



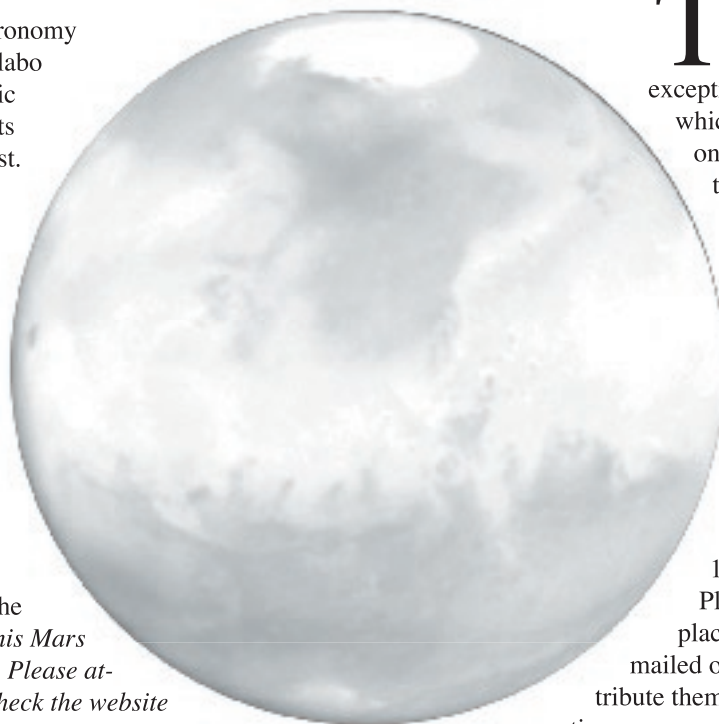
Capitol Skies

The newsletter of the Madison Astronomical Society

August/September 2003

Mars observing events planned

MAS and the UW Astronomy Department will collaborate to help the public observe Mars during the week of its upcoming opposition, 24-30 August. Weather permitting, Washburn Observatory will be open to the public each night that week from approximately 10 p.m. until midnight. MAS volunteers will set up their own telescopes on the grounds near the observatory to offer other viewing opportunities to the public. We hope to arrange to have some of the lights in the vicinity of Observatory Hill turned off during the observing hours. Logistics of the observing event will be discussed further at the August MAS meeting. *(Plans for this Mars observing event are still very fluid. Please attend the August MAS meeting or check the website*



The President's Desktop

by Neil Robinson

The June Picnic meeting saw the reelection of the current slate of club officers with the exception of the secretary's position, which is still open. We need someone to step forward and volunteer to serve as secretary for this year.

We may be collaborating with the UW Space Place on a Mars observing event, stay tuned for more info to come out soon.

I will begin taking orders for the Royal Astronomical Society of Canada's Observer's Handbook at the next monthly meeting. The price (assuming that I get at least 10 orders) will be \$15 per copy. Please pay by cash or check when placing the order. The books will be mailed out in November and I will distribute them at the November and December meetings.

Upcoming Events

August 8	MAS monthly meeting. 7:00 pm board meeting, 7:30 main presentation: TBA. Space Place, 1605 S. Park St..
August 12	Space Place Guest Speaker, Dr. Lawrence Krauss. 1605 S. Park St., 7:00 pm. See note this page.
August 28	Mars at opposition. Watch for news of observing events on the MAS website and at the August meeting.
September 12	MAS monthly meeting. 7:00 pm board meeting, 7:30 main presentation: TBA. Space Place, 1605 S. Park St..

Space Place to host Dr. Lawrence Krauss

by Jim Lattis

UW Space Place Guest Presentation: Tuesday, August 12th, 7 p.m., Prof. Lawrence Krauss will give a talk entitled "The Physics of Star Trek," which will build upon his best-selling book with the same title. Prof. Krauss is a well known science writer, physicist, and astronomer. The program is free and open to the public. This presentation is sponsored by the WINNERSS Project of the Office of Space Science Education, Space Science and Engineering Center, UW-Madison.

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Madison Astronomical Society members are active in sharing the pleasures of astronomy with the public, acting as a resource for students and teachers, and exchanging information at Society meetings which occur monthly. The Society continues to pursue its original goal to "promote the science of astronomy and to educate the public in the wonders of the universe." For more information about the Society, please contact one of the officers listed above.

MAS thanks

Internet Dynamics Corporation
for hosting our web presence.

Visit MAS on the web at:

www.madisonastro.org

Another Blast From the Past

by Eric W. Thiede

The Occultation of Epsilon Geminorum by Mars

April 8, 1976

At that time in my life (age 27) I was not following astronomical news or predictions as closely as previously or since, and it was only a fortunate event that called my attention to this. I am glad someone did, as the occultation of a star as bright as third magnitude by Mars has been estimated to occur only once in about four to five centuries!

On that fateful day I was working at my research specialist position in Dr. C. Kung's laboratory in Molecular Biology at the UW. In the late afternoon, I received an unexpected visit from a postdoc in another lab, who was also an amateur astronomer. When he told me what was to occur, my realization of total unpreparedness made me remark in despair "What am I supposed to do about it?" As it turned out, the sky (*mirabile dictu!*) was actually clear, so I finished my work and hastened the six miles to my rustic abode on the late Reggie Kilps' property at Lake Waubesa. The account from my journal follows (with more recent additions in brackets):

"At 6:55 PM [0:55 UT] today, I observed an occultation of Epsilon Geminorum by the planet Mars, with my 6-inch reflector in front of the house by the lake. As the sky was still fairly light, I did not have an easy time finding the planet, but was fortunate enough to have it in the field about 30 sec. before the star was occulted. About 2 or so [in actuality about 5] minutes later it reappeared. I had never before seen such a demonstration of the rapidity of planetary motion. I had hoped to time the events, but my decrepitated [sic] shortwave radio failed to get WWV reliably. I was impressed by the fact that the disappearance and reappearance were only slightly less instantaneous than in the countless [at least many, to be sure] lunar occultations I observed several years ago. It was sort of fun dragging out the old telescope again, and it brought back memories of Wynn [Wacker] and I in more carefree days."

For those interested in more information on this event, there are four references in *Sky and Telescope*:

March 1976 p.162

July 1976 p.23

June 1976 p.434

August 1976 p.147

We should have all of these in our collection at YRS.

Log Books from Oscar Mayer Observatory Sought

Wynn Wacker and Eric Thiede are trying to find out if anyone in the MAS knows the whereabouts of the old observatory log books from the old Oscar Mayer Observatory in Fitchburg.

We made a bit of a search at YRS during the picnic but couldn't find them out there. These could be of historical interest (not to mention entertainment value) if they could be found. It's also possible that they may still be at OMO, in which case it would also help to know who to get ahold of to get in there and have a look.

LeRoy Yanna's contributions recognized at June meeting

by Mary Ellestad

During our meeting and picnic at YRS in June, the Madison Astronomical Society was very pleased to present LeRoy Yanna with a plaque which he got to keep for all of a few hours. It was then installed in a place of honor in our clubhouse. Hopefully the inscription conveys our sincere appreciation for his donation of land to MAS and for his many years of being a member and our very good neighbor. After the meeting we all did a great job consuming a bunch of brats and burgers. The food that everyone brought was especially tasty this year. We then presented LeRoy with a special cake and that didn't last long either!

Here is just a bit of history regarding LeRoy's gift. In the early 1980's the Madison Astronomical Society was using an observing site in Fitchburg. When that site was no longer available, MAS began a search for other land to purchase for our observing site. LeRoy had been a member in the past and was approached regarding selling us some of his land. He agreed and the MAS Board prepared a proposal to purchase for approval at the next meeting. However, at that meeting, LeRoy rejoined MAS and offered to donate the land instead of selling it to us. The inscription on LeRoy's plaque is reproduced here:



LeRoy J. Yanna

In 1984, after 50 years of building telescopes and enjoying astronomy, LeRoy J. Yanna donated a parcel of his land to the Madison Astronomical Society. This generous gift became the foundation for his namesake, the Yanna Research Station, and remains the largest portion of our land. For nearly 20 years, MAS members have been inspired by the wonders of the night sky and the vast universe above YRS. LeRoy is now a lifetime member and the MAS is honored to acknowledge his contribution to our society and to many more years of amateur astronomy at Yanna Research Station. June 14th, 2003.

Bringing Astronomy to the Visually Impaired: A Trip to the Yerkes Observatory

by Matt Mills

The difference between a sighted person and a blind person is very small when one considers the electromagnetic spectrum. We are all blind in radio waves, microwaves, infrared radiation, ultraviolet radiation, x-rays, and gamma rays. A blind person is blind to a tiny region of the electromagnetic spectrum called visible light.

I was invited by Kathy Arndt, Acting Principal, for the Wisconsin Center for the Blind and Visually Impaired (WCBVI) in Janesville, Wisconsin to act as a sighted guide for the students' field trip to Yerkes Observatory in Williams Bay, Wisconsin on June 12th, 2003. The field trip was part of the Space Exploration Experience Project for the Blind and Visually Impaired, a collaboration involving Yerkes, DePaul University and WCBVI. The program is funded by a grant through NASA.

The students were a group of four sixth-graders who had just studied astronomy in teacher Kelly Bailey's class and three high-school students with an interest in astronomy. The group included sixth-graders Angelica Hope, Paul Kowald, Tauri Ramsey and Kris White; junior Grace King; and seniors Chelsea Reilly and Jessica Raichle.

We were met by Vivian Hoette, Education Outreach Coordinator who welcomed us into the observatory's rotunda along with Dr. Kyle Cudworth, Yerkes Observatory Director, Jim Gee, Observatory Manager, and Professor Bernhard Beck-Winchatz from the DePaul University. In addition, a large contingency from the Williams Bay Lion's Club was at hand to present a Swellform Graphics Machine to the observatory.

The Swellform Graphics Machine is able to produce raised images from astronomical pictures along with Braille text for visually impaired students to read. The printer creates a black and white image on special Swellform paper and raises the dark portion up like Braille.



Visually impaired students "see" the famous 40" refractor at Yerkes.

This was to be the Lions Club's "Kickoff Day" and the Yerkes' staff accepted the printer donation from club president, Rick Pfenning. The Lions Club purchased the printer for \$1,000, along with \$75 worth of the special Swellform paper—about 100 sheets. Vivian Hoette and her husband, Chuck, a Lions Club director, were instrumental in bringing the whole project to fruition.

Professor Bernhard Beck-Winchatz developed the concept to use the printer's capabilities in astronomy for the blind. Beck-Winchatz's other major educational program is Hands-On Universe (HOU) is an educational program that enables students to investigate the Universe while applying tools and concepts from science, math, and technology. Using the Internet, HOU participants around the world request observations from an automated telescope, download images from a large image archive, and analyze them with the aid of user-friendly image processing software. His two year program was funded by both NASA and the National Science Foundation (NSF).

After the presentation, the students negotiated their way to the famous 40" refractor to participate in raising the dome's floor, a hands on demonstration of the sidereal tracking of the telescope and to actually move by hand the six ton telescope.

Next we moved onto the observatory roof to see the two Meade telescopes equipped with CCD cameras for remote observations which the students will be using in future classes from school. Then we were on to the last telescope, the 24" reflector. Students took turns rotating the new Ash dome and moving the telescope around.

We made our way back into the building to participate in the Stratospheric Observatory for Infrared Astronomy (SOFIA) outreach activities which included a lecture by Dr. Al Harper and activities for the students. Each student built their own light detector. The student-made squealers are detectors allowing them to detect (hear!) both visible light using a flashlight and invisible light using a TV remote control. The students connected

a solar cell to an amplifier/speaker and experimented with different light sources.

When Professor Beck-Winchatz and Vivian Hoette brought out the tactile images created on the new machine a distinct change came over the students. I heard "Hey I'm looking at this!" and "Sweet, it has Braille too". Reilly, 19, of Edgerton, Wisconsin, said she's interested in studying astronomy next year at Carthage College. "I like the telescopes," Reilly said. She said she was also excited

about the images produced by the Swell-form printer. "It's neat to look at a galaxy you can feel," Reilly said.

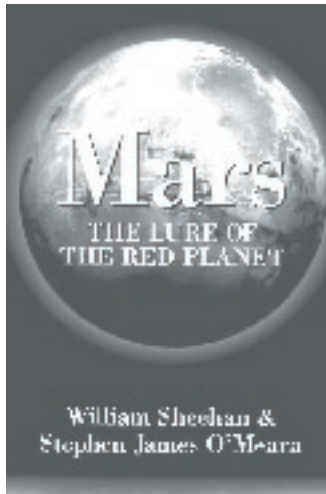
For professor Beck-Winchatz, a modest caring individual, it had to be one of the finest moments in his life. "Many people believe that it (astronomy) is a visual science. They think of an astronomer as someone who looks through a telescope, and takes notes on what he or she observes in the sky. This may have been the way Galileo conducted his observa-

tions almost 400 years ago, but modern astronomy is very different. Astronomers (today) use their eyes to read numbers, words and sometimes graphs on the computer screen, but never as scientific instrument to make measurements. There is nothing a blind person could not do as well," said professor Bernhard Beck-Winchatz.

Books: Mars in fiction and fact

by John Rummel

There have been literally hundreds of books written about Mars. I've read many of them over the years and just this past spring and summer, was lucky enough to come across some new ones - and some favorite old ones. Here is a very limited selection of some good Mars books. If you or your friends and family are motivated by Mars' excellent opposition to do some reading, here are a few jumping-off points.



Mars: A History... is a wonderful historical survey of mankind's attempts to unveil the secrets of the fourth planet. Written before the "modern" age of Pathfinder and Global Surveyor, it presents an enjoyable narrative filled to the brim with Sheehan's impeccable research and prose.

The Lure of the Red Planet (2001) is largely an updated edition of the first work, with the addi-

tion of Stephan O'Meara as a coauthor. Either is highly recommended though you may not want to purchase both.

Smithsonian Book of Mars by Joseph M. Boyce

The most technical book of the bunch, Boyce reviews the current state of knowledge (his book was written before Odyssey's arrival), with focus on Martian geology, atmosphere and climate. It's a good read, but the level of science assumed is clearly higher here than any of the other reviewed books.

The planet Mars : A History of Observation & Discovery by William Sheehan

Mars: The Lure of the Red Planet by William Sheehan and Stephan James O'Meara

Bill Sheehan remains one of my favorite authors. His 1996 *The Planet*

Mapping Mars by Oliver Morton

Morton's *Mapping Mars* was the most enjoyable read of this bunch, which is saying quite a bit given his competition. It's difficult to describe how wide-ranging this account is. He provides a decent historical sketch of the efforts to understand Mars, with special attention to the process of mapping and understanding its surface features. Interspersed throughout are bios of the principle scientists

and observers. He also devotes several sections to the politics of putting people on Mars, describing in detail the vagaries of NASA policy, and independent efforts to arouse interest in exploring the red planet. Also vivid are his behind the scenes accounts of the unmanned exploration of Mars, from the Mariners through Viking, up to the current era of Pathfinder/Global Surveyor/Odyssey, and the upcoming landers. Finally, Morton includes something you don't see often in popular science accounts of planetary science: a detailed survey of the fiction associated with Mars exploration. This material is scattered throughout the book, but Morton weaves it right in with the text, and it added considerably to the story.

If you're motivated by Mars' historic opposition this summer but only have time to read one book, Morton's *Mapping Mars* is my recommendation.

Fiction

Mars Crossing by Geoffrey Landis

NASA engineer Landis' first novel (his short fiction has won him several prizes) is a beauty. The third crew to reach Mars - the first two had no survivors - face a stiff test. Their own return ship is badly damaged and they must cross over 3000 miles of hostile terrain to reach the site of one of the previous landings, where a still-intact ship will ensure



Madison's Eclipse Drought

by John Rummel

Solar eclipses, one of nature's rarest and most sought after observational prizes, are finicky and fickle things. A solar eclipse of some type happens about twice every year, yet over 99% of the humans alive today have never seen totality and never will.

The unique geometry of a solar eclipse requires that the moon's shadow cross only a narrow band Earth's surface during an eclipse. At its absolute widest, the path of an eclipse can never be more than 170 miles wide. Since over 70% of the Earth's surface is water, odds are the path of totality is over open ocean. When it does fall on land, odds are it's some remote, hostile, God-forsaken patch of Earth that is sparsely inhabited and difficult to reach. Veteran eclipse chasers are undaunted however. Modern "umbraphiles" spend thousands of dollars and travel thousands of miles to get themselves under a few minutes of lunar shadow every few years.

Twice over the last two years, the shadow of totality passed over southern Africa. A narrow strip of civil war torn Angola actually got to see both events - just 18 months apart. As I ruminated about this dual African event, I wondered: when can us Madisonians next see an eclipse without leaving home? When is the next time totality will darken Dane County? A solar eclipse (partial, annular or total) happens on average twice each year somewhere in the world. When will Madison's number come up?

Conventional astronomical wisdom holds that any given spot on the globe will see totality, on average, about once in 360 years. This number comes from the excellent astronomy textbook by Russell, Dugan, and Stewart (vol. I, page 227). Owen Gingerich elaborates on their reasoning on page 209 of his excellent compilation *The Great Copernicus Chase*, and concludes, through much hedging owing to the Earth-sun-moon geometry, that the actual average is between 224 years and 427 years, depending on

whether one is talking about annular or total eclipses (annular eclipses occur on average a bit more frequently), and the latitude and hemisphere (north or south) of the location, which also affects frequency.

So I spent a few hours at my computer over several days, surfing the major eclipse web sites, and using some astronomy software simulators to search for candidate eclipses that would be visible from Madison. As with any such trek down trivia lane, I found some interesting facts, and a few astounding ones. I'm reasonably certain about the conclusions presented here, but as always, I welcome any informed critique, particularly if anyone knows of any previous attempts to pin down total eclipses visible from southern Wisconsin.

Let's start our journey first by reviewing the 20th century. In May 1994, a central annular eclipse crossed central Illinois and northern Indiana. The northern edge of the path was just south of Chicago, missing Madison by a good 150 miles. Back in 1954, a total solar eclipse crossed the twin cities in Minnesota, and passed through northwest Wisconsin. Another miss for Madison. January 24th, 1925, the path of totality grazed the northern tier of Wisconsin. This would have been a wondrous sight. Eclipse gazers in northeast portion of our state would have been treated to the trio of Mercury, Venus, and Jupiter rising just before sunrise, and then the deeply eclipsed sun rising just minutes before totality. This event is more commonly known as the "New York City Winter Eclipse," because the path of totality went on to cross directly over much of Manhattan, Long Island, and Connecticut. Unfortunately, eclipse gazers in northern Wisconsin (and throughout the midwest) were completely clouded out that morning. Nobody saw a thing.

The 21st century is more promising. On August 17, 2017, a total eclipse will cross the United States from coast to coast. The path crosses southern Illinois

- I'll be generous and call that a near miss for Madison. Seven years later, on April 8, 2024, totality again hits the midwest, cutting a path up through southern Illinois, Indiana, northwest Ohio, and New York). Just 21 years later, on August 12, 2045, yet another total eclipse path cuts across the US, passing through Oklahoma, Arkansas, Missouri, and Alabama. Three total eclipses, three misses for Madison.

Finally, a hit - sort of. On June 11, 2048, a central annular eclipse passes directly over Madison. It's not totality, but an annular is better than nothing.

Several other near misses round out the latter half of the 21st century, but Madison finally hits pay dirt on September 14, 2099, when a central total eclipse crosses directly over the southern badger state (see figure 1). Madison will be treated to just over 3 minutes of totality. Mark your calendars.

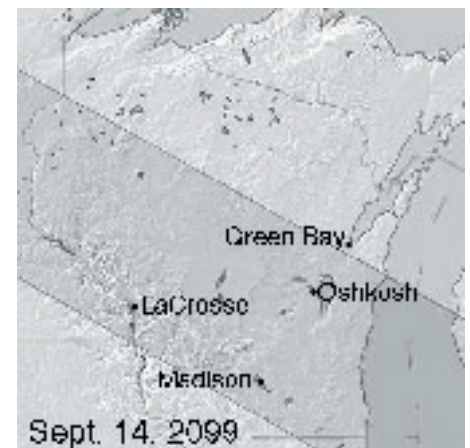


Figure 1: Path of the September 14, 2099 total solar eclipse across the state of Wisconsin. Lunar shadow crosses from west to east (left to right).

So Madisonians, born and not-yet-born, will have to wait 96 years for the next eclipse show on our home turf. To find out how long our current drought is though, we need to know when the last total eclipse was in Madison. Starting in the 19th century and working backwards,

here's what we find:

On August 7, 1869, an eclipse crossed central Iowa, missing Wisconsin by just a few dozen miles. In September of 1838, an annular eclipse path missed Madison by about 50 miles, with the edge of the path crossing near West Allis. On September 17, 1811, an annular eclipse's path just barely grazed Madison, Appleton was near the centerline of this event. Prior to that event, we have to travel way back in time, to pre-settler days. In April of 1558, the edge of the path of totality missed the isthmus area that would become Madison three centuries later by just 70 miles. In June of 1451, another near miss to the east, with the path of totality crossing northeastern Wisconsin and Michigan.

The last time a total solar eclipse was visible in (pre) Madison was May 16, 1379. That makes our "drought period" 720 years long, a bit above the global average!

While looking at list after list of eclipse events, I found one circumstance that might be of interest to local eclipse enthusiasts. Though it lies more than 20 generations in the future, I can't resist sketching out what might be southern Wisconsin's most incredible bunching of eclipses ever.

The show gets started with a total eclipse passing over Madison on June 17,

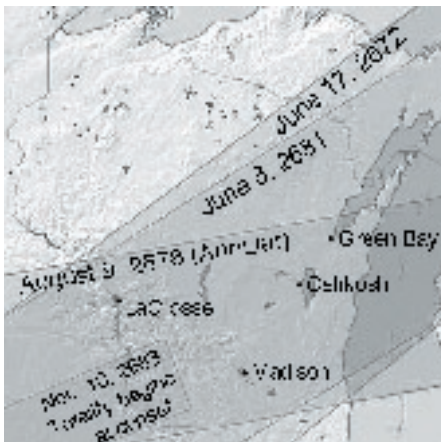


Figure 2: Four eclipse paths plotted over southern Wisconsin in the 27th century. Technically, only extreme southwest Wisconsin catches all four, but the proximity to Madison and the bunching in time were irresistible. In each case, the lunar shadow crosses from west to east (left to right).

2672 (see figure 2). Six years later on August 9, 2678, an annular eclipse follows suit. Then, on June 8, 2681, another total eclipse, followed by a marginal call on November 10 2683. In this last event, the umbra reaches southern Wisconsin just as the sun sets over Madison, and it's debatable whether totality will be visible in Madison at all before the sun disappears below the horizon. Maybe Madison will have some skyscrapers by then that will allow future citizens to watch the show from the 50th floor, who knows? At any rate, all one has to do that day to ensure seeing totality is to travel down to Prairie Du Chein. The sunset from Madison that evening would be most unusual - the deeply eclipsed sun will drop toward the horizon, and just as it dips below and totality begins, the sky will darken dramatically for just over a minute, and then will suddenly brighten again as totality - now below the horizon - ends.

Such three-fold repetitions of eclipses in one geographical area are not unheard of. In the April 2000 issue of *Sky and Telescope*, veteran eclipse calculator Jean Meeus writes of other occasions where one lucky geographic location is treated to 3, 4, or even 5 eclipses in a short span of time. Madison's 27th century event didn't make Meeus's cut because his list is made up of ten even more dramatic bunchings, all of which are under 8 years. However, only one of Meeus's top ten occurred over land.

Eclipses are wonderful and compelling events. Simulations and theoretical meanderings such as this article give a flavor for the wonderful rarity of this phenomenon and may encourage the reader to travel a bit for the opportunity to experience the shadow.

In preparing this article, I made heavy use of three excellent software programs: Voyager II to find suitable eclipse candidates; Shinobu Takesako's excellent free Windows program, Emapwin to plot the shadow paths, and Starry Night Pro to simulate the local circumstances in Madison and other locations.

Mars books, cont.

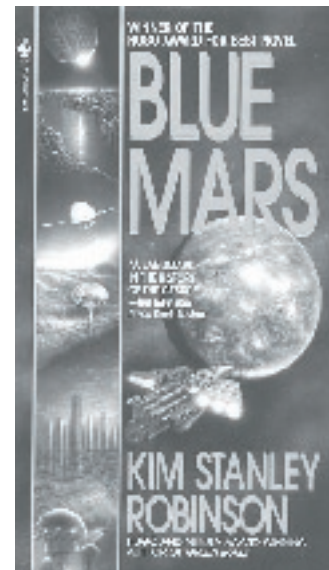
their ability to return to Earth. Landis' account of Martian geography and geology is compelling and really makes Mars feel like place. The characters are also very well developed as he describes their failings and triumphs. A must read for any SF fan and Marsophile.

Mars by Ben Bova

An outstanding novel recounting the first human expedition to Mars, the search for life, and the mystery and science of exploring a new planet. Bova's story contains several excellent plot twists and conveys the frustration of trying to explore such a large planet when limited by time and resources. Highly recommended.

Red Mars, Green Mars, and Blue Mars by Kim Stanley Robinson

Robinson's epic trilogy is larger than life. Scientifically rigorous (as all of these novels) Robinson's series covers the first



explorers and colonization of the fourth planet, and the subsequent efforts to "terraform" the planet, or modify its atmosphere to render it habitable to humans and plant life. A central to the story as the science is the politics of terraforming. Opposite views on the subject polarize into enemy camps

as "Red Marsers" who want to preserve the Mars they find and the "Green Marsers" who want to transform it. Robinson portrays both groups realistically and sympathetically, though the titles of the books give away the final outcome.



Capitol Skies
2810 Mason Street
Madison, WI 53705

First Class

MAS would like to thank:

PRINT-TECH

*and Tim Stanton for printing
the newsletter and*

IDC

for hosting our web presence

This resource list is made up of people who have special interests which they are willing, even eager, to share with others in the Society. Many members, not listed, also are interested in particular aspects of astronomy and have considerable expertise in viewing and imaging the skies. Members are encouraged to come to the monthly meetings, not only to get to know the other members, but to discuss and enjoy their special or general interests in various aspects of astronomy. This is a Society of beginners and experienced amateurs. From time to time we have seasoned professionals attending. The meetings are a good

Resource People and Special Interests

- Newsletter Editor: desperately seeking one
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- Photo Editor: Tim Ellestad 233-3305
(ellestad@mailbag.com)
- Webmaster: Dan Strome 241-3775
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- Variable Stars: Dave Weier 241-1444
(daveweier@att.net)
- CCD Imaging: Dick Greiner 233-6882
(ragreiner@mailbag.com)
- Jupiter Observations: Wynn Wacker 274-1829
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- Deep Sky Observing: Tom Brissette 833-4225 (tom.brissette@midplains.net)
- Minor Planet Search: Greg Sellek 848-6301
(orion98@charter.net)

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