

TWO THUMBS UP FOR COMET HALE-BOPP

Martin Gaskell

Kevin Dowd & I went out to the east of town around 5:30 Monday morning, February 17, for a look at Comet Hale-Bopp. The transparency was poor, but through a break in the clouds we got a good view. The comet is at least as bright as Altair (wow!). In Kevin's 7X35 binoculars we could see 3 - 5 degrees of tail fanning out. In Tel'Poke (my telescope) the nucleus looked elongated perpendicular to the tail (probably due to jets?) and the bow shock was visible. Behind the nucleus was a very dark shadow-like area.

I took a few photos, but missed the clear spell to take these, so they probably weren't that great.

It's well worth getting up early to see the comet, whenever moonlight doesn't interfere with the view.

Erik Hubl

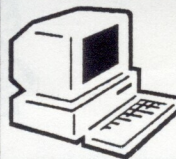
For some time now I have been embarrassed to say I haven't seen the comet yet. You know how it goes....too much of this and that and a new baby soon on the way. And mornings this time of the year are not that inviting to me. Well this morning at 5:15 I saw it.

As with yesterday's report by Martin and Kevin, it is a must see. I claim it is 'almost' as bright as Altair, maybe a half magnitude off. I defocused my binoculars and did the comparison. The tail is VERY fan shaped, but the nucleus (as Martin indicated) is elongated and perpendicular to the tail...most curious. I was only using my 10 x 50 binoculars, but already this comet appears to offer as much, if not more than Hyakutake and I would have liked to get my 6" out, but its buried in the garage.

The star 27 Vulpecula was shrouded in the tail which pointed nearly straight up relative to the horizon. Hale-Bopp is half way between Cygnus and Delphinus but the neat thing is the summer triangle looks so different with this 'other bright object' between Deneb and Altair. Twilight began to be noticeable at 6:00 AM, but I could still see it well. I saw all this from my backyard at 51st & J. I am highly anticipating March and April.

Bryan Schaaf

Like Erik, I saw Hale-Bopp on February 19th, but at 6:15 AM from my home. It looked like a bright hairy star. At 6:40 AM I could still see the stellar nucleus even in the advancing twilight from the Kawasaki Motors parking lot, where I work.



If you have access to Internet, see the
Prairie Astronomy Club web page:
<http://www.4w.com/pac/>
E-mail us at: pac@infoanalytic.com
Omaha Astronomical Society web page:
<http://www.top.net/cdcheney>
NEKAAL web page: <http://world.std.com/~wlc/>

FEBRUARY/MARCH MEETING NOTICES:

PAC MEETING
TUESDAY, FEBRUARY 25th, 7:30 p.m.
at Hyde Memorial Observatory

STAR PARTY
FRIDAY, MARCH 7th at the Atlas Site
SATURDAY, MARCH 8th (Rain Date)

NSP MEETING
THURSDAY, MARCH 20th, 7:30 p.m.
at Mahoney State Park Lodge, Blue Agate Room

BRIEFS:

The scheduled Nebraska Star Party Meeting dates are:
March 20 Blue Agate Room (The original date was March 13, but there were no rooms available)
April 24 Blue Agate Room (...was April 17, but there were no rooms available)
May 15 Blue Agate Room (Original date)
June 12 Cottonwood Room (Original date)
July 17 Prairie Agate Room (Original date)

(All the rooms are at the Mahoney State Park Lodge and all the dates are THURSDAYS) -John Bruce

The RAS (Royal Astronomical Society) Observer's Handbooks arrived February 18. They will be available at the next PAC meeting for those that ordered them, along with the Guy Ottewell Calendars. -Liz Bergstrom

Steve Bornemeier is back from his 6-month Mediterranean cruise! His ship, the USS SAIJAN, returned about the last weekend of December. He might visit Lincoln in March in time to observe Comet Hale-Bopp. He is now building giant binoculars that he hopes will be ready to observe the comet in March. His address until June is: 105 South Poinsettia
Crystal River, Florida 34429

-Bryan Schaaf

The Prairie Astronomer

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MEETING ADJOURNED...



Secretary's Report by Liz Bergstrom

The 28 January 1997 meeting of the Prairie Astronomy Club was called to order promptly at 7:30 PM by President Doug Bell. He said we had a full slate of business to discuss for this meeting before we could enjoy the program. Doug then asked if there were any guests in the audience. There were many guests and they were James Miller and his son, Tom T. Walsh and his son, Christopher and Mary Wigley. We also had Jake Winemiller, the astronomy teacher from Southeast High School (Lincoln, NE.) and his astronomy students. The club welcomed all the guests.

OLD BUSINESS

The matter of the change in the club dues was brought forward for discussion. The dues are to be increased to \$20.00 for individuals and \$22.00 for families. The benefits include:

The Atlas observing site will be available to all members with entry to the site by the use of a combination lock.

The expected cost increase in the Astronomical League dues and the cost of the club liability insurance will be accommodated.

The motion which was made and seconded at the November 26, 1996 meeting was to increase the dues and delete the site key fee. It was voted on and passed at this meeting.

NSP NEWS

Jason Stahl reported that the packets for the 4th Nebraska Star Party are being readied as well as the brochures. He mentioned that there will be no banquet this year, but instead a catered meal is being planned for the last Friday of the star party. As of the meeting night there are only 2 cabins left for those who wish to stay in them. To reserve a cabin a nonrefundable deposit must be paid to Tom Miller within 10 days of the reservation request. The NSP meetings are scheduled on Thursdays at Mahoney State Park at 7:30 PM.

VIEWING NEWS

Dave Knisely reported that Comet Hale-Bopp is bright at 2.5 magnitude. Mars, the red planet, is 1.8 magnitude, however there is a carbon star in the general sky area of Mars that is 3 times more red than Mars.

Also mentioned was the FIREBALL seen over Pickrell, Nebraska the night before 01-27-97, which was reported on the 6:00 PM news on TV.

Doug Bell asked Dave Scherping if he would continue to write up the lists of "What's Up" [in the sky] during the month. Dave agreed to continue producing the list.

TREASURER'S REPORT

John Bruce stated that he was not at the last meeting due to the "Flu Bug". He gave the balances in the club account and also in the NSP

account. John also mentioned that the first year of NSP several of the club members contributed a total of \$300 to start the NSP account, which currently (after NSP 3) now has a balance of \$2400. John said that NSP is becoming very well known and has a national reputation for the BEST STAR VIEWING IN THE NATION. Dave Scherping, Jason Stahl, Tom Miller and members of the NSP committee are to be congratulated for a job well done.

NEW BUSINESS

Rick Johnson spoke up to say that a poet laureate was needed for the Internet astronomy chat room. He then read a poem written by Dave Knisely about the chat room "lady". Rick proceeded to appoint Dave Knisely as our Poet Laureate.

Dave Knisely announced that the Astronomy Day celebration will be held at 8:00 AM on 12 April 1997 at Mueller Planetarium on the UNL campus in downtown Lincoln, Nebraska. He also stated that this is the official date for the national Astronomy Day celebration. Dave is the chairman for this event.

Doug Bell advised that June Moore has donated Carroll Moore's astronomy library consisting of 80 books and some videos and newspapers to our club library. See Bryan Schaaf if you wish to check out any of these books or materials.

Mark Dahmke brought the CDs of the 3rd NSP to the meeting. Those who have ordered should pick them up from Mark. The price for a CD is \$15.00. Mark who does the work for the club Web Site page on the Internet reported that our Web Site has received a top award for this category.

SITE NEWS

Dave Scherping said that he had been out to the site the week before and there were people there looking at it. The people represent the realty company that made the purchase agreement for the Atlas Site and they wanted to see the silo facility. Someone expressed an interest to see the inside of the silo for the possibility of living in the former control room, which is five stories down inside the silo. It is a very good possibility that this area is under water due to the high water table.

Dave Scherping mentioned that there have been no star party dates listed in the calendar of events in the last few issues of the newsletter. The omission will be rectified and the dates will be listed as of the first Friday before a new moon.

MORE NEWS

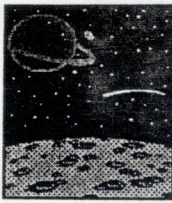
Dave Knisely reported that Clyde Tombaugh, the discoverer of the planet Pluto and the last of the planet discoverers had passed away this past month.

Liz Bergstrom advised that the 1997 Guy Ottewell calendars are in. Please pick up your orders at the next meeting. The RAS Handbooks for 1997 are in also as of February 18 and will be available at the next meeting.

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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 Members...\$20/yr.; Family Memberships...\$22/yr. Address all new memberships, renewals, or questions to THE PRAIRIE ASTRONOMY CLUB, INC., P.O. BOX 80553, LINCOLN, NE 68501. For other club information contact one of the following: President Doug Bell (Lincoln) 489-8197, Vice President Ron Veys (Lincoln) 486-1449, Treasurer John Bruce (Lincoln) 483-0389. All newsletter comments and articles should be sent to: Bryan Schaaf, 1309 W. PLUM, LINCOLN, NE 68522 (or e-mail to schaaafb@juno.com) ten days prior to the club meeting. Club meetings are held the last Tuesday of each month at Hyde Memorial Observatory in Lincoln, Nebraska.

Observing Chairman's Report by Douglas Bell



(Secretary's Report continued from page 2)

For March observing

New Moon:	March 8	Planet:	Mars
Atlas site star party:	March 7	Messier monthly:	M 94
Lunar object:	Spider's web	Top 40:	Equinox
Deep sky:	NGC 3384	Challenge:	M 1-92

Quote of the month: "Inspiring? It's damned frightening!"
-Actor Charles Laughton at the Palomar 200 inch dedication.

Tip of the month: Don't let "common wisdom" keep you from trying something new. Ignoring magnification limits, Moonlight, etcetera can pay big dividends.

Lunar feature: The Spider's Web in Tranquillity is in the center of the Sea of Tranquillity and contains a large collection of ridges arrayed like a spider's web. Can you see it?

Planet of the month: Mars
Everyone's looking at Hale-Bopp, but don't let the Martian opposition pass you by.

Messier Monthly: M 94
A bright galaxy in Canes Venatici. Noted to be very bright and (what else?) comet like.

Top 40: The Equinox
Don't get the scope out for this one. Enjoy the start of Spring and the warmer weather.

Deep Sky: NGC 3384
An elliptical galaxy in Leo. Noted to be in the same field as M 105.

Challenge: M 1-92
Minkowski 1-92, in Cygnus is a bright, star-like reflection nebula which appears double at high magnification. Well, we're jumping the gun a bit. But why not give it a try since you're already up for Hale-Bopp.

Astro Trivia: Professional instruments are often much faster the most amateur scopes. What's the fastest, large (over 1 meter) instrument in current use?

Last month's Trivia answer: Inferior conjunction means between us and the Sun. Superior conjunction means the Sun is between us and the object. Opposition means we are between the object and the Sun. Only the Moon can be inferior, not superior, and also in opposition.

At the February meeting, Jack Dunn will provide a NASA video program about the December 1993 Hubble Telescope repair mission.

No further business was brought up for discussion, therefore the meeting was moved and seconded for adjournment so all could enjoy Stephanie Snedden's presentation about "Quasars and Black Holes".

Stephanie is a graduate student at the University Of Nebraska. She is a student of and works with Martin Gaskell in plotting quasars and black holes in the heavens.

Stephanie gave a brief history of radio astronomy in which amateurs played a large role in the discovery of quasars and radio galaxies. In 1936 Grote Reber built the first radio telescope in the backyard of his home in Illinois. From there he detected Cygnus A.

In 1951 others such as Walter Beede, Rudolph Minkowski, as well as Grote Reber who were experimenting with radio astronomy found the Cygnus A location with radio interferometry. A photo of Cygnus A and of the spectrum was taken by the 200 inch telescope at Palomar Observatory. Cygnus A emitted bright emission lines which were redshifted. At the time this was the farthest galaxy known, therefore the emission lines must have been very bright.

In the late 1950's and during the 1960's other radio loud spots were discovered in the heavens. These were catalogued in the 3rd Cambridge Catalogue. During this time astronomers found some stars [3C 48 and 3C 273] with odd emission lines. Normally the emission lines from active galaxies are hydrogen, but the odd emission lines were redshifted. Maarten Schmidt realized that these were not nearby stars as the emission lines were highly redshifted hydrogen. These were far away galaxies.

Stephanie gave a demonstration of hydrogen emission lines. She passed out what looked like clear slides mounted in slide holders (called defraction gratings) to every one and then held up a container filled with hydrogen. The hydrogen was then energized and all looked through the defraction gratings. It was very obvious that the hydrogen looked as though it had red lavender vertical lines with the longest line in the center of the viewing area. Stephanie then stated that there are two different types of quasars; those that have broad line emissions and those that have narrow line emissions. She described and showed what she called a "Rogue's Gallery":

- 1) quasar [3C 273]- No spiral structure and a noted addition of a jet in the picture
- 2) active galaxy [NGC1275 a.k.a. 3C 84] - Hints of structure with a very small, but very bright nucleus
- 3) Seyfert galaxy [NGC 1068] - structure with a bright nucleus
- 4) Radio galaxy [Grote Reber's Cygnus A] - Visible, however not in the picture shown as this was a radio image of the galaxy

Question? Are all these various classes of objects related? Stephanie's stated that she and Martin Gaskell think that they are related. She showed a drawing representing a supermassive black hole as the central engine for the activity. The drawing showed the supermassive black hole in the center, the vertical emission lines and radio waves, the accretion disk, the broad line clouds, the narrow line clouds and the direction of the material flowing into the black hole. In a supermassive black hole the matter drawn into it is pulled in with a stronger and stronger gravitational force the closer it gets to the hole. The orientation of the disk will create either a radio galaxy, a quasar or a blazar.

The kinetics of a black hole that is the size [scale] and motion can be

(Continued on page 4)

measured in several ways; reverberation mapping to determine a time lag, which will give the size of the black hole, emission line profiles, pure rotation, outflow and inflow to determine the motion of the black hole.

Stephanie provided the coordinates and names of four radio loud quasars and galaxies. They are as follows:

3C 273 Radio Loud Quasar, V= 12.8 magnitude, RA: 12H 29M 06.64S, Dec: +02 03' 09"

NGC 1275 [3C 84] Radio Loud Active Galaxy, V=12.5 magnitude, RA: 03H 19M 48.09S, Dec: +41 30' 44"

NGC 1068 [M77] Seyfert Galaxy, V= 11.3 magnitude, RA: 02H 42M 40.16S, Dec: -00 00' 40"

3C 390.3 Radio Loud Active Galaxy, V= 15.5 magnitude, RA: 18H 42M 08.73S, Dec: +79 46' 17"

For additional information and photos of quasars and black holes

Stephanie said to try some of the Web Site Sampler Addresses that follow.

<http://csepl.phy.ornl.gov/guidry/violence/violence-root.html>
This site contains nice photos with a section on active galaxies.

<http://oposite.stsci.edu/pubinfo/Subject.html>
This site contains Hubble Space Telescope photos.

<http://crux.astr.va.edu/activee.html>
Here are more real nice photos.

<http://wwwatng.atnf.csiro.au/people/bkoribal/definitions.html>
Terminology information

http://obshpx.obs-hp.fr/www/CATALOGUES/VENON2_7.HTML
Quasar catalogue

<http://nedwww.ipac.caltech.edu>
NAS/IPAC Extragalactic Database/A gold mine of information

Lastly, Stephanie asked if there were any questions and there were several.

At press time of this newsletter news of Comet Hale-Bopp has hit the presses and the airwaves all over the world. It is bright and getting brighter. Get up early and look for it in the east to northeast sky. You won't be disappointed

The Prairie Astronomy Club March 1997

S	M	T	W	T	F	S
Finally the month to enjoy Comet Hale-Bopp at its brightest has arrived! Watch for its appearance in Cygnus during the first week of March. The comet will slide east-northeast into northern Andromeda by mid-month and will be closest to Earth on the 22nd. Mars is at opposition on the night of March 16 meaning it will rise that evening as the sun sets and set as the sun rises. Mars is at its brightest (mag. -1.3) and largest (14.2") angular size this month. Telescopically you might see features on Mars, especially the north polar cap. Earth races past Mars this month, so if you have no telescope watch Mars' rapid retrograde motion westward in Virgo. The red planet will be just 10 degrees northwest of the partially eclipsed moon on March 23/24. The umbral (darkest shadow portion) eclipse begins at about 8:58 PM and ends at about 12:21 AM with mid-eclipse occurring at 10:39 PM. Saturn descends into the evening twilight this month shortly after sunset and Jupiter makes an appearance in the southeast morning sky an hour before sunrise. The Vernal Equinox (the first day of Spring!) is on March 20th. Also, on the same day Mars is at its closest to Earth and the Moon is at Apogee (most distant from Earth). This month the "realm of galaxies" - the Virgo Galaxy Cluster and all the Messier Objects are well placed overnight in the sky. <i>-Clear Skies!</i>						1
2 LAST QTR. MOON 3:37 AM	3	4	5 1979: VOYAGER 1 FLIES PAST JUPITER	6 1979: VOYAGER 1 FLIES PAST CALLISTO	7 HALE-BOPP NOW FREE OF MOON LIGHT UNTIL MAR. 19	8 NEW MOON 7:15 PM MOON AT PERIGEE
9 1982: UNUSUAL LINE-UP OF PLANETS; NOT TO WORRY	10 1978: SKYLAB CONDITIONS REPORTED TO BE "NORMAL"	11	12	13 1987: TINY DIAMONDS FOUND IN METEORITES	14 1987: COURSE OF VOYAGER 2 ADJUSTED FOR NEPTUNE	15 FIRST QUARTER MOON 6:06 PM
16 MARS AT OPPOSITION 2:00 AM	17 1978: MANNED SOYUZ 27 RETURNS; 96 DAYS ALOFT	18 1977: SOLAR ENERGY ADVANCED TO HEAT HOMES	19 HALE-BOPP LOW IN N.E. MORNING SKY	20 NSP MEETING AT MAHONEY STATE PARK 7:30 PM	21 HALE-BOPP MOVES INTO EVENING SKY (IN N.W. SKY)	22 COMET HALE- BOPP CLOSEST TO EARTH
24	25 PAC MEETING AT HYDE OBS. 7:30 PM	26 HALE-BOPP NOW FREE OF MOON LIGHT UNTIL APRIL 8	27	28 1976: MYS- TERY; APOLLO 15 "ALSEP" INSTRUMENTS TURN OFF/ON	29	
31 LAST QTR. MOON						

LIBRARY MATERIALS DONATED BY JUNE MOORE IN MEMORY OF CARROLL

VIDEOS

Apollo XI, The Eagle Has Landed / 1985
 Isaac Asimov / Voyage to the Outer Planets and Beyond / 1996
 Space Shuttle Satellite Rescue / 1986.
 Recorded Creation, Comet Halley
 Recorded Halley's Comet / SE High School
 Recorded LA the Movie, Earth the Movie, Miranda the Movie, Mars the Movie, Backyard Astronomy, Hyde Observatory Anniversary
 Recorded NOVA Hole in the Sky, Death of a Star, Infinitely Reasonable Copernicus
 Recorded Ocean cruise eclipses of 1988, Tour of Bali and Philippines
 Recorded Space Part I
 Recorded Space Part II
 Recorded Space Shuttle Challenger disaster
 Recorded The Moon Above - The Earth Below
 Recorded To the Moon
 Recorded Voyager Press Conference, Backyard Astronomy
 Recorded Audio tape of Michael Collins speech from 1988 eclipse cruise

NEWSPAPERS

<i>Newspaper</i>	<i>Date</i>	<i>Headline Article (complete paper is present)</i>
St. Louis Globe	July 18th, 1969	Apollo 11 and Luna 15 in race for the Moon
St. Louis Globe	July 19-20 1969	Astronauts Find LM in Good Shape
St. Louis Globe	July 21st, 1969	Men Walk on Moon
St. Louis Globe	July 22nd, 1969	They Are Headed Home
St. Louis Globe	July 23rd, 1969	Nixon will Visit
St. Louis Globe	July 24th, 1969	Splash down Area Shifted
St. Louis Globe	July 25th, 1969	Our Heroes are Home
Today (Florida)	Jan. 31st, 1971	Apollo 14 Commemorative Newspaper
Sunday Journal-Star	1976	An 8 Part History of Nebraska

BOOKS

A. Pannekoek / A History of Astronomy / 1961
 Alan E. Nourse / Nine Planets / 1960
 Andrew Tomas / We are not the First / 1971
 Arthur J. Zadde / Making Friends with the Stars / 1963
 Arthur P. Norton / Star Atlas & Telescope Handbook - Twelfth Edition / 1954
 Barry H. Downing / The Bible & Flying Saucers / 1968
 C.A. Newham / The Astronomical Significance of Stone Henge / 1972
 Carleton Pearl / The Tenth Wonder - Atomic Energy / 1956
 Christopher P. Jargocki / Science Brain-Twisters, Paradoxes and Fallacies / 1976
 Clifford Wilson / Crash go the Chariots / 1972
 Donald H. Menzel, Jay M. Pasachoff / A Field Guide to the Stars and Planets / 1983
 Donella H. Meadows / The Limits to Growth / 1972
 Dr. E.C. Krupp / In Search of Ancient Astronomies / 1978
 Dr. Edward U. Condon / Scientific Study of Unidentified Flying Objects / 1968
 E.C. Krupp / Griffith Observer - Indonesia Solar Eclipse, December 1983
 E.L. Schatzman / The Structure of the Universe / 1968
 Editors of Pensee / Velikovsky Reconsidered / 1976
 Erich Von Danikens / Chariots of the Gods / 1969
 Frank Edwards / Flying Saucers - Serious Business / 1966 (Autographed)
 Frank Edwards / Flying Saucers - Serious Business / 1966 (Paper back)
 Fred Hoyle / Frontiers of Astronomy / 1957
 Fred Hoyle / The Nature of the Universe / 1950
 Fred L. Whipple / The Mystery of Comets / 1985 (Autographed)
 George Gamow / Biography of the Earth / 1941
 George Gamow / The Creation of the Universe / 1952
 George Greenstein / Frozen Star / 1983
 George Sarton / A History of Science / 1952
 H. Spencer Jones / Life on Other Worlds / 1960
 Hans Thirring / Energy for Man / 1958
 I.S. Shklovskii, Carl Sagan / Intelligent Life in the Universe / 1966
 Irving Adler / The Stars - Steppingstones into Space / 1962
 Isaac Asimov / Second Foundation / 1953
 Isaac Asimov / The Collapsing Universe / 1977
 Isaac Asimov / Visions of the Universe / 1981
 J.W.N. Sullivan / The Limitations of Science / 1933
 James B. Conant / On Understanding Science / 1955

(Continued on page 6)

(Donated Library Books continued from page 5)

- James Bryant Conant / Harvard Case Histories in Experimental Science VOL. 2 / 1957
- James F. Fixx / Games for the Super-intelligent / 1972
- James M. McCampbell / UFOlogy / 1973
- Jean Charon / Cosmology - Theories of the Universe / 1970
- Jean-Pierre Maury / Newton - The Father of Modern Astronomy / 1992
- Jean-Pierre Verdet / The Sky, Mystery, Magic and Myth / 1992
- John G. Fuller / Incident at Exeter / 1966
- Johnson and Adler / Discover the Stars, How to use the Telescope / 1965
- Joseph F. Goodavage / The Comet Kohoutek / 1973
- Karen Arms / Environmental Science / 1990
- Kenneth Brecher, Michael Feirtag / Astronomy of the Ancients / 1979
- Life Science Book / Giant Molecules / 1963
- Lucretius / The Nature of the Universe / 1951
- M.W. Postins / StoneHenge Sun, Moon & Wandering Stars / 1987
- Martin Gardner / Fads & Fallacies in the name of Science / 1957
- Max Casper / Kepler 1571-1630 / 1959
- Milton K. Munitz / Theories of the Universe / 1957
- O. Richard Norton / Rocks From Space / 1994
- Patrick Moore, John Mason / The Return of Halley's Comet / 1984
- Poul Anderson / Time and Stars / 1964
- Prahlad Singh / Stone Observatories - Jantar-Mantars of India / 1986
- Richard A. Craig / The Edge of Space - Exploring the Upper Atmosphere / 1968
- Richard Berendzen / Life Beyond Earth & the Mind of Man / 1973
- Roger Ressmeyer / Space Places / 1990
- Samual Moffat / Life Beyond the Earth / 1965
- Samual Rapport, Helen Wright / The Crust of the Earth / 1955
- Stephen Hawking / A Brief History of Time / 1988
- Stillman Drake / Discoveries and Opinions of Galileo / 1957
- Stillman Drake / Galileo Galilei - Dialogue Concerning the two Chief World Systems / 1953
- Thomas S. Kuhn / The Copernican Revolution / 1959
- Thorton Page / Stars and Galaxies / 1962
- Timothy Ferris / Coming of Age in the Milky Way / 1988.
- Timothy Ferris / The Red Limit / 1977
- Verne H. Booth / The Structure of Atoms / 1964
- Viktor E. Frankl / Man's Search for Meaning / 1985
- William J. Busler / The Amateur's Guide to the Messier Objects / 1967
- William T. Olcott / A Field Book of the Stars / 1935
- Zsolt De Harsanyi / The Star-Gazer (Life of Galileo) / 1939



The Prairie Astronomer
c/o The Prairie Astronomy Club, Inc.
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First Class Mail

Next PAC Meeting
Feb. 25th, 1997

2-97

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