REFLECTIONS REFRACTIONS

of the University Lowbrow Astronomers

April 2001

The University Lowbrow Astronomers is a club of Astronomy enthusiasts which meets on the third Friday of each month in the University of Michigan's Physics and Astronomy building (Dennison Hall, Room 130 or 807). Meetings begin at 7:30 pm and are open to the public. Public star parties are held twice a month at the University's Peach Mountain Observatory on North Territorial Road (1.1 miles west of Dexter-Pinkney Road; further directions at the end of the newsletter) on Saturdays before and after the new Moon. The party is canceled if it's cloudy or very cold at sunset. For further information call (313) 480-4514.

The Open House of October 28, 2000 was one to remember as evidenced by Mark Deprest photograph. On the recent weekend of March 31st and April 1st one of the largest sunspot groups ever recorded produced an expansive terrestrial aurora displays as far south as Arizona. The insert, to the left, is the view most Lowbrows saw. Sometimes you just can't win. The winter of 2000 - 01, with its many clouded skies will be one to soon forget. Spring is hear and the skies a clear. So get yourself outside and do some observing.

This Month:

April 20 - Meeting at 130 Dennison - CLUB ELECTIONS - Also, Phil McCausland, graduate student at the University of Western Ontario, member of Royal Astronomical Society of Canada, London Centre, presents 'The Tagish Lake

Meteorite'.

April 21 - Public Star Party at Peach Mountain Observatory - Perfect observing weather expected with Orion setting and Virgo rising.

April 28 - Public Star Party at Peach Mountain Observatory - Still time to observe those winter constellations. April 28 is also National Astronomy Day - Join the Lowbrows at Leslie for some Solar Observing. Contact B. Friberg for specifics at Bfriberg@aol.com

Next Month

May 18 - Meeting at 130 Dennison - Excellent speaker just as soon as we find 'em.

May 19 - Public Star Party at Peach Mountain Observatory - Fear of the Virgo cluster? Find out tonite. Its on the meridian.

May 26 - Public Star Party at Peach Mountain Observatory - Mars is coming if you stay late.

ASTRONOMY/SPACE EVENTS (All times in EDT) submitted by Doug Warshow

Apr 20 - 4:02 Great Red Spot at Jupiter's central meridian.
- 16:00 Venus 10 deg. N. of the Moon.
- 23:00 Moon is 8.7 deg. SSE. of Venus
- 23:54 Great Red Spot at Jupiter's central meridian.

April Piscid (radio) meteor shower.

Past Events: 1920 - Shapley-Curtis debate on the nature and distance of spiral nebulae.

Apr 21 - Venus 30 deg. upper right of rising Sun.
- 14:00 532 Herculina at opposition.
- 18:00 Saturn closest to the Pleiades (5.8 deg. SSE.).
- 19:45 Great Red Spot at Jupiter's central meridian.

Apr 22 - 0:00 Peak of Lyrid meteor shower.
- 5:41 Great Red Spot at Jupiter's central meridian.
- 8:00 Moon 0.16 deg. N. of 4 Vesta.

Apr 23 - 1:33 Great Red Spot at Jupiter's central meridian.
5:00 Mercury at superior conjunction.
11:00 Peak of Pi Puppid meteor shower.
11:26 New Moon.
12:00 Moon 4.2 deg. SSE. of Mercury.
16:00 Moon 1.9 deg. NNW. of 3 Juno.
21:25 Great Red Spot at Jupiter's central meridian.
T Centauri at maximum.

Past Events: 1858 - Max Planck born.
1962 - Ranger 4 launched (Moon).
1971 - 1st manned docking with space station Soyuz 10/Salyut 1).
1996 - Priroda module launched to Mir.

Apr 24 Delta Piscid (radio) meteor shower.

Past Events: 1970 - China becomes 5th nation to launch its own satellite.
1971 - V. Komarov became 1st to die in space (Soyuz 1).
1990 - STS-31 Discovery launched.

Apr 25 - 3:12 Great Red Spot at Jupiter's central meridian.
- 12:00 Saturn 1.4 deg. N. of the Moon.
Moon 7.2 deg. SSE. of the Pleiades.
- 19:00 Mercury reaches its ascending node.
- 23:04 Great Red Spot at Jupiter's central meridian.

PM: Moon between Saturn and Aldebaran and below Jupiter.

Past Events: 1990 - Hubble Space Telescope deployed.

Apr 26 - 4:00 Moon 3.0 deg. NNW. of Aldebaran.
- 9:00 Jupiter 1.8 deg. N. of the Moon.
- 18:55 Great Red Spot at Jupiter's central meridian.

PM: Moon has moved to upper left of Jupiter. Saturn is 12 deg. to Jupiter's lower right.
V Coronae Borealis at maximum.
RS Scorpii at maximum.

Past Events: 1962 - Ariel 1launched. First international satellite.
1993 - STS-55 Columbia launched.
Apr 27 - 4:51 Great Red Spot at Jupiter's central meridian.
- 10:32 Moon occults Eta Geminorum.
Apr 28 - NATIONAL ASTRONOMY DAY.
- 0:43 Great Red Spot at Jupiter's central meridian.
- 5:45 Moon reaches ascending node.
- 20:00 Neptune at western quadrature.
- 20:35 Great Red Spot at Jupiter's central meridian.
PM: Moon near Pollux and Castor.
Past Events: 1774 - Francis Baily born.
1900 - Jan Oort born.
1906 - Bark Bok born.
1991 - STS-39 Discovery launched.
Apr 29 - 2:22 Great Red Spot at Jupiter's central meridian.
- 9:00 Moon 5.3 deg. S. of Pollux.
Comet Kushida-Muramatsu at perihelion.
- 22:00 3 Juno in conjunction with the Sun.
Past Events: 1985 - STS-51B Challenger launched.
Apr 30 - Mercury at perihelion.
- 5:43 Algol at minimum.
- 7:00 Moon 0.93 deg. N. of M44 (Beehive Cluster).
- 13:08 First Quarter Moon.
- Great Red Spot at Jupiter's central meridian.
Just after sunset: Mercury setting, 12 deg. lower right of Saturn.
May 1 - 22:00 Moon 3.5 deg. NNE. of Regulus.
Past Events: 1949 - Gerard Kuiper discovers Neptune's moon, Nereid.
1996 - Comet Hyakutake closest approach to Sun.
May 2 - 0:00 Moon at perigee (369,420 km).
- 4:02 Great Red Spot at Jupiter's central meridian.
- 12:00 Comet 24P/Schaumasse at perihelion.
- 23:53 Great Red Spot at Jupiter's central meridian.
S Hydrae at maximum.
May 3 - NATIONAL SPACE DAY. Why not take an astronaut out to launch?
- 2:32 Algol at minimum.
- 19:45 Great Red Spot at Jupiter's central meridian.
May 4 - 4:00 Mercury at its greatest illuminated extent.
- 5:41 Great Red Spot at Jupiter's central meridian.
- 14:00 Venus at its greatest brilliancy.
- 19:00 Peak of Eta-Aquarid meteor shower.
- 20:00 Venus at its greatest illuminated extent.
Past Events: 1967 - Lunar Orbiter IV launched.
1989 - STS-30 Atlantis launched, releases Magellan spacecraft (Venus).
May 5 - 1:33 Great Red Spot at Jupiter's central meridian.
- 18:00 Moon 7 deg. NNE. of Spica.
- 21:24 Great Red Spot at Jupiter's central meridian.
- 23:21 Algol at minmum.
T Ursae Majoris at maximum.
Past Events: 1961 - Freedom 7 suborbital flight; Alan Shepard is 1st American in space.
May 6 - 3:00 Mercury 2.3 deg. SSE. of the Pleiades.
PM: Mercury passes 1.6 deg. N. of Saturn.
Past Events: 1975 - NASA announces that Canada will build the Shuttle robot arm.
May 7 - 3:12 Great Red Spot at Jupiter's central meridian.
- 9:52 Full Moon.
- 13:00 Mercury 4 deg. N. of Saturn.
- 23:04 Great Red Spot at Jupiter's central meridian.
Past Events: 1992 - STS-49 Endeavour launched.
May 8 - 0:44 337 Devosa occultation.
- 18:55 Great Red Spot at Jupiter's central meridian.
- 20:00 Comet 61P/Shajn-Schaldach at perihelion.
- 20:09 Algol at minimum.
T Camelopardalis at maximum.
Past Events: 1963 - 1st transatlantic color TV pictures sent (Telstar 2).
May 9 - Epsilon Arietid (radio) meteor shower.
- 4:00 Moon 6.9 deg. NNE. of Antares.
- 4:51 Great Red Spot at Jupiter's central meridian.
May 10 - 0:43 Great Red Spot at Jupiter's central meridian.
- 16:00 Mercury at its greatest heliocentric latitude N.
- 15:00 Mars 1.9 deg. S. of the Moon.
- 20:35 Great Red Spot at Jupiter's central meridian.
- 22:00 Neptune is stationary.
- 23:00 Venus reaches its descending node.
PM: Jupiter, Mercury and Aldebaran form nearly equilateral triangle.
May 11 - 6:30 Great Red Spot at Jupiter's central meridian.
- 7:02 Moon reaches its descending node.
- 11:00 Mars is stationary.
Past Events: 1916 - Einstein's Theory of Relativity is presented.
1974 - SMS-1 launched, 1st geostationary weather satellite.
May 12 - 2:22 Great Red Spot at Jupiter's central meridian.
- 6:00 Mercury 8 deg. N. of Aldebaran.
- 22:14 Great Red Spot at Jupiter's central meridian.
May 13 - 20:00 Neptune 3 deg. N. of the Moon.
May 14 - 4:01 Great Red Spot at Jupiter's central meridian.
- 21:00 Moon at apogee (404,144 km).
- 23:53 Great Red Spot at Jupiter's central meridian.
Past Events: 1973 - Skylab launched.
May 15 - 4:00 Uranus 3 deg. N. of the Moon.
- 6:00 Moon 3.1 deg. SSE. of Uranus.
- 6:11 Last Quarter Moon.
- 9:00 Uranus at western quadrature.
- 19:45 Great Red Spot at Jupiter's central meridian.
Past Events: 1713 - Nicolas de la Caille born.
1963 - Faith 7 launch, last flight of Mercury program.
1997 - STS-84 Atlantis launched.
May 16 - May Arietid (radio) meteor shower.
- 5:41 Great Red Spot at Jupiter's central meridian.
- 8:00 Mercury 2.8 deg. N. of Jupiter.
- 13:00 Mercury 3 deg. N. of Jupiter.
May 17 - 1:32 Great Red Spot at Jupiter's central meridian.
- 21:24 Great Red Spot at Jupiter's central meridian.
T Hydrae at maximum.
T Herculis at maximum.
532 Herculina 10' SE. of 14 Bootis.
Past Events: 1836 - Norman Lockyer born.
May 18 - 17:00 1 Ceres is stationary. Located 0.5 deg. SE. of 52 Sagittarii.
Past Events: 1969 - Apollo 10 launched (Moon).

Constellation of the Month: Lynx

By Mark S. Deprest

Johannes Hevelius is credited with the creation of this constellation saying that anyone wishing to study the stars in this area would need the eyes of a Lynx.

There is another more romantic story about Lynx, which I kind of like. It involves Pluto (God of the Underworld) and Proserpina, daughter of Ceres (Goddess of Agriculture). As it turns out Ceres cause a great blight to kill all of the grains and lay the earth barren until Pluto returned her daughter Proserpina. Of course by this time Proserpina was already the queen of the Underworld and could not be returned to her mother. Zeus finally stepped in and decreed that for six months Proserpina would live in the Underworld (winter, the season when nothing grows) and then for six months she would live in the Upperworld (summer, the season when crops grow and mature). This placated Ceres rage and sorrows enough for her to send a messenger in her dragon-drawn Chariot to rain seeds of harvest across the Earth. When her messenger came close to Scythia, reigned by the jealous and envious King Lyncus, a plot to kill this messenger and take the credit for the good harvest was contrived by Lyncus. But, just a the fowl deed was about to happen, Ceres changed Lyncus into a Lynx and placed him in the sky where the stars were so dim that nobody could see him, unless "you had the eyes of a lynx." I like this last story best, but most scholars recognize Hevelius as Lynx creator.

Transit at Midnight of Alpha Lyncis: February 14th
The constellation runs sort of diagonally from its southeastern corner at 9 hours 23 minutes Right Ascension and north 33 degrees Declination to its northwestern corner at 6 hours 18 minutes R.A. and north 62 degrees Dec. Working clockwise, Lynx is bordered by Camelopardalis to the north, Auriga to the west, Gemini and Cancer to the south, followed by Leo Minor and Ursa Major to the east. The brightest stars in Lynx are Alpha Lyncis, a K5 spectral class 3.13 magnitude star, 31 Lyncis; Alsciaukat a 4.24 mag. K5 spec. and 38 Lyncis a 3.93 mag. A2 spec. The remaining stars that make up Lynx are a dim 4.50 to 5.50 magnitude and only dark clear skies will make them comfortably visible with the naked eye.

Things to Check Out in Lynx:
Multiple Star Systems
12 Lyncis; STF948; ADS 5400
RA (J2000): 06 46 14.15 declination: +59 26 30.1
Included in the Astronomical League's certificate list of 100 double stars. Visual binary star. Included in Michael R. Feltz's list of the widest visual binaries. Orbital elements and diagram available on Richard Dibon-Smith's website. (http://www.dibonsmith.com)
Component A: magnitude +5.4 spectral type A3V
Component B: magnitude +6.0 spectral type A2V
Component C: magnitude +7.3 spectral type ??
Separation AB: 1.8 " at position angle 101
Separation AC: 8.7 " at position angle 308
First observed by Struve in 1828. Described by Muirden (1988) as " a beautiful triple, A appearing slightly yellowish ".
Distance: 230 light-years
Projected orbital separation: 120 AU between A and B; 610 AU between A and C
Luminosity (Sun =1): A 28 B 16 C ??
Diameter (Sun =1): A 2.3 B 1.7 C ??

19 Lyncis; STF1062; ADS 6012
RA (J2000): 07 22 52.06 declination: +55 16 53.3
Included in the Astronomical League's certificate list of 100 double stars. Components show no relative motion. Some observers report the companion to purplish and others say it appears green, let me know what you see.
Component A: magnitude +5.6 spectral type B8V Spectroscopic binary
Component C: magnitude +6.5 spectral type B9V
Separation AC: 14.8 " at position angle 315
Distance: 470 light-years (approx)
Projected orbital separation: 2100 AU
Luminosity (Sun =1): A 100 B 43
Diameter (Sun =1): A 2.3 B 1.9

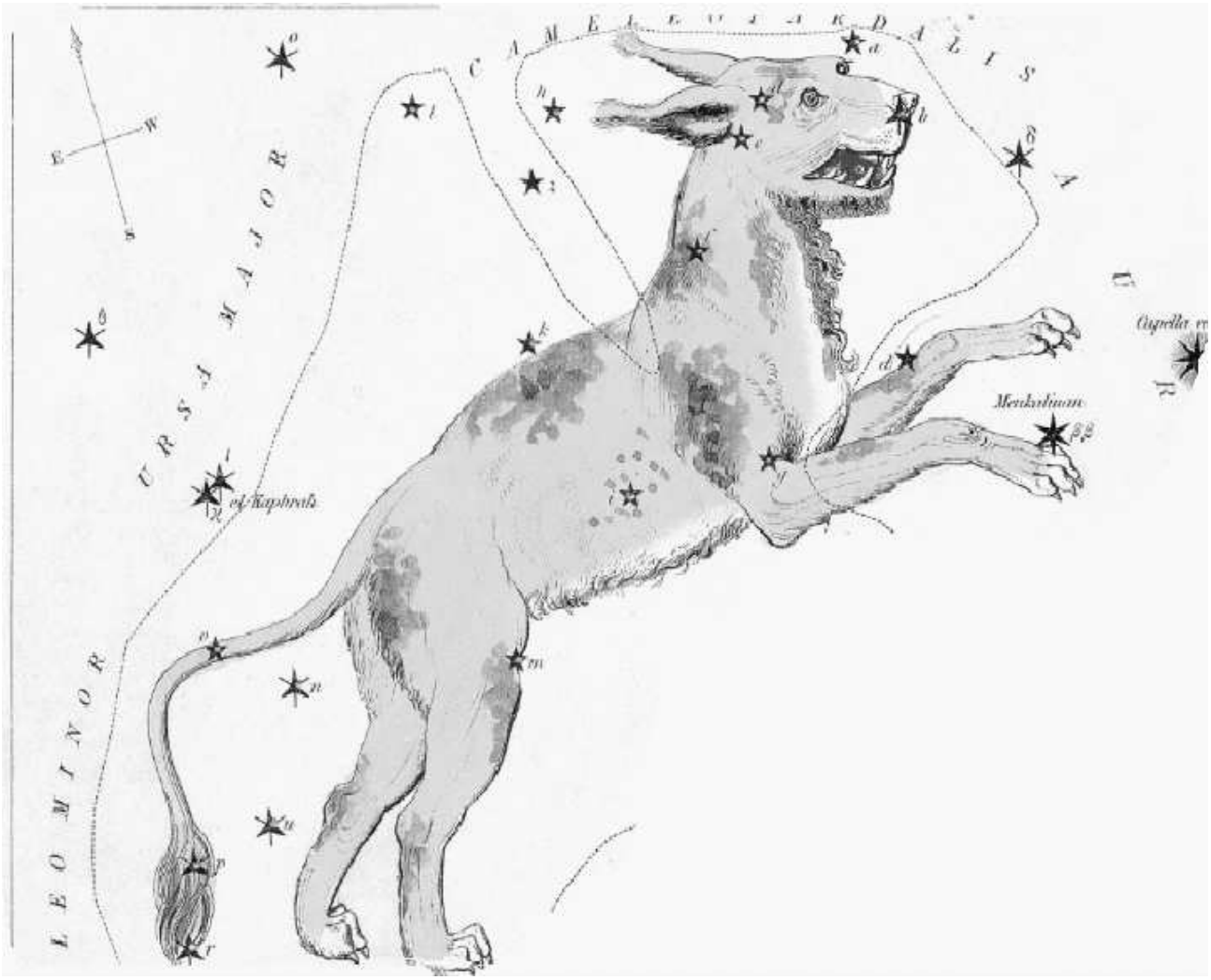
38 Lyncis; STF1334; ADS 7297
RA (J2000): 09 18 50.67 declination: +36 48 10.4
Included in the Astronomical League's certificate list of 100 double stars. Visual binary star.
Component A: magnitude +3.9 spectral type A3V Spectroscopic binary
Component C: magnitude +6.6 spectral type ?A3V
Separation AC: 2.7 " at position angle 229
Stars AB and C are sometimes said to look green and blue respectively, although Muirden (1988) says emphatically of A and B that "the primary is white ".
Distance: 122 light-years
Projected orbital separation: 100 AU
Luminosity (Sun =1): AB 32 C 2.7
Diameter (Sun =1): AB 2.4 C 0.7
There is an 11th magnitude fourth component at 88 " in PA 212.
Deep Sky Objects
NGC 2683; Spiral galaxy
J2000 RA: 08h52.7m dec: +33 25'

Magnitude 10.4
Very bright, very large, very much extended, 39deg, gradually much brighter middle.
Comments from SAC (Saguaro Astronomy Club) 6.0 database: PA 44, peanut-shaped bulge, many filaments arm with dark lanes on 1 side angular diameter 9.2'x2'.
Inclination (1=face on, 5=edge on): 3
Surface brightness 12.9

NGC 2419; Caldwell 25; Globular Cluster
J2000 RA: 07h38.1m dec: +38 53'
Magnitude: 10.4
Pretty bright, pretty large, little extended, 90deg, very gradually brighter middle, star of mag 7th or 8th at 267 degrees and 4' distance. Most distant globular, Brightest * 17 mag.
Angular diameter 4.1'

Variable Stars
R Lyncis; Mira-type
Right ascension: 07h01m18.0s Declination: +55 19' 50"

Period of 387.75 days. Maximum magnitude: 7.2 Minimum magnitude: 14.3 In 2001 it should reach its maximum in late April or early May. According to Richard Dibon-Smith this star is unusual in that it belongs to a small group of long-period variables with a "S" spectrum. Which is a 'cool red giant' that shows the presence of zirconium oxide.



An Observational History of Mars

by David Snyder

This year the "Astronomy on the Beach" at Kensington Metropark will focus on Mars and the International Space Station (ISS). The ISS has generated a lot of interest recently, but why focus on Mars? I suppose the obvious answer is that Jupiter and Saturn are past their prime for this year and we don't have any bright comets to work with. However Mars is a fascinating object and besides, this June Mars will be closer to the earth than it has been at any time since 1988.

Mars has been observed by many ancient cultures - we have no idea who was the first to notice it. Those who did, noticed a pale pink object that was only visible in the early morning just before dawn (and rather difficult to see at that). This object moved relative to the stars, got brighter over the next year and rose earlier and earlier. Then it abruptly stopped and reversed direction. At its brightest it was the third brightest object in the night sky (only Venus and the Moon were brighter), had an intense red
color and was visible all night long. After moving the "wrong" direction for some 70 days or so, it again stopped and reversed direction again. It gradually got dimmer, was only visible in the evening sky and set earlier and earlier. After another year it again was a pale pink object, this time only visible just after sunset. Shortly after, it could not be seen at all. It remained hidden for about one hundred days when the cycle repeated again. Each cycle took a little over two years.

The Greeks named this object Ares after their god of war. The Romans in
turn named it Mars after the roman god of war.

The scientific study of Mars begins in 1600 when various individuals (mainly scientists, but a surprising number of amateurs as well) observed the planet with telescopes. Our knowledge increased gradually, but certain misconceptions became established, many of which persisted until the last half of the 20th century. It is then we start to see groups (instead of individuals) studying Mars. Some of these groups were composed of amateurs, some were composed of scientists and some were composed of both amateurs and scientists. The most successful of these groups was NASA. While NASA's primary objective was landing men on the Moon, clearly the second item on NASA's priority list was the scientific exploration of Mars using unmanned spacecraft.

NASA, along with its soviet counterpart IKI, sent numerous spacecraft to the red planet. While there were many failures, there were many successes as well. In addition, out of the thousands of meteorites that have been examined by scientists, a dozen or so are now known to have originated on Mars. The data from the spacecraft and the meteorites have dramatically changed our picture of Mars and gave us a seemingly endless set of clues to the geology, chemistry, atmosphere and possible biology of Mars. However in the process we seemed to have created more questions than answers.

A detailed chronology follows:

356 or 357 BC: Aristotle observed Mars passing behind the Moon. We now call such an event an occultation. This convinced Aristotle that Mars was more distant than the Moon.

1609 - Galileo Galilei makes the first telescope observation of Mars. He cannot detect any surface detail, but he notices it is not perfectly round. (We now know that Mars is 100% illuminated only near opposition, at other times it is shaped like a gibbous Moon).

1659 - Christiann Huygens made the first useful sketch of Martian surface features. (Modern images of Mars show a planet with dark red regions among lighter red regions. In the following text I will use term "maria" for the dark regions and the term "desert" for the light regions. This matches modern usage, but these terms were not used in 1659. However do not assume the deserts are hot dry places. Maria often appear greenish in color but we now know this is an optical illusion.)

With Huygens' crude telescope, he saw one of these maria (which is now called Syrtis Major). He observed it move that night and again the next night. He concluded that Mars rotated on its axis with a rate of 24 hours. Huygens believed that Mars might be inhabited, perhaps even by intelligent creatures. He shared that belief with many other scientists who would observe Mars over the years to come.

1666 - Giovanni Cassini conducts more careful observations. He concludes the rotation rate is 24 hours and 40 minutes. While there is some question on this matter, Cassini is probably the first to notice that Mars has white spots located near the poles. For the next 300 years people assume these spots are made up of snow, ice or both (we now call these spots "polar caps").

1719 - Cassini's nephew Giacomo Filippo Maraldi conducts some observations of his own. After many years, Maraldi is convinced that the shapes of some maria change over time. He thinks this is evidence of clouds that sometimes obscure the surface. He also saw changes in the polar caps. He speculates this showed evidence of seasons: ice from the polar caps supposedly melted during the "summer" and freeze again during "winter."

1783 - William Herschel confirms Cassini's suspicions that Mars has seasons. This is based partly on Cassini's observations, partly on his own observations, but also on the fact that Mars has an inclination that is close to the same value as Earth's.

Herschel seems to be the first to refer to the maria by the term "sea," however he was not the first to assume that maria actually contained liquid water. He suggests that flooding may explain some of surface changes, though he agreed that clouds could explain some changes.

1860 - Emmanuel Liais suggests the variations in surface features are due

to changes in vegetation (not flooding or clouds).

1863 - Father Pierre Angelo Secchi notice that maria change color. At different times he observed maria with green, brown, yellow and blue colors.

1877 - Since the Earth, Jupiter and Saturn were known to have moons, scientists suspected Mars might have a moon as well. However finding this moon was not easy. Asaph Hall had been searching for a Martian moon, but he found nothing. He almost gave up, but his wife insisted he keep trying. Soon, Hall was rewarded with not one, but two small moons, which were given the names Deimos and Phobos.

Giovanni Schiaparelli makes a map of Mars that showed maria, some of which were connected by thin lines. He wasn't the first to observe them (earlier maps show a few) but he saw more lines than his predecessors. However some observers did not see any lines, and there was some controversy over whether they existed at all.

Schiaparelli assumed that these lines were natural landscape features. He gave them the name "canali" which is the Italian word for "groove." However when this word was translated into English, "canali" became "canal," a word with a very different meaning. This simple mistake led many people to speculate about intelligent beings who built canals. Schiaparelli himself was unconvinced and somewhat annoyed that his observations led to such speculation. He did not think the lines proved anything about life on Mars, though he remained open to the possibility.

1892 - Edward Emerson Barnard observed craters on Mars. This observation was almost completely ignored for over 70 years.

1894 - Percival Lowell, a 39 old aristocrat with no previous training in astronomy suddenly becomes interested in Mars and conducts observations with the help of William and Edward Pickering. Over the next few years he conducts many observations of Mars and becomes one of the best Mars observers. However he had the tendency to engage in speculation, particularly on the subject of life on Mars. This did not go over well with the scientific community. Lowell's activities discouraged many scientists, particularly in the United States, from studying Mars as it no longer seemed a "serious" subject worthy of scientific pursuit.

However in Lowell's defense, some have argued that he deserves credit for developing modern planetology, a word Lowell invented. He originated the notion that the Martian climate has changed over time, a notion we now believe to be correct. He insisted that any theory of planetary evolution needed to account for changes in all the planets not just the planet a scientist happened to be studying. And he was the first to suggest that Mars is the best location to test theories of climate change. This might help scientists studying changing in the Earth's climate. In some respects Lowell was almost a hundred years ahead of his time. On the other hand, his ideas on possible Martian biology seem antiquated to the modern observer.

1906 - Lowell publishes a book "Mars and its Canals." The book claims that Schiaparelli's lines are in fact canals and there were built by Martians for the purpose of transporting water from the poles to what Lowell assumed were dry Martian plains.

1907 - Alfred Russell Wallace (a well known biologist), responded with a book of his own in which he argued that Mars is completely uninhabitable. Wallace measured the light coming from Mars and calculated that Mars has a surface temperature of minus 35 degrees Farenheit. Lowell's claim that there was liquid water must be wrong. He also concluded that the polar caps consisted of frozen carbon dioxide not water ice as Lowell and many others had assumed.

1909 - The scientific community has totally rejected Lowell's ideas of life on Mars, but Lowell is unfazed. By this point he has become well known and respected by the general public. He writes more books and gives public lectures.

1912 - Svante Arrhenius has an alternate suggestion for the Martian surface variation: Mars might be covered with salts, during the winter the salts have a light color. When the polar caps melt in summer, the salts absorb water and develop a darker color.

1938 - On the day before Halloween, Orson Wells produces a radio production of the fictional story "War of the Worlds." This is a story of Martians invading the earth. The production was so convincing, that many people believe there has been a real invasion by Martians. A panic resulted.

1947 - The Association of Lunar and Planetary Observers (ALPO) is formed. ALPO along with the BAA (which was founded in 1890) and other organizations coordinate several Mars observation programs. In such programs, amateur and/or professional astronomers from around the world pool resources. Over the next several years, these programs provide several extended periods of almost continuous observations (because you can observe Mars only at night, it is impossible for a single observer at a
single location to do this - but a group of observers can).

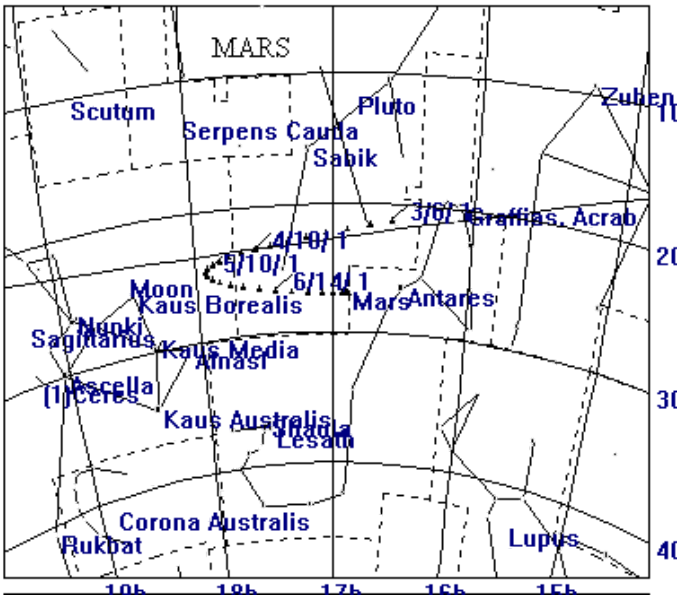
1952 - Gerard Kuiper makes the first attempt to determine the composition of the Martian atmosphere using modern equipment. He discovered spectral lines that indicated carbon dioxide. It had been assumed that the atmosphere was mainly nitrogen and argon (based on purely theoretical grounds), so carbon dioxide was assumed to be present only in trace amounts.

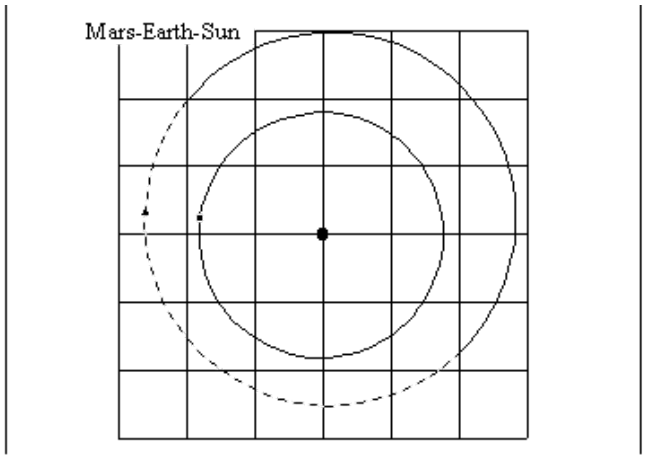
1954 - For several decades, researchers had attempted to measure the atmospheric pressure of Mars. Estimates vary over a wide range, from less than 24 millibars to well over 90 millibars (by comparison the earth's atmospheric pressure is about 1000 millibars).

(CONTINUED NEXT MONTH)

Mars -- Rise Time -- Transit -- Set Time

April 15	0h 10m	- - 4h 40m --	9h 10m
May 1	23h 21m	3h 51m	8h 17m
May 15	22h 31m	2h 58m	7h 21m
June 1	21h 17m	1h 40m	5h 58m
June 15	20h 6m	0h 26m	4h 41m
July 1	18h 44m	22h 57m	3h 15m
Aug 1	16h 37m	20h 51m	1h 7m





Mars at Opposition 6/13/2001

Credit: The Sky Program for the above charts, Mars rise time, transit and set times. extracted by BF

Comet Headlines

Credit: NASA, JPL, The Minor Planet Center (MPC) and the International Astronomical Union (IAU)

Last Updated: 10 April 2001

As reported on this page at the beginning of the month, C/2001 A2 (LINEAR) had an unexpected brightening from about 12.0 to 7.5 magnitude with the majority of the increase coming in a 36 hour period from March 29.5 UT to March 31.0 UT

Orbital elements are taken from MPC 42547:
C/2001 A2 (LINEAR)
Epoch 2001 May 11.0 TT = JDT 2452040.5
T 2001 May 24.5246 TT Nakano

q	0.779039	(2000.0)	P	Q
z	+0.000738	Peri. 295.3265	-0.4763363	+0.6952129
+/-	0.000016	Node 295.1270	-0.4246931	-0.7179962
e	0.999425	Incl. 36.4828	-0.7698958	-0.0340659

Ephemeris for A2

The following ephemeris is at intervals of five days. A daily ephemeris covering the same time interval is also available.

Date	TT	R. A. (2000)	Decl.	Delta	r	Elong.	Phase
2001 04 11		05 58.85	-09 33.0	0.911	1.128	72.1	57.7
2001 04 16		05 57.44	-11 04.5	0.891	1.066	68.2	60.9
2001 04 21		05 56.24	-12 41.9	0.866	1.007	64.6	64.4
2001 04 26		05 54.96	-14 25.8	0.835	0.951	61.4	68.2
2001 05 01		05 53.23	-16 16.3	0.798	0.901	58.5	72.5
2001 05 06		05 50.59	-18 12.7	0.756	0.857	55.9	77.1
2001 05 11		05 46.48	-20 12.7	0.709	0.822	53.7	82.2
2001 05 16		05 40.26	-22 12.6	0.657	0.796	51.9	87.6
2001 05 21		05 31.15	-24 06.2	0.601	0.782	50.5	93.1

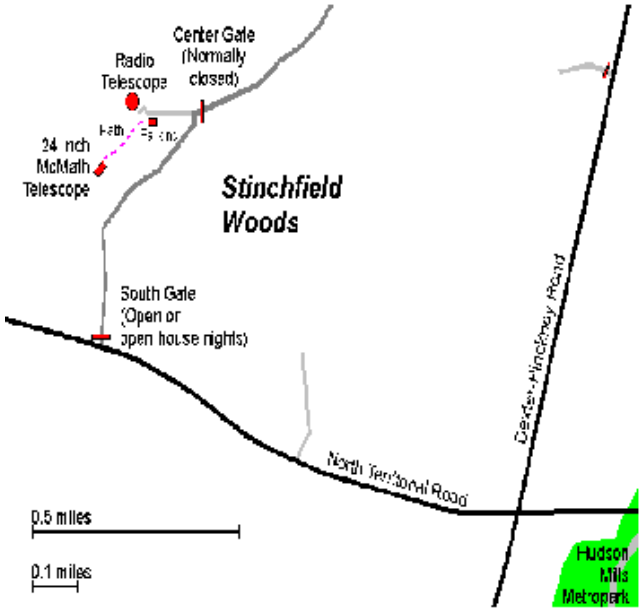
RA and Dec for comet McNaught-Hartley

4-11	18h	50.62m	65deg	37.6m	9.7 mag
4-16	18	54.33	67	32.0	
4-21	18	56.35	69	15.7	
4-26	18	56.5	70	49.1	10.3
5-1	18	54.6	72	12.4	
5-6	18	50.6	73	25.6	10.6

April 24,25,26 -- Kristina Nyland's presentation at Crestwood High, "A Journey Back to the Beginning of Our Universe, Our Galaxy, Our sun and Our Planet". 7:30pm, 1501 N. Beech Daly Rd. Dearborn Heights.
Telephone # 313-274-3711 to check the status of the event.

Places and Times:

Dennison Hall, also known as The University of Michigan's Physics and Astronomy building, is the site of the monthly meeting of the University Lowbrow Astronomers. It is found in Ann Arbor on Church Street about one block north of South University Avenue. The meeting is held in room 130. Monthly meetings of the Lowbrows are held on the 3rd Friday of each month at 7:30 PM. During the summer months, and when weather permits, a club observing session at Peach Mountain will follow the meeting.



Peach Mountain Observatory is the home of The University of Michigan's 25 meter radio telescope as well as the University's McMath 24 inch telescope which is maintained by the Lowbrows. The observatory is located northwest of Dexter. The entrance is on North Territorial Road, 1.1 miles west of Dexter-Pickney Road. A small maize-and-blue sign marks the gate. Follow the gravel road one mile to a parking area near the radio telescopes. Walk along the path between the two fenced in areas (about 300 feet) to reach the McMath telescope building.

Public Star Parties:

Public Open House/Star Parties are held on the Saturday before and after each new Moon at the Peach Mountain Observatory. Star Parties are canceled if the sky is cloudy at sunset or the temperature is below 10 degrees F. Call 480-4514 for a recorded message on the afternoon of a scheduled Star Party to check on the status. Many members bring their telescopes and visitors are welcome to do likewise. Peach Mountain is home to millions of hungry mosquitoes - bring insect repellent, and it does get cold at night so dress warmly!

Amateur Telescope Making Group meets monthly, with the location rotating among member's houses. See the calendar on the front cover page for the time and location of next meeting.

Membership:

Membership dues in the University Lowbrow Astronomers are $20 per year for individuals or families, and $12 per year for students and seniors (age 55/+). This entitles you to the monthly REFLECTIONS newsletter and the use of the 24" McMath telescope (after some training). Dues can be paid to the club treasurer Charlie Nielsen at the monthly meeting or by mail at this address:

6655 Jackson Road #415
Ann Arbor, MI 48103

Magazines:

Members of the University Lowbrow Astronomers can get a discount on these magazine subscriptions:

Sky and Telescope: $29.95 / year
Astronomy: $29.00 / year

For more information contact the club Treasurer. Members renewing subscriptions are reminded to send your renewal notice along with your check when applying through the club Treasurer. Make the check payable to "University Lowbrow Astronomers".

Newsletter Contributions:

Members and (non-members) are encouraged to write about any astronomy related topic of interest. Call or E-mail to Newsletter Editors at:

Bernard Friberg (743)761-1875 Bfriberg@aol.com
Chris Sarnecki (734)426-5772 chrisandi@home.net

to discuss length and format. Announcements and articles are due by the first Friday of each month.

Telephone Numbers:

President:	Mark Deprest	(734)662-5719
Vice Presidents:	Dave Snyder	(734)747-6537
	Paul Walkowski	(734)662-0145
	Doug Warshow	(734)998-1158
Treasurer:	Charlie Nielsen	(734)747-6585
Observatory Director:	Bernard Friberg	(734)761-1875
Newsletter Editors:	Chris Sarnecki	(734)426-5772
	Bernard Friberg	(734)761-1875
Parking Enforcement	Lorna Simmons	(734)525-5731
Keyholders:	Fred Schebor	(734)426-2363
	Mark Deprest	(734)662-5719

Lowbrow's Home Page:

http://www.astro.lsa.umich.edu/lowbrows.html
Dave Snyder, webmaster
http://www-personal.umich.edu/~dgs/lowbrows/

Monthly Meeting
April 20th, 7:30 pm

Room 130 Dennison Hall
Physics & Astronomy Building
The University of Michigan

This month's meeting:

CLUB ELECTIONS !
also
Phil McCausland, graduate student at the University of Western Ontario, member of Royal Astronomical Society of Canada, London Centre, presents

The Tagish Lake Meteorite.

You could win this telescope by offering to run for a position in your club's elections this month (but I doubt it). This 10 inch refracting telescope from Angell Hall was decommissioned in 1994. Photo: Chris Sarnecki

UNIVERSITY LOWBROW
ASTRONOMERS
3684 Middleton Drive
Ann Arbor, Michigan 48105

Lowbrow's WWW Home Page:
www.astro.lsa.umich.edu/lowbrows.html

Check your membership expiration date on the mailing label !