

The OBSERVER

The Newsletter of the Twin City Amateur Astronomers, Inc.

September 2003 Volume 28, Number 9



Wildly Successful Observing Sessions – Carl Wenning

In This Issue:

- **Wildly Successful OSs** 1
What a month! And Carl was there to write about it!
- **TCAA Calendar** 1
Use our calendar to mark your calendar.
- **Where in the Universe?** 3
Feeling lost? Learn how to find yourself at our next meeting.
- **Reflections on an LX-200** 4
Carl's first impressions of the SGO's LX-200 12".
- **YAOS** 5
Yet another observing session, this one in Decatur.
- **TCAA Meeting Minutes** 5
- **Mars: The Water Trail** 6
Thirsty? Here's where to find H2O on Mars.
- **Treasurer's Report** 9
- **TCAA Crossword** 10
Pencil? Wits? Go!
- **Welcome Mat** 12

THREE RECENT TCAA observing sessions have been wildly successful. On Friday, August 22, eighteen

TCAA members and guests attended the observatory open house at Milliken University in Decatur. Attendees viewed through both a portable 10-inch reflector and the observatory's 20-inch reflector stationed five and six storeys above ground level respectively. Both systems are "go to" telescopes, and gave members a better understanding of the effectiveness (and tribulations!) of using automated telescopes. Even the 10-inch telescope working under the light polluted skies of Decatur was able to showcase a good number of M-objects that otherwise would have



An observing session in progress. Not ours, of course, because no-one ever remembers the camera :-0

been difficult, if not impossible, to find using traditional star-hopping methods. Thanks to Michael Rogers and Dan Miller

for hosting this session.

On Saturday, August 23, some 50 amateur astronomers from around central Illinois met at the Mackinaw Valley Winery just east of Mackinaw to have a joint "members only" star party. The party was arranged by Rich Thoennes

from the Peoria Astronomical Society, and co-hosted by both the TCAA and the PAS. Observers came from as far away as Springfield's Sangamon Astronomical Society. Though no official head
continued on page 2

Where in the Universe??

Details, p. 3

TCAA Calendar

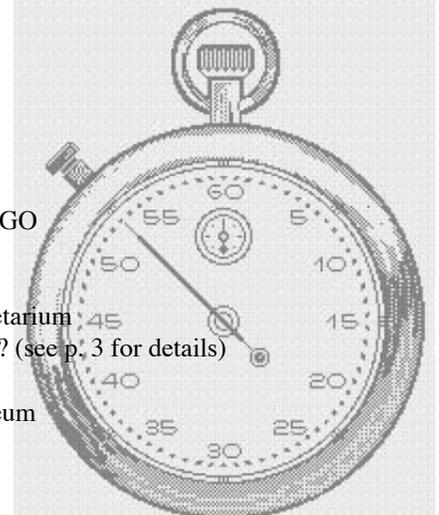
Saturday, 20 September, 2003, Dusk, SGO
Members-Only Observing Session.

Monday, 22 September, 2003
Autumnal Equinox

Saturday, 27 September, 2003, 7:30-9:30 PM, SGO
Public Observing Session.

Monday, 13 October, 2003, 7:00 PM, ISU Planetarium
TCAA Meeting. Topic: Where in the Universe? (see p. 3 for details)

Friday, 17 October, 2003, Prairie Aviation Museum
Public Observing Session (Details TBA)



The Observer

The Newsletter of the TCAA, Inc.

The Observer is a monthly publication of the Twin City Amateur Astronomers, Inc., a non-profit organization of amateur astronomers interested in studying astronomy and sharing their hobby with the public.

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\$40.00 per household, per year
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continued from p. 1

count was taken of the number of TCAA attendees, the number was in excess of one dozen. The night sky was clear, but sky glow from both the Twin Cities and Peoria was readily discernable from the viewing site. Nonetheless, many celestial objects were observed; the observing session continued well past midnight for most of those who attended the session.

On Saturday, August 30, the TCAA presented a special Mars Watch at Sugar Grove Nature Center. There was an observatory open house and three Mars-related talks in the picnic shelter. The evening began with a 15-minute "filler" program presented by Rebecca Wenning who spoke about the Challenger Learning Center while attendees gathered. At 8:30 p.m. Dan Meyer introduced the three speakers for the evening. Sandy McNamara gave a 25-minute orientation to Mars by talking about its history up through the time of the Viking landings in 1976. Carl Wenning, using the Voyager simulation software, then spoke for 35 minutes to describe why this particular opposition of Mars was so significant. Tom Willmitch then brought everyone up-to-date by providing a 45-minute slide show dealing with what we know about Mars today, and how water has played a significant role in the formation of Martian features.

Following these presentations and a series of questions and answers, the general public took tours of the SGO in groups of 10. Observatory tours were coordinated by Mike Rogers, Dan Miller, and Rebecca Wenning. Others visited the Sugar Grove Nature Center where Jean Memken and Anne Lehmkuhl supervised a desk with TCAA brochures, a donation box, copies of *Astronomy* magazine, and other free publications. Bill Carney and Carl Christ set out reflecting and refracting telescopes for examination. Four members of the SGNO Board of Directors arranged "hay rack rides" and managed parking. The public was directed to park in the large

field to the south of the SGO. They were then transported to the SGNC picnic shelter on trailers outfitted with bales of hay. New TCAA member Benjamin (?) assisted with directing foot traffic all evening. All these contributed to the enjoyment of the evening, and assured continuous dark and safe conditions at the assembly site.

The Mars watch event was sponsored in part by the ISU Planetarium. Tom Willmitch coordinated much of the publicity for the event, and provided copies of *Astronomy* magazine and other handouts that he had obtained from Kalmbach Publishing. Tom arranged for a press release about Mars Watch and the opposition through the ISU News Service. This resulted in a large feature article in the Pantagraph on Sunday, August 24th. The article took up nearly all of page E4, and featured three large color pictures. Michael Rogers and Dan Miller were shown working the association's "go to" telescope at the SGO, Dan viewing the sun, and a Hubble shot of Mars. The text of the article featured an interview with Mike, Dan, and TCAA president Dan Meyer. The story overflowed onto the back page of the section, filling the upper 1/3 of the page and included a large orbital graphic.

On Tuesday, August 26th the comments of Tom Willmitch and Carl Wenning filled a section of the ISU newspaper, The Vidette. Tom also spent some 30 minutes speaking on WGLT radio on about the Mars opposition on opposition date Wednesday, August 27th. All this resulted in a strong outpouring of public interest that culminated in anywhere from 250 to 300+ members of the general public being present at the SGNC Mars Watch program. A follow-up article was printed in the Pantagraph the day following. Thanks and "a tip of the hat" to all TCAA members who made these events successful.

CELESTIAL SPHERE, RIGHT ASCENSION (in hours), AND DECLINATION (in deg. + or -)

Celestial meridian of star
R.A.=20 hours
Dec.=+45 deg.

Right Ascension

Right



Hour Angle

V
e
r
n
a
l
E
q
u
i
n
o
x

Declination of Sun on June 21 is +23.5 deg



Declination of Sun on December 21

Celestial ecliptic

Sun on March 21 First point of Ar

Where In the Universe?

Are you confused yet? Don't have a clue as to what any of these key astronomical terms mean? Fear not, help is as close as the next TCAA Public Meeting!

A Beginner's Session — repeat, Beginner's Session — will teach you everything that you need to know about that most fundamental of concepts: how to describe the location of objects in the night sky. We assume no prior knowledge of anything, not even how to find the ISU Planetarium (on the ISU campus, near the Alamo II Bookstore, due West of Julian Hall, due North of Hovey hall, look for the big dome).

What: TCAA Public Meeting
Where: ISU Planetarium
When: 13 October, 2003, 7:00 PM



Azimuth?

Declination?

Celestial Sphere
Circle (cuts celest
al p... analogous to a mer
eat circles that intersect at
March 21 is called the First
prime meridian, analogous
ne celestial sphere is RIGHT
is marked as ONE HOUR OF R
As the Earth rotates toward the east, the celestial
east to west. This motion brings successive hours

Reflections on the SGO Telescope

— Carl J. Wenning

ON SATURDAY evening, September 6, I had my first chance to do some serious observing with the TCAA's 12-inch, LX200 telescope at the Sugar Grove Nature Center observatory. That evening Sandy McNamara had graciously consented to help me complete my "check out" so that I might obtain key holder status. Also in attendance that evening were Tom Willmitch, Shaukat Goderya and his son Mudrekh, Dr. and Mrs. Dale Birkenholtz, and four members of the general public showed up in the hope that someone might be observing Mars. Arriving later were Jim, Susan, and Stephanie Baker. We all had an opportunity to take advantage of a very transparent sky. Unfortunately, the moon, a 12-day-old gibbous and 92% full, brightly illuminated the southern sky. Having had this opportunity to conduct a "sky tour," I find that this to be an opportune time to provide some reflections on the SGO telescope.

First, let me say how impressed I was by the automated "go to" ability of the telescope. After learning about the operating system from Sandy and aligning the telescope on Arcturus and the rather "obscure" star α Cassiopeiae, I began to move the telescope across the sky with great ease. In about 90 minutes, we were able to view the following solar system: Mars, Moon, Uranus, Neptune, and possibly Pluto. The following Messier Objects were also observed: 31, 32, 110, 17, 20, 6, 7, 4, 13, 92, 15, 27, 11, 51, and several others. Additional objects included h and χ Perseii, and the binary star systems Albireo and ϵ Lyrae. I was quite impressed at the ease of use of the automation system, and even more impressed by the very accurate and consistently good pointing ability of the telescope. Everything that we choose to observe came immediately into view in the main telescope eyepiece.

Second, let me give my impression of the 12-inch Meade optics. For deep sky objects the images were fine. When viewing dim objects the observer is more forgiving because any lack of ability to bring an image into sharp focus is not readily discernable. Unfortunately, the telescope didn't produce all that clear of images planets that evening. Mars, for instance, was somewhat nebulous, even when great

care was taken to assure the best focus. Jim had set up the club's 10-inch



reflector

outside the SGO

providing an image of Mars that just blew away the image produced by the 12-inch. The image in the 12-inch showed none of the extremely sharp detail visible through the 10-inch. In fact, I have to admit that the 10-inch showed the very best images of Mars I have ever seen. Perhaps the 12-

inch didn't perform as well as the 10-inch due to thermal currents exiting the dome, a warm telescope, the low elevation of Mars, and/or poor-performing eyepieces. Before I can make a better judgment of the quality of the 12-inch optics, I really do need to spend more time with them. Does anyone else have a similar concern, or did I just have a "bad" night?

Third, the mount of the 12-inch is admittedly wobbly. After viewing through the telescope I noted the high frequency of vibrations that supposedly are related to the tall concrete pier upon which it rests. The discussion about fixing the wobble in the main pier has gone on for quite a while, but I feel now that one very important fact has been overlooked and didn't become clear to me until I had an opportunity to do some real observing with the telescope. The frequency of the vibration is probably too high to be accounted for by the concrete post. A long, high-mass post should oscillate at a much lower frequency than what I experienced. We might be overlooking the main source of the vibration as I see it. *The high rate of oscillation inherent in the telescope is possibly due in large part to the metal platform between the telescope and the concrete pier.* Above the concrete post is built a support consisting of four thin pieces of metal angle iron. Perhaps most of the wobble can be attributed to this unit. If it is, the motion can be readily damped with the use of cross braces – eight crisscrossed cables with turnbuckles on each. This would stiffen the top support greatly, and could help to suppress some if not the majority of the wobbling inherent in the telescope mount.

In conclusion, with the Meade's ease of use and great ability to find things in the sky, TCAAer's should spend time observing at the SGO under clear sky conditions, regardless of the phase of the moon. Without any doubt, I'll be spending more time at the SGNC than ever before. I hope other TCAAer's will consider doing the same.

YAOS (Yet Another Observing Session!)

— Michael P. Rogers

ON FRIDAY AND SATURDAY nights — on the 5th and 6th of September, 2003, for those of you who like to be precise — high atop the wind-swept roof of the Requarth Observatory, at Millikin University in Decatur, Dan Miller, yours truly, and a supporting cast of perhaps a dozen spent over 6 hours showing off the observatory facility to more than 400 Decaturians, eager to catch a glimpse of Mars.

This was, by far, the most organized public observing session I have ever had the pleasure to attend. It really had to be, because the Millikin administration, while keen to show off the observatory and perform public outreach, did not want large numbers of the public wandering aimlessly and unescorted through the halls of the Leighty Tabor Science Building.

As we think about why we might want to use the ISU Planetarium to help promote TCAA observing sessions, our experiences at Millikin may prove instructive.

First, we worked with 2 women at Alumni and Development, Peg Luy and Jan Devore, who wield organizers in the same way that Michaelangelo wielded a brush. I do not recall who suggested the idea, but it was decided that rather than let people just show up, they would need to RSVP, and be assigned an entrance time on the half hour — 9:00, 9:30, etc.

While this might be awkward for us to manage, Alumni and Development could delegate the task to a secretary.

Dan had the brilliant idea of setting up extra telescopes, so that we wouldn't have one huge queue waiting for the Parallax Instruments 20". For those of you who attended our tour of the Requarth Observatory earlier, you may recall that in addition to the monster telescope, piers on the roof could handle the Physics Department's LX-200's. We chose a number of interesting objects — M39, M13, Albireo,

Mizar/Alcor, the Moon, and created a brief script for each "telescope guardian" to read. Most of our help knew little about astronomy or telescopes, but thanks to the wonders of the LX-200, the objects stayed squarely in the eyepiece for the whole 3 hours, except for one incident somebody accidentally pulled out the cord :-)

Dan also dug up a video camera, and projected a huge image of the moon on the side of the observatory, for people to contemplate.

The observing sessions themselves were a huge success. The Alumni and Development people kept us, more or less, on schedule, with groups switching from telescope to telescope after 5 minutes. Dan spent all of his time outside — lucky guy! — while I ended up spending most of my time inside the dome, making sure that our visitors didn't break their necks as they ascended the ladder towards the eyepiece.

As you might expect, the view of Mars as we began, at 9 PM, was embarrassing. It was low in the sky, the telescope took a long time to cool, and really it was very difficult to make out any detail at all. By about 10 PM, the seeing started to improve — now you see it, now you don't was the rule. By 10:30, it started to look really crisp, and by 11 PM, it was absolutely splendid. We had a 17 mm eyepiece, and definitely could have used something smaller!

The time of night did not matter to the attendees, however. For many of them, it was their first time looking through a telescope, and certainly their first time atop the Leighty Tabor Science Building, and everyone seemed to have a thoroughly enjoyable time, and praised us over and over again for our efforts. Nobody actually *paid* us, but still...

A reprise is scheduled for the 19th and 20th of September. The sessions are supposedly filled, but you might want to con-

tact the Alumni and Development office at Millikin if you'd like to go. Otherwise, think of us at the MOOS on the 20th, where you will undoubtedly be enjoying better skies (assuming that it isn't raining, of course!).

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Minutes of TCAA Meeting 9/08/03

— Carl Wenning

The group met in Moulton Hall room 309. Twenty were in attendance, including 6 members and 14 guests. The meeting was called to order by President Dan Meyer at 7:00 p.m. This was immediately followed with a 55-minute presentation by Rebecca Wenning. Her presentation was titled "Mayan Astronomy." Rebecca presented a PowerPoint program that included information about the Mayan culture, including building construction, mathematics, iconography, calendar keeping, astronomical observations and record keeping. Her PowerPoint presentation included lots of images, and a movie clip. She periodically shifted back and forth with the program "Maya Quest" with which

she gave computer-generated virtual tours of several important Mayan astronomical sites. Rebecca's presentation was warmly received by all who were present to see it. Also in attendance at this meeting was a one-person television crew from the ISU student television station. (A television story about Rebecca subsequently ran on the Insight cable channel 20 on Tuesday and Wednesday at noon.)

Following a 5-minute break, Dan conducted a short business meeting at which he reported to those in attendance activities, past and present, of the TCAA. He mentioned the September 20 MOOS, and the September 27 POS. He encouraged members to volunteer to assist at the lat-

ter. He noted the next public meeting of the TCAA at which Mike Rogers will present information at the ISU Planetarium about celestial coordinate systems, and invited all to attend. In addition, he noted the upcoming Chitaqua event at SGNC on October 17/18, and solicited volunteers to assist. Neale Lemkuhl is coordinating this event. Dan noted that Astrofest and the Illinois Dark Sky Party are also coming soon. He referred everyone in attendance to consult the TCAA Observer or the TCAA web site for additional pertinent details. Following a brief summary of the club's telescope loan program, and its key holder policy for the SGO, the meeting was adjourned at 7:18 p.m.

Mars: The Water Trail

— JPL

THIRTY EIGHT YEARS AGO, on the eve of the first spacecraft flyby of Mars, everything we knew about the Red Planet was based on what sparse details could be gleaned by peering at it from telescopes on Earth. Since the early 1900s, popular culture had been enlivened by the notion of a habitable neighboring world crisscrossed by canals and, possibly, inhabited by advanced lifeforms that might have built them -- whether friendly or not. Astronomers were highly skeptical about the canals, which looked more dubious the closer they looked. About the only hard information they had on Mars was that they could see it had seasons with ice caps that waxed and waned, along with seasonally changing surface markings. By breaking down the light from Mars into colors, they learned that its atmosphere was thin and dominated by an unbreathable gas known as carbon dioxide.

The past four decades have completely revolutionized that view. First, hopes of a lush, Earth-like world were deflated when

Mariner 4's flyby in 1965 revealed large impact craters, not unlike those on Earth's barren, lifeless Moon. Those holding out for martians were further discouraged when NASA's two Viking landers were sent to the surface in 1976 equipped with a suite of chemistry experiments that turned up no conclusive sign of biological activity. Mars as we came to know it was cold, nearly airless and bombarded by hostile radiation from both the Sun and from deep space.

But along the way since then, new possibilities of a more hospitable martian past have emerged. Mars is a much more complex body than Earth's Moon. Scientists scrutinizing pictures from the Viking orbiters have detected potential signs of an ancient coastline that may have marked the edges of a long-lost sea. Today's Mars Global Surveyor and Mars Odyssey orbiters have revealed many features that strongly appear to have been shaped by running water that has since disappeared, perhaps buried as layers of ice just under the planet's surface.

Although it appears unlikely that complex organisms similar to Earth's could have existed in any recent time on Mars' comparatively hostile surface, scientists are intrigued by the possibility that life in some form, perhaps very simple microbes, may have gained a foothold in ancient times when Mars may have been warmer and wetter. It is not unthinkable that life in some form could persist today in underground springs warmed by heat vents around smoldering volcanoes, or even beneath the thick ice caps. To investigate those possibilities, scientists must start by learning more about the history of water on Mars -- how much there was and when, in what form it existed, and how long it lasted.

One of the most promising ways to answer those questions is to look at the diverse clues that water has left on Mars. Besides the water-carved landforms visible for decades from orbiting spacecraft, many details of the story of water on the Red

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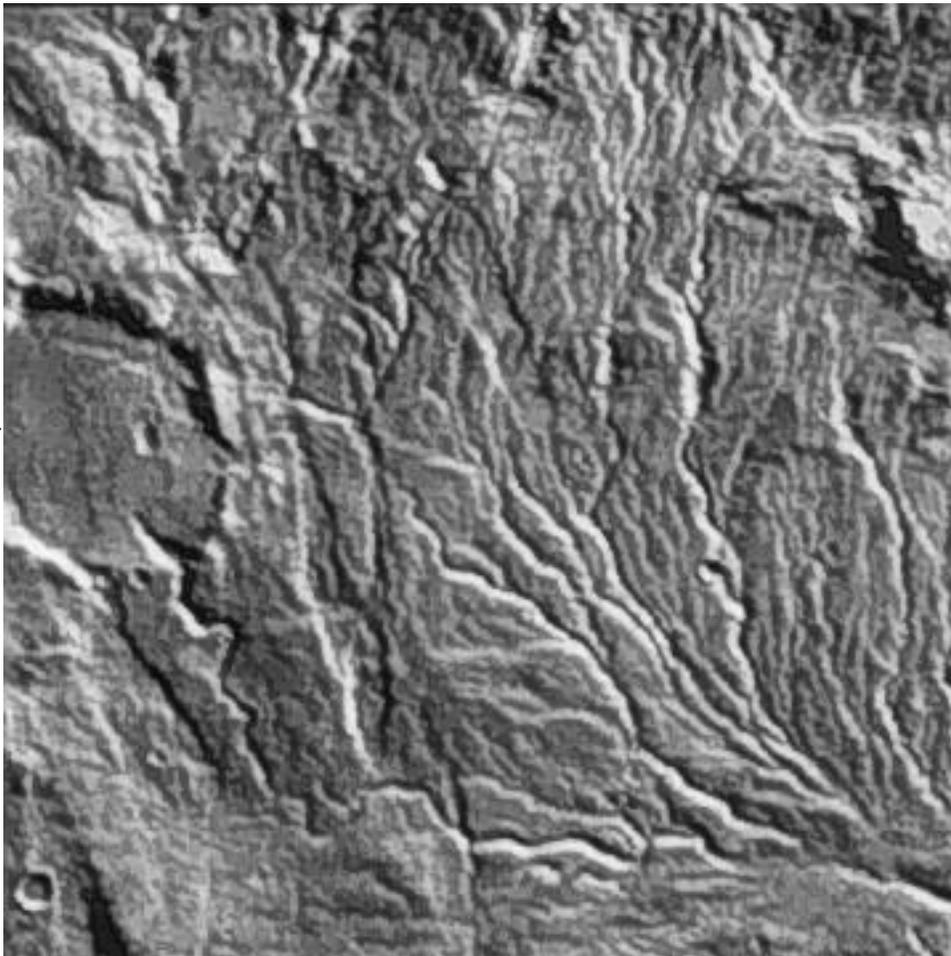
Planet are locked up in the rocks littered across its surface. Rocks are made up of building blocks known as minerals, each of which tells the story of how it came to be a part of a any given rock. Some types of minerals, for example, are known to form on Earth only submerged underwater, while others are profoundly altered when hot water runs through them, leaving behind residues. Up until now, it has been very difficult to get to know the minerals in martian rocks because we have not had the tools to unravel their mineralogies. By understanding Mars' rocks in a more complete manner, scientists can gain a better view into the history of liquid water on the planet. Like their predecessor mission, Mars Pathfinder, the Mars Exploration Rovers will pursue this goal by placing robotic geologists on the planet's surface -- ideally suited to "reading the rocks" to understand the still mysterious history of water, and even of life-friendly ancient environments.

Myths and Reality

Mars caught public fancy in the late 1870s, when Italian astronomer Giovanni Schiaparelli reported using a telescope to observe "canali," or channels, on Mars. A possible mistranslation of this word as "canals" may have fired the imagination of Percival Lowell, an American businessman with an interest in astronomy. Lowell founded an observatory in Arizona, where his observations of the Red Planet con-

vinced him that the canals were dug by intelligent beings -- a view that he energetically promoted for many years.

By the turn of the last century, popular songs envisioned sending messages between worlds by way of huge signal mirrors. On the dark side, H.G. Wells' 1898 novel "The War of the Worlds"



portrayed an invasion of Earth by technologically superior Martians desperate for water. In the early 1900s novelist Edgar Rice Burroughs, known for the "Tarzan" series, also entertained young readers with tales of adventures among the exotic inhabitants of Mars, which he called Barsoom.

Fact began to turn against such imaginings when the first robotic spacecraft were sent

to Mars in the 1960s. Pictures from the 1965 flyby of Mariner 4 and the 1969 flybys of Mariner 6 and 7 showed a desolate world, pocked with impact craters similar to those seen on Earth's Moon. Mariner 9 arrived in 1971 to orbit Mars for the first time, but showed up just as an enormous dust storm was engulfing the entire planet. When the storm died down, Mariner 9

revealed a world that, while partly crater-pocked like Earth's Moon, was much more geologically complex, complete with gigantic canyons, volcanoes, dune fields and polar ice caps. This first wave of Mars exploration culminated in the Viking mission, which sent two orbiters and two landers to the planet in 1975. The landers included a suite of experiments that conducted chemical tests in direct search of life. Most scientists interpreted the results of these tests as negative, deflating hopes of identifying another world on where life might be or have been widespread. However, Viking

left a huge legacy of information about Mars that fed a hungry science community for two decades.

The science community had many other reasons for being interested in Mars, apart from the direct search for life; the next mission on the drawing boards concentrated on a study of the planet's geology and climate using advanced orbital reconnais-

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sance. Over the next 20 years, however, new findings in laboratories on Earth came to change the way that scientists thought about life and Mars.

One was the 1996 announcement by a team from Stanford University and NASA's Johnson Space Center that a meteorite believed to have originated on Mars contained what might be the fossils of ancient bacteria. This rock and other likely Mars meteorites discovered on several continents on Earth are believed to have been blasted off the Red Planet by asteroid or comet impacts. They are presently believed to have come from Mars because of gases trapped in them that unmistakably match the composition of Mars' atmosphere as measured by the Viking landers. Many scientists questioned the conclusions of the team announcing the discovery of possible life in one martian meteorite, but if nothing else the mere presence of organic compounds in the meteorites increases the odds of life forming at an earlier time on a far wetter Mars.

Another development that shaped scientists' thinking was spectacular new findings on how and where life thrives on Earth. The fundamental requirements for life as we know it today are liquid water, organic compounds and an energy source for synthesizing complex organic molecules. Beyond these basics, we do not yet understand the environmental and chemical evolution that leads to the origin of terrestrial life. But in recent years, it has become increasingly clear that life can thrive in settings much different -- and more harsh -- from a tropical soup rich in organic nutrients.

In the 1980s and 1990s, biologists found that microbial life has an amazing flexibility for surviving in extreme environments -- niches that by turn are extraordinarily hot, or cold, or dry, or under immense pressures -- that would be completely inhospitable to humans or complex animals. Some scientists even concluded that

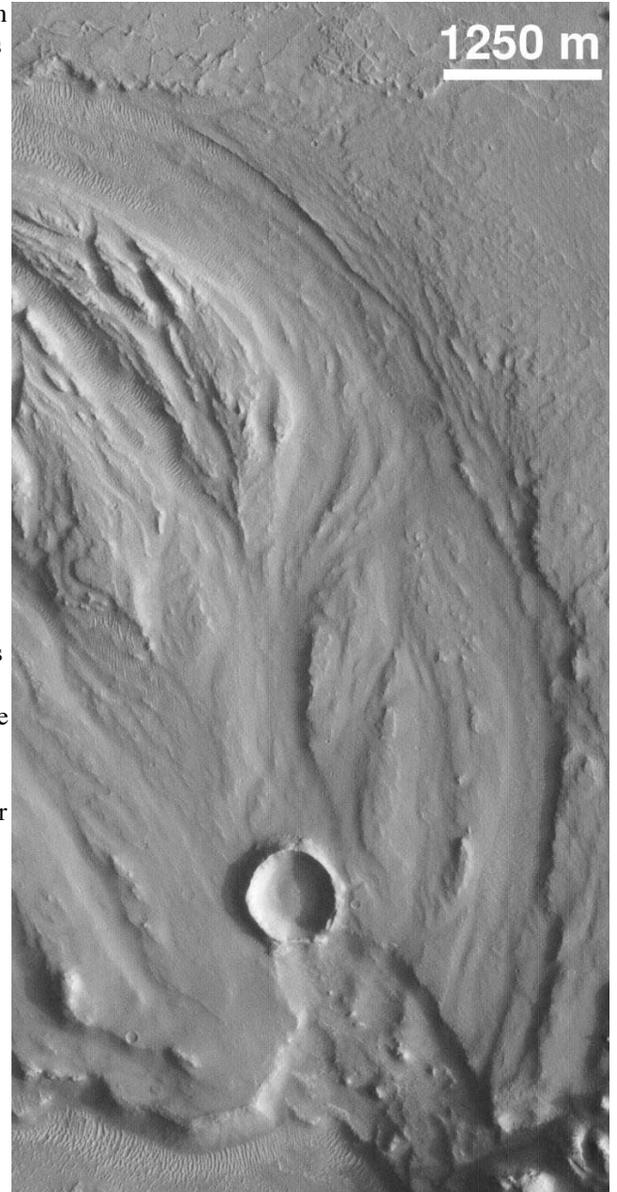
life may have begun on Earth in heat vents far under the ocean's surface.

This in turn had its effect on how scientists thought about Mars. Martian life might not be so widespread that it would be readily found at the foot of a lander spacecraft, but it may have thrived billions of years ago in an underground thermal spring or other hospitable environment. Or it might still exist in some form in niches below the currently frigid, dry, windswept surface, perhaps entombed in ice or in liquid water aquifers.

After years of studying pictures from the Viking orbiters, scientists gradually came to conclude that many features they saw suggested that Mars may have been warm and wet in an earlier era. And two currently operating orbiters -- Mars Global Surveyor and Mars Odyssey -- are giving scientists yet new insights into the planet. Global Surveyor's camera detected possible evidence for recent liquid water in a large number of settings, while Odyssey's camera system has found large amounts of ice mixed in with Mars surface materials at high latitudes, as well as potential evidence of ancient snowpacks.

The Three Ages of Mars

Based on what they have learned from spacecraft missions, scientists view Mars as the "in-between" planet of the inner solar system. Small rocky planets such as Mercury and Earth's Moon apparently did not have enough internal heat to power volcanoes or to drive the motion of tectonic plates, so their crusts grew cold and



static relatively soon after they formed when the solar system condensed into planets about 4.6 billion years ago. Devoid of atmospheres, they are riddled with craters that are relics of impacts during a period of bombardment when the inner planets were sweeping up remnants of small rocky bodies that failed to "make it as planets" in the solar system's early times.

Earth and Venus, by contrast, are larger planets with substantial internal heat

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sources and significant atmospheres. Earth's surface is continually reshaped by tectonic plates sliding under and against each other and materials spouting forth from active volcanoes where plates are ripped apart. Both Earth and Venus have been paved over so recently that both lack any discernible record of cratering from the era of bombardment in the early solar system.

Mars appears to stand between those sets of worlds, on the basis of current yet evolving knowledge. Like Earth and Venus, it possesses a myriad of volcanoes, although they probably did not remain active as long as counterparts on Earth and Venus. On Earth, a single "hot spot" or plume might form a chain of middling-sized islands such as the Hawaiian Islands as a tectonic plate slowly slides over it. On Mars there are apparently no such tectonic plates, at least as far as we know today, so when volcanoes formed in place they had the time to become much more enormous than the rapidly moving volcanoes on Earth. Overall Mars appears to be neither as dead as Mercury and our Moon, nor as active as Earth and Venus. As one scientist quips, "Mars is a warm corpse if not a fire-breathing dragon." Thanks to the ongoing observations by the Global Surveyor and Odyssey orbiters, however, this view of Mars is still evolving.

Mars almost resembles two different worlds that have been glued together. From latitudes around the equator to the south are ancient highlands pockmarked with craters from the solar system's early era, yet riddled with channels that attest to the flow of water. The northern third of the planet, however, overall is sunken and much smoother at kilometer (mile) scales. There is as yet no general agreement on how the northern plains got to be that way. At one end of the spectrum is the theory that it is the floor of an ancient sea; at the other, the notion that it is merely the end product of innumerable lava flows. New theories are emerging thanks to the

discoveries of Mars Odyssey, and some scientists believe a giant ice sheet may be buried under much of the relatively smooth northern plains. Many scientists suspect that some unusual internal process not yet fully understood may have caused the northern plains to sink to relatively low elevations in relation to the southern uplands.

Scientists today view Mars as having had three broad ages, each named for a geographic area that typifies it:

- The Noachian Era is the name given to the time spanning perhaps the first billion years of Mars' existence after the planet was formed 4.6 billion years ago. In this era, scientists suspect that Mars was quite active with periods of warm and wet environment, erupting volcanoes and some degree of tectonic activity. The planet may have had a thicker atmosphere to support running water, and it may have rained and snowed.
 - In the Hesperian Era, which lasted for about the next 500 million to 1.5 billion years, geologic activity was slowing down and near-surface water perhaps was freezing to form surface and buried ice masses. Plunging temperatures probably caused water pooled underground to erupt when heated by impacts in catastrophic floods that surged across vast stretches of the surface -- floods so powerful that they unleashed the force of thousands of Mississippi Rivers. Eventually, water became locked up as permafrost or subsurface ice, or was partially lost into outer space.
 - The Amazonian Era is the current age that began around 2 billion to 3 billion years ago. The planet is now a dry, desiccating environment with only a modest atmosphere in relation to Earth. In fact, the atmosphere is so thin that water can exist only as a solid or a gas, not as a liquid.
- Apart from that broad outline, there is lively debate and disagreement on the

details of Mars' history. How wet was the planet, and how long ago? What eventually happened to all of the water? That is all a story that is still being written.

In addition to studying the planet from above with orbiting spacecraft, NASA's Mars Exploration Program is putting robotic geologists on the surface in the form of instrumented rovers. Both of the landing sites selected for the Mars Exploration Rovers show evidence of water activity in their past. The rovers will look at rocks to understand the types of minerals that they are made of, and hence the environments in which they formed. This, in turn, will offer clues about the environment in which the rocks formed. Some types of rocks, for example, might be of types that form in running water, whereas others might be typical of the sediments that form on the beds of lakes.

Even if we ultimately learn that Mars never harbored life as we know it here on Earth, scientific exploration of the Red Planet can assist in understanding the history and evolution of life on our own home world. Much if not all of the evidence for the origin of life here on Earth has been obliterated by the incredible pace of weathering and global tectonics that have operated over billions of years. Mars, by comparison, is a composite world with some regions that may have histories similar to Earth's crust, while others serve as a frozen gallery of the solar system's early days. Thus, even if life never developed on Mars -- something that we cannot answer today -- scientific exploration of the planet may yield critical information unobtainable by any other means about the pre-biotic chemistry that led to life on Earth. Mars as a fossil graveyard of the chemical conditions that fostered life on Earth is an intriguing possibility.

TCAA Treasurer's Report – August, 2003

– L. Duane Yockey, Treasurer

OPERATING FUND BALANCE – July 31, 2003 -	\$ 774.11
Income	
Gail Fisher (dues) -	\$ 40.00
Expenses	
Astronomical Society of the Pacific -(slide program)	\$ 131.90
OPERATING FUND BALANCE – August 31, 2003 -	\$ 682.21
OBSERVATORY FUND BALANCE – July 31, 2003 -	\$ 754.64
Income	
None	\$ 0.00
Expenses	
None	\$ 0.00
OBSERVATORY FUND BALANCE – August 31, 2003 -	\$ 754.64
TOTAL TCAA FUNDS – August 31, 2003 -	\$ 1,436.85

Sugar Grove Observatory: Listing of Official Keyholders (Paid \$10 deposit/\$5 renewal)

Jim Swindler (April 2001)
 Duane Yockey (April 2001, renewed Jan. 2003)
 Sandy McNamara (June 2001, renewed Jan. 2003)
 Dan Miller (August 2001)
 Michael Rogers (August 2001)
 Dan Meyer (February 2002, renewed March 2003)
 William Carney (March 2002, renewed Jan. 2003)
 Vic Connor (August 2002)
 Neale Lehmkuhl (May 2003)

The Observer Crossword

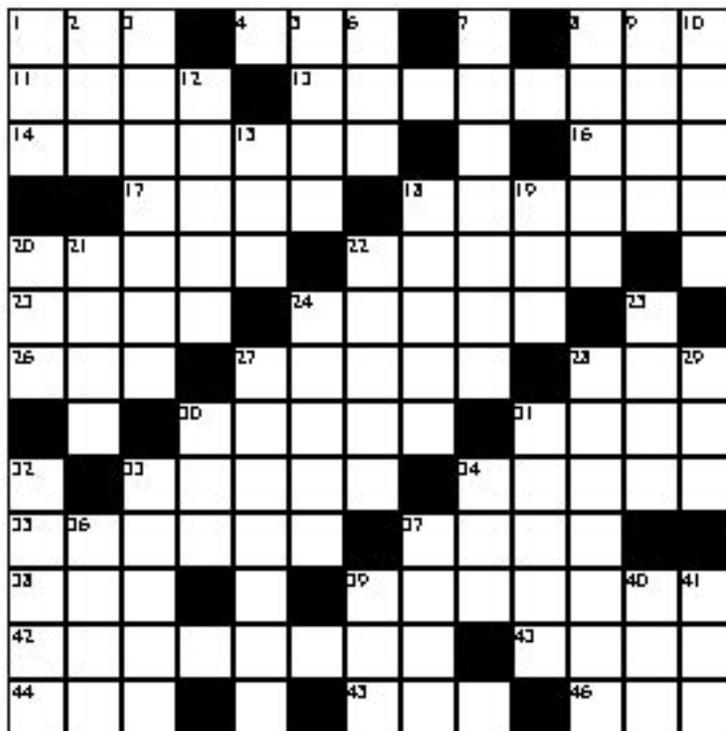
—Observer Staff

ACROSS

- 1 The unit of electrical resistance
 4 Edmund Scientific eyepieces
 8 Very skilled person
 11 Great age
 13 Unbreakable
 14 Crumbly
 16 Fastener
 17 Keep away from
 18 Nymph of Greek myth
 20 Constellation : The whale
 22 Operatic feature/bright region on Mars
 23 As previously given
 24 Physician
 26 Son of Jacob
 27 Thaws
 28 Gone by
 30 Altar stone
 31 Crack
 33 Worth
 34 Clock pointers
 35 Lacking movement
 37 Island of Hawaii
 38 Title of a knight
 39 5th Greek letter
 42 The Cosmos
 43 Small yeast cake
 44 7th Greek letter
 45 Besides
 46 Curved bone

DOWN

- 1 Idiot
 2 Pronoun
 3 Make moist
 5 Furnace
 6 Before
 7 Alternative name for Alpha Scorpii
 8 These radiation particles are helium nuclei
 9 City in NW France
 10 Having an edge
 12 Book of the Bible
 15 Passenger vehicle
 18 4th Greek letter
 19 Slender metal fastener
 20 Spanish hero
 21 Yellow cheese coated with red wax
 22 City in central Belgium
 24 Arising from a gene
 25 Mild oath
 27 Deserved



- 28 A "near-miss" eclipse
 29 Roman goddess of plenty
 30 Encountered
 31 Indian form of address
 32 Point in question
 33 Lunar 'seas'
 34 Possesses
 36 Hue
 37 A type of star cluster
 39 Ariane's developer (abbr)
 40 Japanese sash
 41 Arrest



The Welcome Mat

Three new members this month! Must be a Martian thing :-) :-)



Cheyenne Adams
Normal, IL

Matt Hughes
Shirley, IL

Bob Warfield
Bloomington, IL



The OBSERVER

The Newsletter of the Twin City Amateur Astronomers, Inc.

Michael Rogers & Jean Memken, Editors
2206 Case Drive
Bloomington, IL 61701

Dues Due?

The Dues Blues

If you see a check in the box above, it means **your dues are due**. To retain membership -- and with a new observatory, why quit now??? -- please send \$40 to our esteemed treasurer:

Duane Yockey
508 Normal Avenue
Normal, IL, 61761

As always, thank you for your support!!