

THE FLINT RIVER OBSERVER

NEWSLETTER OF THE FLINT
RIVER ASTRONOMY CLUB

An Affiliate of the Astronomical League

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Club Calendar. Thurs., July 12: FRAC meeting (7:30 p.m., The Garden in Griffin; **Fri.-Sat., July 13-14:** JKWMA observings (at dark); **Fri., July 20:** Fayette Co. Rec Dept. observing (8:30 p.m., Lake Horton); **Sat., July 21:** FCRD rainout date (same place and time).

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Editor's Message. With **Mars** gleaming brighter and larger in our view than it has been in 15 yrs., this issue of the *Observer* pays tribute to its special appeal. No other planet or object in the solar system has fired human imagination the way that Mars has.

Simply put, of the seven planets besides Earth, Mars has the greatest chance of harboring life in some form or another. **Mercury** is too close to the **Sun**, and the gas giants **Jupiter**, **Saturn** and **Neptune** have no surface to speak of inside their massive, deadly gaseous exteriors.

Life may have existed on **Venus** or Mars at some time in the distant past – but with a surface temperature of 864° F Venus certainly does not

contain life as we know it today. Mars may not either, but the only way to know for sure is to study it up close and personal. That's why the U. S., Russia and other nations have sent 45 spacecrafts to fly by, orbit or land on the Red Planet since 1960. Twenty-two of those missions have been successful (or at least partly successful), and seven additional missions are still in the developmental stage.

-**Bill Warren**

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Last Month's Meeting/Activities. Fifteen members – **Dwight Harness**; **Erik Erikson**; **Carlos Flores**; **Truman Boyle**; **John Felbinger**; **Kenneth Olson**; **Joseph Auriemma**; **Marla Smith**; **Eva Schmidler**; **Alan Pryor**; **Sean Neckel**; **Steve Hollander**; **Aaron Calhoun**; **Tom Moore**; and yr. editor – and visitor **John Killian** -- attended our June meeting. Ken brought cookies, and yr. editor dived into them with both hands. (He later pondered life's greatest mystery: *How can you eat a few cookies and gain four pounds?*)

Tom, FRAC's astronomical equivalent of **Stephen Hawking**, said he'd heard that next month **Mars** will be as big as the **Full Moon**, whereupon Aaron, another intellectual giant, replied, "Wow, that's big!"

Aaron and yr. editor attended both June JKWMA observings. Friday produced about 10 min. of observable conditions; Saturday brought somewhat clearer skies and John Killian, the visitor who attended the Thurs. meeting.

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This 'n That. Comparing Mars and Earth. If Earth were the size of a quarter, Mars would be the size of a dime, 100 yds. away. Other comparisons:

*Mars has two tiny moons, **Deimos** (7.8 mi. in dia.) and **Phobos** (13.8 mi. in dia.). Phobos, the closer of the two, orbits Mars every 7 hrs.

Deimos and Phobos were twin sons of **Mars**, the Roman god of war. Appropriately, their names mean dread and fear, respectively.

Our **Moon** (2,159 mi. in dia.) orbits Earth every 27 days. "Moon" comes from the old Anglo-Saxon word moneth (which also gave us our word month).

*Mars is considerably colder than Earth. The average temperature on Mars is -81° F, with a high

of 86° F and a low of -284° F. Earth's average temperature is 57° F, with a low of -126° F at the poles and a high of 136° F elsewhere.

Like Earth, Mars contains polar ice caps. But while Earth's polar regions are covered in a thick layer of permanent water ice (H₂O), Mars's polar caps are composed of frozen CO₂ (dry ice). During the martian summer, the northern polar cap's dry ice sublimates into gases. (We'll have more to say about that next month.)

*The martian atmosphere is 96% CO₂ – but it is only 1% as dense as Earth's. In that thin atmosphere, winds do not exceed 60 mph.

“The key difference between Earth and Mars winds,” says NASA's **William Farrell**, “is that Mars's atmospheric pressure is a lot less. Things get blown around during dust storms, but not with the same intensity as winds on Earth.” Aside from the possibility of getting lost under conditions of poor visibility, your biggest problem probably would be getting the clinging martian dust off your spacesuit to keep it out of your landing capsule, Mars rover or living quarters.

To fly a kite on Mars, you'd need much stronger winds than we need here on Earth.

*Light on Earth and Mars are, of course, produced by the **Sun**. Visible sunlight consists of all the colors of the spectrum from blue to red. (We can't see ultraviolet or infrared.)

On Earth, the sky is blue because our dense atmosphere scatters short wavelength light at the blue end of the spectrum. The longer wavelength colors such as red aren't scattered by the atmosphere but absorbed by it, so our eyes merge those colors into the Sun's bright image. Only at sunrise and sunset, when residual sunlight must travel through vastly more atmosphere to reach us, do we see red skies.

On Mars, however, the atmosphere is too thin to scatter the blue portion of sunlight. (See below.) During most of the daylight hours, the martian sky is butterscotch in color due to dust suspended in the atmosphere from Mars's frequent dust storms. (Sometimes those dust storms cover the entire planet.) The large dust particles absorb the short wavelength blue light and act as mirrors to scatter their own colors and the rest of the spectrum.

Around sunrise and sunset, the martian sky takes on a softer, pinkish-red color, but near the rising or setting Sun it is blue – in both cases due to the greater amount of atmosphere the sunlight must travel through to reach the camera.

From space, Mars appears red due to the rust-colored iron oxide that comprises most of its soil. Earth is a “blue marble” as seen from the Moon because 70% of its surface is covered in water.

*Earth's dia. (7,926 mi.) is nearly twice as large as Mars's (4,222 mi.), and its surface area is 3.5 times as great as Mars's – but they contain the same amount of dry land. (**Venus** has more dry land than Earth or Mars.)

***Other Mars Trivia**. Towering nearly 72,000 ft. above the martian landscape, **Olympus Mons** is nearly 2.5 times higher than Mt. Everest, the tallest mountain on Earth. At its base, Olympus Mons is as large as the state of Arizona.

The martian canyon **Vallis Marineris** stretches nearly 2,500 mi. across Mars – almost long enough to cross the continental U. S.

*The largest crater in the solar system, Mars's **North Polar Basin**, covers 40% of the planet.

*As of May, 2014, 132 meteorites found on Earth are known to have come from Mars.

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Upcoming Meetings/Activities. Our July meeting will be held in The Garden in Griffin at 7:30 p.m. on **Thurs., July 12th**. The program will be **Alex Filippenko's** “Of Mars and Martians.”

Our JKWMA club observings will be held on **Fri.-Sat., July 13th-14th**.

We'll return to Lake Horton in Fayette Co. on **Fri., July 20th** for another public observing sponsored by the Rec Dept. The event will begin at 8:30 p.m., with a rainout date of **Sat., July 21st**.

To get to Lake Horton from, say, Griffin, go 10.6 mi. toward Fayetteville on Ga. 92 from the stoplight at U. S. 19/41 and turn left at Woolsey Rd. (It's just past a gas station on the right.) Go 0.7 mi., and turn left at the stop sign at Antioch Rd. Go 0.4 mi., and continue straight toward Lake Horton at the stop sign where the main road curves to the right.

The park entrance is 1.0 mi. ahead. After passing through the gates, turn right at the black

asphalt road about 50-100 yds. beyond the entrance. That winding road through the woods leads to a large parking lot; that's where we'll meet. We'll set up our 'scopes on the grassy hill between the parking lot and the main road, then drive our cars back to the parking lot.

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Above: "To everything there is a season": **Mars** at different times of the year. (Photos by **Alan Pryor**)

The Planets in July. **Mars** is, of course, the "star" of the night sky parade in July.

Observing challenge #1: Run off a copy of a martian map that has the surface features marked and see how many of them you can identify. (On Sept. 3, 2003, **Felix Luciano** saw the **South Polar Ice Cap**; dark **Mare Tyrrhenum**, **Mare Serpentis** and **Syrtis Major**; and light-colored **Elysium** during that famous Mars opposition. Other features you may see (depending on which part of Mars is facing you at the time) include: **Chryse**; the **Hellas Basin**; **Libya**; and **Solis Lacus**.

All of the surface features you're likely to see are called *albedo features* because they reflect light well. They change shape with the martian seasons and from one Mars appearance to the next, depending on how the wind moves bright surface dust around. You should be able to see them in 'scopes as small as 2" to 4".

Observing challenge #2: (This one is harder.) Look for Mars's two moons, **Deimos** (mag. 12.0) and **Phobos** (mag. 10.6). They always lie very close to the planet, so best results are obtained by using high magnification and a blue (Wratten #14) filter that dampens Mars's fierce glow. Move the planet just outside the field of view, then go slowly all the way around it that way. You'll probably need at least a 6" or 8" telescope, clear skies and steady seeing conditions to have a decent chance of spotting them. Deimos is the smaller and fainter of the two, but it's easier to see because it's farther away from the planet. The closer to July 31st that

you observe, the better your chances will be of seeing either of them.

Elsewhere, **Mercury** (mag. 0.0) will be easily visible in the W sky, as will brighter **Venus** (-4.1) to its upper left. **Jupiter** (mag. -2.2) will be high in the S sky, and **Saturn** (mag. 0.2) will spend the month near Messier objects in *Sagittarius*.

Neptune (mag. 7.8) and **Uranus** (mag. 5.8) will be visible in binoculars in the pre-dawn sky.

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The 2018 Mars Apparition

Here's what all the hullabaloo regarding the **2018 Mars apparition** (appearance) is all about:

As Mars and Earth follow their elliptical orbital paths around the **Sun**, they are constantly moving closer to or farther away from each other. But their positions also change relative to the Sun and each other.

Mars is the 4th planet out from the Sun, so it is always farther away from the Sun than Earth is. At *conjunction*, Mars lies on the far side of the Sun and cannot be seen at all, lost in the Sun's glare.

At *opposition*, however, Mars lies opposite the Sun in our view, so it is visible all night. Oppositions occur every 2 yrs. and 50 days, when Earth passes between Mars and the Sun.

In May, Mars became visible to us again as it moved toward its latest opposition that will occur on July 27th. But Mars is also moving closer to us, and four days later, on July 31st, it will have its closest approach to Earth in this apparition, i.e., 35.6 million mi.

Due to those combined factors, Mars will be much larger (24.31") and brighter (mag. -2.8) at opposition this summer than it normally is. It will remain visible in the night sky for several months. For much of that time it will be brighter than mag. -1.5 **Sirius (Alpha Canis Majoris)**, the brightest star in the night sky. Between July 7th-Sept. 7th, Mars will be even brighter than **Jupiter**, temporarily making it the 2nd brightest planet after **Venus**. (None of the planets are ever brighter than Venus.)

The Mars opposition of 2003 brought the Red Planet to within 34.6 million mi. of Earth. It was the closest that the two planets had been to each

other in 59,619 yrs., and it will be another 254 yrs. before they are that close again.

Mars will be a million mi. farther away in 2018 than it was in 2003, but for our purposes the difference won't matter. It will still be a "golden" opportunity to see surface features such as the large, dark shield volcano **Syrtis Major**.

You don't have to wait for opposition on July 27th to observe Mars. It has been visible for two months already, and is growing steadily brighter as you read this. *Now* is the time to observe Mars while it is one of the brightest objects in the night sky.

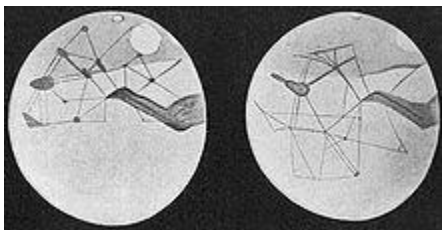
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The Canals of Mars

by **Bill Warren**

During the **Mars** opposition of 1877, Italian astronomer **Giovanni Schiaparelli** noticed some faint but curious surface features on the Red Planet: a network of web-like, straight-line markings in the equatorial region. He called them "canali" – the Italian word for channels – but did not speculate on what they might be. His report, which included drawings of what he saw, attracted world-wide attention.

Most astronomers found little or no evidence of those channels. A few observed and drew them, but their drawings did not match Schiaparelli's or each other's.



Above: Two of Percival Lowell's early drawings of the canals of Mars

One of the astronomers who saw the straight-line markings was American **Percival Lowell**, the founder of Lowell Observatory in Arizona. Lowell believed that they were evidence of intelligent life on Mars. He studied them for 15 yrs., analyzing and making intricately detailed drawings of more than 350 of them. He recorded what he thought

were canals bordered by dark vegetation, dark oases in the martian desert where lines intersected, and lines that sometimes were single and at other times double, paralleling each other "like the twin rails of a railway," as he put it. Lowell attributed differences in his drawings to changes in surface visibility as the martian seasons changed.

The English translation of Schiaparelli's report mistakenly translated "canali" as canals. Lowell, unknowingly accepting the faulty translation as accurate, believed that the markings were large irrigation ditches that had been dug by martians to transport water from the polar ice caps to civilizations spread over the planet. In three best-selling books published between 1895-1908, Lowell theorized that the martians, desperate for water on a planet that was drying up, built the canals to take advantage of the one remaining plentiful water source on their dying planet.

Lowell's books were well received by a reading public that was already fascinated by the idea of life on Mars through earlier popular martian sci-fi novels by **H. G. Wells** and **Edgar Rice Burroughs**. Lowell lent scientific credibility to the notion of martian civilizations. (Front page headline from the *N. Y. Times* on Dec. 9, 1906: "**THERE IS LIFE ON THE PLANET MARS!**")

"Prof. Percival Lowell," the article began, "recognized as the greatest authority on the subject, declares there can be no doubt that living beings inhabit our neighbor world." The public believed him because they wanted to believe that we are not alone in the universe.)

Still...It was obvious from the start that something was wrong, or else more than just a handful of astronomers would have seen the canals. But telescopes and photographs of that era were incapable of resolving martian surface features with any kind of accuracy. (Poor as it was, visual observing was decidedly superior to photography, which at the time was virtually useless in producing clear images of surface details.) Astronomers who failed to see the markings doubted their existence, or at least questioned whether they were as extensive as Lowell's drawings showed them to be. Astronomers in the latter category allowed that some of the markings might exist as natural features, but not as the work of intelligent beings on Mars.

Over the years, as spectroscopic analyses and improvements in telescopes and photography produced evidence that Mars could not possibly contain advanced forms of life, the “canals on Mars” became a long-standing joke among astronomers. But the problem was, *there was no way to prove Lowell wrong*, not from a distance of 140 million miles away!

It was not until 1965 when NASA’s Mariner 4 spacecraft took the first close-up photos of the martian surface that the controversy was resolved. Those photos, taken from 6,000 mi. above the planet, showed craters, dusty red plains and other features, but nothing even remotely resembling large straight-line features, whether natural or artificial. Every photo taken by martian orbiters since then has verified that no such markings exist.

So what exactly did Lowell see? Most astronomers believe that his “non-natural features” (his term) were in fact natural features, or else optical illusions, the product of wishful thinking or an overactive imagination. Sometimes people see what they want to see, and there is no doubt that Lowell desperately wanted to see evidence of life on Mars.

(For an in-depth look at the canals of mars controversy, see **Klaus Brach’s** article, “Canal Mania,” in the July, 2018 issue of *Sky & Telescope* (pp. 28-33.)

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Above: The Martian Face. (The black dots on the photo are not part of the martian landscape, they are data errors.)

The Face On Mars

by **Bill Warren**

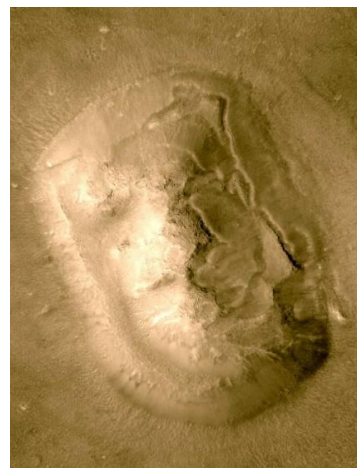
Okay, **Percival Lowell** was wrong about the existence of intelligent life on Mars. He couldn’t have been more wrong if he’d said that he spotted a human face on Mars! But at least Lowell had the luxury of being wrong from 140 million mi. away.

In the mid-1970s, NASA launched two orbiters/landers, Vikings 1 and 2, to study and photograph the Red Planet. Of their orbital photos, 18 were of the **Cydonia** region in the northern hemisphere. One of those photos showed something that looked very much like a large human face.

Viking mission chief scientist **Gerry Soften** described the feature as a 1.2 mi.-long eroded Cydonian mesa; he dismissed its resemblance to a face as “a trick of light and shadow.” But when, 35 orbits later, Viking 1 photographed the face again from a different angle of illumination, it was still visible as a face. (Some folks thought it resembled a youthful **Elvis Presley**.)

Enter conspiracy theorist and author **Richard Hoagland**.

“It doesn’t just look like a face,” Hoagland declared, “it *is* a face!” He went on to say that an alien civilization had colonized Mars, and the face was evidence of an alien city in the Cydonia region. (Obviously, Hoagland didn’t believe in evolution.) He claimed that the city consisted of pyramids and mounds arranged geometrically atop a hill.



Above: Mars Global Surveyor image of the Face on Mars

Regardless, NASA continued to insist that the “Face on Mars” was a natural feature of the

landscape. They were proved correct when, in 2001, the Mars Global Surveyor orbiter photographed the Cydonia region using cameras with incredibly high resolution. The MGS images showed the Face to be a natural rock formation.

Hoagland, however, wasn't satisfied. He claimed that the cameras were not as good as Viking's – a ridiculous statement if ever there was one! – and that NASA had been ordered to doctor the later images to make them look less like a face. NASA had been told, he said, to deliberately withhold from the public any evidence it found of extraterrestrial activity on the **Moon, Mars** or **Venus**. But if that were so, why did they release the photo of the Face? It's not as if it was difficult to see it in the photos.

Bottom line: The "Face on Mars" is an example of the human tendency to see patterns where none exist, such as the Man in the Moon or images of familiar objects in cloud formations. On Mars, our rovers have imaged things that look very much like a rat, a ball, blueberries, a human finger (complete with fingernail), a hard hat, a thighbone, a young girl waving, a dinosaur skull (with teeth), a human skull – maybe he had been running from the dinosaur! - - and even a UFO.

Those anomalies and many others have been detected in Mars rover photos by people searching for evidence to support their claim that life exists on the Red Planet. But consider:

Forty-five years ago, skeptics claimed that NASA never landed men on the Moon, but faked the whole thing on Hollywood sound stages.

Mars is less than twice as large as the Moon, and more than 500 times farther away. It's a far more difficult target to reach and land on. Why haven't those skeptics claimed that the Mars missions and landings have been faked, too?

The answer is simple: *This time they have a different agenda.* In order to show that life exists on Mars, they have to accept that the Mars rovers are actually on Mars, photographing creatures and artifacts on the surface that prove their theory.

Diehard cynics and conspiracy theorists always ignore facts that do not support their beliefs – and they accept as true anything, no matter how bizarre or ridiculous, that supports those beliefs. (Of course, some scientists have been known to do the same thing.)

Still...I know for a fact that Elvis isn't on Mars: I saw him just last week at WalMart, standing third in line at the checkout counter behind someone in a gorilla suit and a 400-lb. man wearing a tutu.

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Above: M106, a spiral galaxy in *Canes Venatici*. (Photo by **Alan Pryor**.) A beautiful sight even in a small telescope, M106 has been described visually by some observers as an underinflated football. It was discovered by **Pierre Mechain** in 1781. (The small elongated galaxy near the upper left edge is **NGC 4218**, and another galaxy, **UGC 7365**, is an extremely faint blur lying halfway between M106's halo and the photo's right border.)

M106 lies in northern *Canes Venatici*, near the southern border of *Ursa Major*. Although the surrounding area is relatively barren of bright guide stars to use in finding it, the region contains scores of smaller, fainter galaxies.

Find M106, and you can use the same Messier observation in the Herschel 400, Two in the View and Galaxy Groups and Clusters observing programs.

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Question: *How far away would Mars have to be to appear as large as the **Moon** to the unaided eye?*

Answer: Since Mars is about twice as large as the Moon (which is roughly 240,000 mi. away), Mars would have to be just twice as far away from Earth (i.e., less than half a million mi.) for us to see them as the same size.

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