

THE MYTHS AND MAGIC OF MARS: SCIENCE AND NON-SCIENCE IN THE GOLDEN AGE OF EXPLORATION. Benton C.Clark. Lockheed Martin Astronautics, POB 179, Denver, CO 80201. E-mail: benton.c.clark@LMCO.com

Introduction: The allure of Ares. The magic of Mars. Of all the planets, it is the Red One that has captivated the minds of the public and scientists during this century. And as the century draws to a close, we have in place the most ambitious series of planetary exploration missions ever mounted by humanity, centering on this one object. Is it due to the persistent idea that other life in the universe may be in our own solar system backyard? Is it because of accessibility and environment, Mars is the only one for which it seems practical or sensible to someday send human explorers. Does that recurring bright redness which makes it the ruby of the night sky reach into our subconscious like an old friend? Do the vivid two-page color spreads in books and magazines burn into our imaginations as the brilliance and sparkle of fire?

Mars Program: Whatever the basis of our intrigue with Mars, it has triggered a program that has seen the development of two different landing techniques, rovers, the use of aerobraking (and someday aerocapture) to achieve orbits efficiently, and soon-to-come, the hardware to get back up off the planet and return carefully selected samples back to Earth. Yet, the half-century since Mars missions began has been a roller coaster of vigorous thrusts interspersed with inaction. With the advent of lower cost and smaller missions, a near-continuous program of exploration has become more sustainable. How do we maintain that program?

The Myths of Mars: Arrhenius was right; Lowell, Wells and Welles were wrong. Mars is a dry, salt-laden rocky desert, not a canal-fed network of farmlands or an abode of intelligent, hostile aliens bent on a take-over of planet Earth. Scientific views of Mars have swung as a pendulum since the dawn of active exploration. Its atmosphere was at one time thought to be 80 mbar, a full order of magnitude higher than reality; and the composition was claimed to be up to 40% argon, another full magnitude of error. Polar caps were first water ice, then CO₂ ice, then both. A magnetic field was missing, then found. So-called wave-of-darkening was as observationally wrong as the network of lines. The Viking premise, that “if life is anywhere, life is everywhere”, has given way to the belief that life on Mars, if it still exists, has taken refuge in rare hydrothermal sites or in aquifers deep underground. The so-called “clement” conditions on Mars are now viewed as extremely hostile to microbial life. The pH of martian soil is basic, or, it is acidic, or neither.

Spectral analyses attributed Mars’ red color to pink feldspar or abundant limonite; *in situ* elemental measurements overturned these, but in turn are variously inter-

preted as iron-rich smectite clays, glass-rich palagonites, or the products of physical weathering overprinted by partial acidic conversion to salts. Geophysicists confidentially calculated that impact-ejection of objects from Mars would melt them; we now have discovered 13 unmelted martian meteorites on Earth. Based on meteorite and soil analyses, Mars was seen as K-poor and ultrabasic; yet Pathfinder rocks are sufficiently K-rich they mimic terrestrial andesites. Pathfinder was predicted to land amid a diversity of rocks; all the rocks analyzed were geochemically similar.

It seems that almost no matter what we first believe about Mars, we are all too often proven wrong. In spite of this, and partly because of it, scientific interest remains manifest and strong. According to the media, all missions to Mars are something about the search for life. Ironically, since Viking, there has been not a single lander mission investigation whose avowed objective is to detect biological activity on Mars.

Myths in the Making: There persist several ideas about Mars that can only be called “myths” at this time, as the evidence is mostly circumstantial so far. For example: There must be carbonates on Mars; we have just not found them. There must have been life in the past, and we simply need to find the remains. Or: We have already found the remains in certain martian meteorites. There was an ancient ocean on Mars. IR spectroscopy will unravel the mystery of martian mineralogy from orbit. Mars soil may be toxic to humans, and we can find out with remote measurements. Radiation is a potential hazard on the surface of Mars. Interesting sites on Mars will be found by remote IR sensing. Scientists want a human base on Mars so that they can explore one site with extreme thoroughness. The public loves Mars, and always will financially back it. “Total Recall” and “Mission to Mars” will increase public understanding of the red planet. Mars can be colonized. Mars can be terraformed.

Which of these modern myths will be proven true, and which proven false remains to be seen. As we strive to further the scientific exploration of this most diverse and accessible planet, is it not incumbent upon us to maintain balance, to temper expectations, and to interact with the public via imaginable ways of communicating the fascination of the red planet and the necessity of sustained, systematic investigations?