxy of 43,000 light years and a bit over 100,000 light-years for the southern galaxy thanks to its plumes. The projected distance between their cores is 60,000 light-years. Projected distance assumes they are equally distant from us. Since this is unlikely their true

separation distance is likely larger, how much larger is the question.

While transparency was finally excellent for this image allowing me to easily go beyond 22nd magnitude and pick up galaxies NED shows at over 5 billion

light-years, seeing would suddenly distort things severely. This resulted in some stars being elongated in various directions and other, often only a short angular distance away, looking normal. I can't recall ever having such distortion before. Very odd.



Curiosity Mars Rover Begins Study of Ridge Destination

The car-size NASA rover on a Martian mountain, Curiosity, has begun its long-anticipated study of an iron-bearing ridge forming a distinctive layer on the mountain's slope.

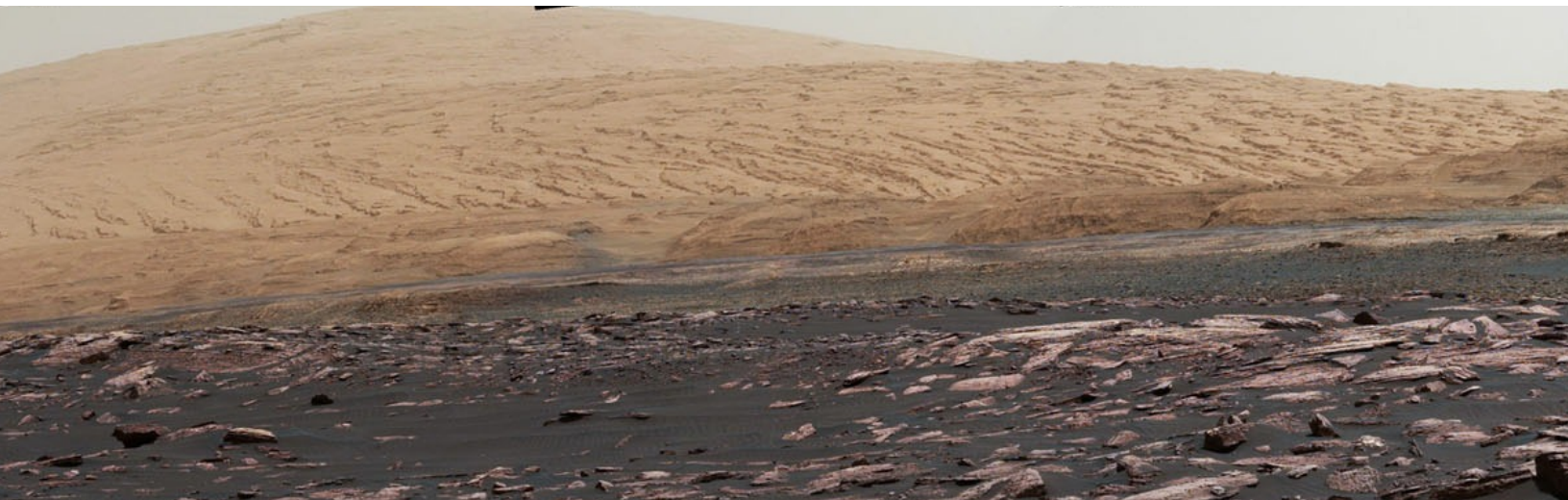
Since before Curiosity's landing five years ago next month, this feature has been recognized as one of four unique terrains on lower Mount Sharp and therefore a key mission destination. Curiosity's science team informally named it "Vera

Rubin Ridge" this year, commemorating astronomer Vera Cooper Rubin (1928-2016).

"Our Vera Rubin Ridge campaign has begun," said Curiosity Project Scientist Ashwin Vasavada of NASA's Jet Propulsion Laboratory, Pasadena, California. "Curiosity is driving parallel to the ridge, below it, observing it from different angles as we work our

way toward a safe route to the top of the ridge."

A major appeal of the ridge is an iron-oxide mineral, hematite, which can form under wet conditions and reveal information about ancient environments. Hematite-bearing rocks elsewhere on Mars were the scientific basis for choosing the 2004 landing site of an older and still-active rover, Opportunity. Studies of Mount Sharp with the Compact



This look ahead from NASA's Curiosity Mars rover includes four geological layers to be examined by the mission, and higher reaches of Mount Sharp beyond the planned study area.

The redder rocks of the foreground are part of the Murray formation. Pale gray rocks in the middle distance of the right half of the image are in the Clay Unit. A band between those terrains is "Vera Rubin Ridge." Rounded brown knobs beyond the Clay Unit are in the Sulfate Unit, beyond which lie higher portions of the mountain.

The view combines six images taken with the rover's Mast Camera (Mastcam) on Jan. 24, 2017, during the 1,589th Martian day, or sol, of Curiosity's work on Mars, when the rover was still more than half a mile (about a kilometer) north of Vera Rubin Ridge. The panorama has been white-balanced so that the colors of the rock and sand materials resemble how they would appear under daytime lighting conditions on Earth. It spans from east-southeast on the left to south on the right. The Sol 1589 location was just north of the waypoint labeled "Ogunquit Beach" on a map of the area that also shows locations of the Murray formation, Vera Rubin Ridge, Clay Unit and Sulfate Unit.

The ridge was informally named in early 2017 in memory of Vera Cooper Rubin (1928-2016), whose astronomical observations provided evidence for the existence of the universe's dark matter.

Reconnaissance Imaging Spectrometer for Mars, on NASA's Mars Reconnaissance Orbiter, identified hematite in the ridge and also mapped water-related clay and sulfate minerals in layers just above it.

Vera Rubin Ridge stands about eight stories tall, with a trough behind it where clay minerals await. Curiosity is now near the downhill face, which forms an impressive wall for much of the ridge's length of about 4 miles (6.5 kilometers).

"In this first phase of the campaign, we're studying the sedimentary structures in the wall," said JPL's Abigail Fraeman, a Curiosity science-team member who helped plan these observations.

This summer's investigations also seek information about the boundary zone between the material that makes up the ridge and the geological unit that Curiosity has been studying since late 2014: the Murray formation of lower Mount Sharp, which holds evidence of ancient lakes. The Murray formation has variable levels of hematite, but whether the hematite in it and in the ridge accumulated under similar environmental conditions is unknown. The planned ascent route will provide access to closer inspection of the hematite-bearing rocks.

"We want to determine the relationship between the conditions that produced the hematite and the conditions under which the rock layers of the ridge were deposited," Fraeman said. "Were they

deposited by wind, or in a lake, or some other setting? Did the hematite form while the sediments accumulated, or later, from fluids moving through the rock?"

Deciphering the history of the ridge's hematite may shed light on whether the freshwater environments that deposited the layers of the older Murray formation were turning more acidic by the time the layers of the ridge formed. The mission also will be watching for clues about whether a gradient in oxidation levels was present, as that could have provided a potential energy source for microbial life.

Terrain near the base of the ridge is rife with boulders and sand, creating challenging conditions for navigation, as well as opportunities to add to the mission's studies of sand dunes and ripples. The largest sand dunes were at lower elevations, including a linear dune informally named "Nathan Bridges Dune" in memory of Nathan Bridges (1966-2017), a Curiosity team member who helped lead the mission's dune studies.

During the first year after its landing on Aug. 5, 2012, PDT (Aug. 6, EDT and Universal Time), the Curiosity mission accomplished a major goal by determining that billions of years ago, a Martian lake offered conditions that would have been favorable for microbial life. Curiosity has since traversed through a diversity of environments where both water and wind have left their imprint. The upcoming

exploration of Vera Rubin Ridge and the higher clay and sulfate layers provides opportunities to learn even more about the history and habitability of ancient Mars. For more about Curiosity, visit:

<https://mars.jpl.nasa.gov/msl>

Status of Curiosity's Drill

The rover team will not have Curiosity's rock sampling drill available in the first phase of studying "Vera Rubin Ridge." The drill feed mechanism, which moves the bit forward or back, faulted on Dec. 1, 2016, and no rocks have been drilled since then. While continuing to test possible ways to move the bit with the drill feed mechanism, rover engineers are also now studying alternative ways to drill. For the 15 rocks that Curiosity has sampled with its drill so far, two stabilizer posts, one to each side of the bit, were placed against the rock before the bit was extended with the feed mechanism.

"We are investigating methods to drill without using the stabilizers," said Curiosity Deputy Project Manager Steve Lee, of JPL. "Instead of using the feed mechanism to drive the bit into the rock, we may be able to use motion of the arm to drive the bit into the rock." Adaptation in delivering the resulting rock powder to laboratory instruments is also under study, such as use of the arm's soil scoop.

24th Nebraska Star Party - July 23-28, 2017



Mark Dahmke

Photo Credit: Fred Hultstrand History in Pictures Collection, NDIRS-NDSU, Fargo.

Join us this summer as we gather families from all over the US and around the world in the sparsely populated sand hills of North Central Nebraska to spend a good week under a galaxy of stars.

NSP Schedule of Events

Sunday: registration and check-in, optional dinner.

Monday: registration and check-in, field school, optional dinner.

Tuesday: registration and check-in, swap meet, field school, free "Cattle Country" hamburger dinner.

Wednesday: (All at Valentine High School) field school, registration, swap meet, speaker program, children's program, dinner on your own.

Thursday: Brewer's Niobrara Canoe or tube float, optional dinner.

Friday: public star party at 9pm.

For more information see the [NSP website](#).

Register online!

August Observing: What to View

Jim Kvasnicka

This is a partial list of objects visible for the upcoming month.

Planets

Mercury: May be visible during the total eclipse of the Sun but it will be faint.

Jupiter: Lower in the SW about 11° above the horizon.

Saturn: In Ophiuchus, its rings are open 27°, the most since 2002.

Neptune: In Aquarius.

Uranus: In Pisces.

Venus: Rises about 3 hours before the Sun, easily seen during the total eclipse.

Mars: Not visible except during the total eclipse of the Sun on August 21st.

Sun: The Great American Eclipse on August 21st.

Meteor Showers

Perseids: August 11-13, the waning gibbous Moon rises before midnight.

Messier List

M6: Butterfly Cluster in Scorpius.

M7: Ptolemy's Cluster in Scorpius.

M8: Lagoon Nebula in Sagittarius.

M9/M10: Class VIII and VII globular clusters in Ophiuchus.

M12/M19: Class IX and VIII globular clusters in Ophiuchus.

M20: Trifid Nebula in Sagittarius.

M21/M23: Open clusters in Sagittarius.

M62/M107: Class IV and X globular clusters in Ophiuchus.

Last Month: M3, M4, M5, M53, M68, M80, M83

Next Month: M13, M14, M22, M28, M54, M69, M70, M92

NGC and other Deep Sky Objects

NGC 6445: Planetary nebula in Sagittarius.

NGC 6781: Planetary nebula in Aquila.

NGC 6818: Little Gem Nebula in Sagittarius.

Double Star Program List

Struve 2404: Close pair of orange stars in Aquila.

57 Aquilae: Two white stars.

Beta Cygni: Albireo, gold and blue pair.

31 Cygni: Yellow primary with a blue secondary.

61 Cygni: Two yellow-orange stars.

Epsilon Lyrae: The Double Double.

Zeta Lyrae: Yellow stars.

Beta Lyrae: Yellow star with multiple white stars.



Challenge Object

NGC 6822: Barnard's Galaxy in Sagittarius.

The Great American Total Eclipse August 21, 2017



Planning your eclipse trip? Take a look at Fred Espenak's presentation on YouTube:

<https://www.youtube.com/watch?v=K4KnxE6yAul>

Focus on Constellations: Lyra

Jim Kvasnicka

Lyra

Lyra, the Lyre is one of the smallest constellations but it contains some big attractions. Vega is the brightest star in the summer and the fifth brightest of all the stars. Lyra has a wondrous deep sky object in M57, the Ring Nebula, one of the most observed and photographed objects in the night sky. Lyra has one other Messier object in the globular cluster M56. Epsilon Lyrae, the Double Double is a favorite telescope object. Lyra has its own meteor shower in the Lyrids which can be seen April 20-22 each year. Lyra is also prominent in astronomy history. Vega was the first star to have its picture taken in 1850. It was also one of the first stars to have its parallax accurately determined. Vega also will play a role in future astronomy history as well. In about 12,000 years Vega will assume the title of North Star.

Showpiece Objects

Planetary Nebulae: M57

Globular Clusters: M56

Multiple Stars: Epsilon-1/Epsilon-2 (Double Double)

Mythology

Classical mythology links the lyre and the tortoise shell with the story of Mercury, who found a tortoise shell. He noticed the resonance when he tapped on the shell. This gave him an idea to drill holes in the shell along opposite ends. He then laced the holes with linen threads. The lyre was invented and Mercury played enchanting music. Apollo beseeched Mercury to teach him to play. Mercury traded the lyre to Apollo for the power to fly and Mercury became the swift messenger of the gods with his winged sandals. Apollo gave the lyre to his son, Orpheus, who learned to play with such talent that his music would soothe the wild beasts. After the death of Orpheus, Jupiter placed the lyre in the heavens.

Number of Objects Magnitude 12.0 and Brighter

Galaxies: 3

Globular Clusters: 1

Open Clusters: 2

Planetary Nebulae: 2

Dark Nebulae: 0

Bright Nebulae: 0

SNREM: 0



Photo: Till Credner -
Own work:
AlltheSky.com

Twenty Years Ago on Mars

This article is provided by NASA Space Place.

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Linda Hermans-Killiam



On July 4, 1997, NASA's Mars Pathfinder landed on the surface of Mars. It landed in an ancient flood plain that is now dry and covered with rocks. Pathfinder's mission was to study the Martian climate, atmosphere and geology. At the same time, the mission was also testing lots of new technologies.

For example, the Pathfinder mission tried a brand-new way of landing on Mars. After speeding into the Martian atmosphere, Pathfinder used a parachute to slow down and

drift toward the surface of the Red Planet. Before landing, Pathfinder inflated huge airbags around itself. The spacecraft released its parachute and dropped to the ground, bouncing on its airbags about 15 times. After Pathfinder came to a stop, the airbags deflated.

Before Pathfinder, spacecraft had to use lots of fuel to slow down for a safe landing on another planet. Pathfinder's airbags allowed engineers to use and store less fuel for the landing. This made the mission less expensive. After seeing the

successful Pathfinder landing, future missions used this airbag technique, too!

Pathfinder had two parts: a lander that stayed in one place, and a wheeled rover that could move around. The Pathfinder lander had special instruments to study Martian weather. These instruments measured air temperature, pressure and winds. The measurements helped us better understand the climate of Mars.

The lander also had a camera for taking images of the Martian



Caption: The Mars Pathfinder lander took this photo of its small rover, called Sojourner. Here, Sojourner is investigating a rock on Mars. Image credit: NASA/JPL-Caltech

landscape. The lander sent back more than 16,000 pictures of Mars. Its last signal was sent to Earth on Sept. 27, 1997. The Pathfinder lander was renamed the Carl Sagan Memorial Station. Carl Sagan was a well-known astronomer and science educator.

Pathfinder also carried the very first rover to Mars. This remotely-controlled rover was about the size of a microwave oven and was called Sojourner.

It was named to honor Sojourner Truth, who fought for African-American and women's rights. Two days after Pathfinder landed, Sojourner rolled onto the surface of Mars. Sojourner gathered data on Martian rocks and soil. The rover also carried cameras. In the three months that Sojourner operated on Mars, the rover took more than 550 photos!

Pathfinder helped us learn how to better design missions to

Mars. It gave us valuable new information on the Martian climate and surface. Together, these things helped lay the groundwork for future missions to Mars.

Learn more about the Sojourner rover at the NASA Space Place:
<https://spaceplace.nasa.gov/mars-sojourner>



The Ring Nebula. Three minute exposure taken through the Esprit 150 at the Boller-Sivill Observatory, by Brett Boller.

Astrophotography



PelicanNebula. Telescope - Esprit 150, Camera - Modified Canon T3i, 1 minute subs, 10 minutes total on each image. Boller-Sivill Observatory.



Above: Crescent Nebula, below: Veil Nebula. Telescope - Esprit 150, Camera - Modified Canon T3i, 1 minute subs, 10 minutes total on each image.



From the Archives: March, 1970

President's Report

The big eclipse of March 7, 1970, has come and gone, and I missed it. Even though I had spent months in preparation and travelled 1500 miles to the path of totality, you can't be sure of anything. The weatherman and mother nature had the final decision. It was cloudy in Valdosta, Georgia on March 7. That's the way it goes. All we can do is hope for better luck next time. It was clear Thursday and Friday, cloudy Saturday, rained Sunday, and clear Monday. I suppose these facts confirm the 50-50 chance of clear skies for Georgia for this time of year.

Just the same I don't feel that my efforts were wasted. I took my family along and we considered the trip as our annual vacation. I also had a great time meeting new arrivals at the industrial park site on Friday and spent half the night visiting with the different groups of amateur astronomers from all over the eastern half of the United States.

I hear that it was clear in Lincoln on March 7, and the club put on one of its best shows at Gateway. I want to express my thanks for everyone who took part in this eclipse show. I also want to thank those who were responsible for the publicity in the paper.

Speaking of publicity! I suppose most of you saw the picture in the Lincoln Journal of my son and me, setting up the telescope at Valdosta. It looks like I really hit the jackpot on publicity. It didn't help the club much though, since the Associated Press photographer failed to mention the club's name after I had written it down for him. Just the same, people from all over the country know that at least there is one person in Nebraska interested in astronomy.

We will have detailed reports on the eclipse at our meeting, from Mexico, Virginia, Georgia, and Lincoln. Some pictures too, I hope.

- Earl Moser, President



Solar Eclipse at Gateway Mall, 1970. Larry Stepp (on the right) is about to get Jess Williams' attention. Fourth from the right is Monte Cole.

CLUB MEMBERSHIP INFO

REGULAR MEMBER - \$30.00 per year. Includes club newsletter, and 1 vote at club meetings, plus all other standard club privileges.

FAMILY MEMBER - \$35.00 per year. Same as regular member except gets 2 votes at club meetings.

STUDENT MEMBER - \$10.00 per year with volunteer requirement.

If you renew your membership prior to your annual renewal date, you will receive a 10% discount.

Club members are also eligible for special subscription discounts on Sky & Telescope Magazine.

CLUB TELESCOPES

To check out one of the club telescopes, please contact a club officer. Scopes can be checked out at a regular club meeting and kept for one month. Checkout can be extended for another month if there are no other requests for the telescope, but you must notify a club officer in advance.

100mm Orion refractor: David Pennington
10 inch Meade Dobsonian: Lee Taylor
13 inch Truss Dobsonian: Available

CLUB APPAREL



Order club apparel from cafepress.com:



Shop through Amazon Smile to automatically donate to PAC:



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