



Nor Any Drop to Drink

Validation, At Last

We take them for granted when walking along a shoreline or river bank. Looking down, we see once-jagged rocks now rounded and worn smooth by the flow of running water. Pebbles have never been big news here—but they were an earth-shattering, or rather a Mars-shattering discovery when spotted on the red planet by the Mars rover Curiosity in 2012.

That finding and further evidence—erosion channels carved into the Martian landscape, large expanses of sedimentary deposits in former lakes (now dry craters)—all strengthen the case that liquid water once flowed freely over the surface of our planetary neighbor when the planet was warmer, and its atmosphere denser, more than three billion years ago. These recent revelations have made me wonder how Percival Lowell would have handled the news, if he were still living today. He's the man who infamously dominated this whole conversation about water on Mars more than a century ago.

The oldest of five children, Lowell came from a well-established New England family. He was one of the Boston Brahmins, upper-crust Massachusetts townsmen who had made their fortunes creating the American textile industry. A few years after graduating from Harvard in 1876, Lowell traveled extensively, especially to the Far East, which led to his writing several well-received books on the region.

By the 1890s, though, restless and

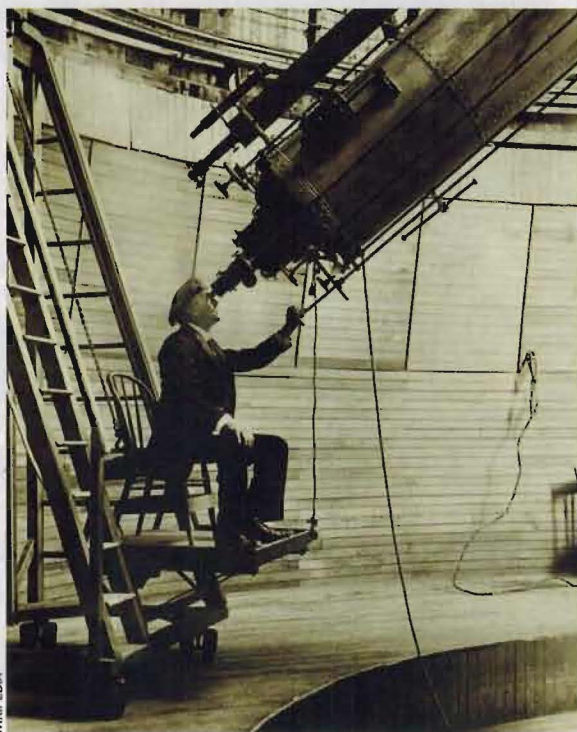
searching for individual expression, he renewed a childhood interest in astronomy. "After lying dormant for many years," recalled his brother, "it blazed forth again as the dominant one in his life." Independently wealthy, Lowell decided to establish his own private observatory atop a pine-forested mesa nestled against

United States. In this rivalry, Lowell became the controversial outsider, insisting that his staff pursue the questions that interested him alone. His initial aim was to observe the particularly close approaches of Mars occurring in 1894 and 1896. Given his obsession with the red planet, the high perch on which his 24-inch refracting telescope rested more than a mile above sea level, was soon dubbed Mars Hill.

Mars, with its vivid ruby luster, had been fascinating stargazers for millennia. This interest grew even more intense after the invention of the telescope. As magnifications increased over the decades, astronomers began to discern distinct markings on Mars' surface. Bright patches around its poles, similar in appearance to our own planet's arctic and Antarctic regions, were seen to wax and wane with the Martian seasons. So earthlike were these phenomena that by 1784 English astronomer William Herschel was reporting that Mars "is not without a considerable atmosphere... so that its inhabitants probably enjoy a situation in many respects similar to ours."

Scrutiny of Mars was particularly favorable in the fall of 1877, when Earth and Mars were at their closest, approaching in their orbits to within 35 million miles of one another. The superb viewing conditions allowed the Italian astronomer Giovanni Schiaparelli to map numerous dark streaks crossing Mars' reddish ochre regions. In his native language, he called these thin shadowy bands *canali*, or "channels," which many deduced arose from natural geologic processes.

But Schiaparelli's term was translated inaccurately, a gaffe that led to many fanciful conjectures. The most notorious, by far, was the assumption



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Although known for observing Mars, Percival Lowell is shown (above) in 1914, observing Venus in the daytime with the 24-inch refracting telescope at the Lowell Observatory, which he established in Flagstaff, Arizona.

the small village of Flagstaff, Arizona (then still a territory of the United States). It was a daring venture for an amateur astronomer with no professional experience, especially since he found himself competing with the new and larger astronomical outposts then being built by universities and research institutions throughout the

that the “canals” were irrigation works built by advanced beings, who were directing scarce resources over the surface of their planet for cultivation. The building of the Suez and Erie canals in the 19th century were still fresh in the public’s memory. “Considerable variations observed in the network of waterways,” wrote French astronomer Camille Flammarion in 1892, “testify that this planet is the seat of an energetic vitality...there might at the same moment be thunderstorms, volcanoes, tempests, social upheavals and all kinds of struggle for life.” No one championed this idea more avidly than Percival Lowell.

With the opening of his observatory in 1894, Lowell immediately began to map Mars, adding 116 waterways to Schiaparelli’s original depiction. And within a year he published a book titled simply *Mars*, following up in coming years with *Mars and Its Canals* and *Mars as the Abode of Life*. The lines discerned on Mars, he declared, were assuredly artificial rivers conveying seasonal snowmelt from the planet’s polar caps. That they were even visible from Earth was likely due to the massive vegetation growing along the canal banks. Promoting his ideas in books and lectures like a blue-blooded carnival barker, he fancifully imagined his Martian civilization as dependent on its global irrigation system to remain extant. The very fact that the Martian features he saw were straight—like the canals, streets, and railways on Earth—increased the odds, he claimed, that they were produced by intelligent workers.

Serious astronomers were aghast



NASA’s Curiosity rover has found evidence for an ancient, flowing stream on Mars, including the rock outcrop pictured above. It may look like a broken sidewalk, but this geological feature on Mars is actually exposed bedrock made up of sand grains and small rounded pebbles cemented together.

at Lowell’s certainty. Prestigious journals refused to publish his findings. William Wallace Campbell, then director of the Lick Observatory (the Lowell Observatory’s chief competitor), called Lowell “a trial to sane astronomers.” Many other observers were not seeing the same Martian features, and with good reason. “From Earth,” University of New Mexico geographer K. Maria Lane has noted, “the surface of Mars was (and still is) notoriously difficult to make out. Even under excellent conditions for ‘seeing,’ Mars shimmered tantalizingly, allowing only fleeting glimpses of its surface.” Lowell had collated his overall map from dozens of sketches of individual Martian regions, each glimpsed in a flash. A new method of planetary photography, which his observatory introduced in 1905, didn’t help his case; a few dark markings were seen, but not a globe-spanning canal system.

The public and the popular press,

however, still revealed in Lowell’s story. So much so that by 1907 the *Wall Street Journal* reported that evidence for the existence of Martian folk surpassed that year’s financial panic as the news story of the year.

It was Lowell’s last hurrah. Within a few years, as further observations used larger telescopes, astronomers generally concurred that Lowell’s canals were merely an optical illusion—the eye imposing linearity upon an array of smaller, irregular details. The Boston Brahmin’s exotic imaginings, which lingered long after his death in 1916 at the age of sixty-

one, were finally put to rest when a series of Mariner missions, launched by NASA in 1965 and 1969, showed Mars to be a completely barren world, pitted with craters.

Later, Mars orbiters photographed ancient riverbeds with tributaries and erosion patterns that appeared to be carved by catastrophic flooding episodes. Probes now roaming over the Martian landscape confirmed those observations. Perhaps Lowell would have been elated that there were Martian channels after all. But these passages were forged by water flowing naturally, and in Mars’ distant past rather than in the present day. In the end, to Lowell’s likely dismay, there were no little green men digging trenches.

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