A Space Exploration

On Mars. Exploration of the Red Planet, 1958–1978. EDWARD CLINTON EZELL and LINDA NEUMAN EZELL. National Aeronautics and Space Administration, Washington, D.C., 1984 (available from the Superintendent of Documents, Washington, D.C.). xvi, 539 pp., illus. $20. The NASA History Series. NASA SP-4212.

In the popular mind, the sending of space probes to Mars for scientific exploration has always taken second place to the more dramatic manned flights around the earth and to the moon. Virtually every American is aware of the landing on the moon in 1969, yet few recall the two Viking landers that reached the surface of Mars in 1976. In this authorized NASA history, Edward and Linda Ezell help redress this imbalance with a well-documented and thoughtful account of American exploration of the red planet.

Two themes stand out. The first is the intense budgetary pressure that delayed the mission to Mars for over a decade and restricted the scope and effectiveness of the eventual Viking flights. The initial plans for a Mars probe, first Mariner B and then the more ambitious Voyager, fell victim to the priority given to Apollo by the Kennedy and Johnson administrations. Seeking to restore American scientific prestige in the wake of Sputnik and Yuri Gagarin's orbital flight, the Democratic presidents of the 1960's put a premium on landing men on the moon ahead of the Russians. When the escalating Vietnam war and the continuing demands of the Great Society created a financial squeeze, Lyndon Johnson focused all the available resources on Apollo, sacrificing the potentially valuable scientific results of planetary probes for the glamour of the moon landing. Only the insistence of NASA chief James Webb kept a scaled-down Mars program alive for the future.

In the 1970's, Webb's successors had to fight equally hard to preserve the Viking probes from budget cuts imposed by Congress and President Nixon. The flights were delayed for two years (probably a blessing in disguise, since the time was needed to perfect equipment for scientific experiments to be conducted on Mars) and the project scaled down to keep the cost under $1 billion. As Ezell and Ezell point out, many of the legislators who had lavished federal funds on Apollo were the ones responsible for the budgetary restrictions on Viking. As a result of the restrictions, those directing the project "had to think about money as much as about science"; fortunately, "ingenuity and good management" proved to be an acceptable substitute "for extra appropriations" (p. 251).

The second theme the authors stress is the search for life on Mars. From the outset, scientists were intent on landing instruments on Mars to determine whether life existed on the planet. In the 1960's, politicians gave equal emphasis to beating the Russians to the red planet, but after the moon landing had restored American pride the space race motivation gave way to scientific curiosity. Even the scientific community was not of one mind about the quest for life on Mars, however. Critics of the space program, notably Barry Commoner and Philip H. Abelson, questioned both the likelihood of finding life on Mars and the wisdom of devoting so many resources to space research "in a world that was underfed and potentially revolutionary" (p. 80).

Pictures taken by the Mariner 6 and 7 flyby missions in 1969, revealing a bleak, heavily cratered and desert-like surface, greatly reduced the expectation of finding life on Mars, but biologists thought that the only way to rule out the possibility was to conduct experiments on the planet's surface. Accordingly, most of the scientific payload on board the two Viking landers consisted of devices to discover whether any form of life had ever existed on Mars. A custom-made biological instrument about the size of a gallon milk carton and containing over 40,000 parts was designed to conduct three separate experiments to uncover the existence of microorganisms in the soil of Mars, and a gas chromatograph–mass spectrometer was used to analyze the soil for signs of organic matter. The biology instrument offered a few ambiguous results that did not rule out the existence of life, but the chemical analysis virtually doomed the life hypothesis by failing to give any positive evidence of the existence of organic compounds. Although some still believed that life might exist in isolated "oases" on Mars or near the polar regions, the authors conclude that on the basis of the Viking mission's findings "there is no visible flourishing life" on Mars (p. 412). All that remains is the remote possibility of, as the Viking biology team leader put it, "some scraggly form of life for which we just haven't found the right nutrients or the right location or the right incubation temperature or the right environment within which to show its presence" (p. 413).

Ezell and Ezell conclude that Viking proved to have unforeseen benefits that more than compensate for the negative findings on the existence of life. They stress the capable performance of the Viking management team and its ability, under tight fiscal controls, to land two spaceships safely on the Martian surface and conduct difficult experiments adroitly. Beyond the confidence gained from this performance, they also point out that the Viking mission revolutionized studies of the red planet, providing an abundance of new data about Mars itself and also about the origins of life on the earth. Mars, they argue, on closer examination "turned out to be a far more interesting place than anyone had predicted and more exciting than generations of scientists had expected" (p. 414).

The ultimate justification for the billion-dollar Viking program transcends the search for the existence of life on Mars. These flights were part of the greater human quest to conquer the unknown. The authors capture the sense of dedication that links the scientists and engineers who directed the Viking flights to the explorers and navigators of the Age of Discovery. Like their predecessors in the 15th and 16th centuries, these scientists and engineers overcame a host of complex technical challenges and political obstacles, adding significantly to what we know about one of our nearest but most mysterious neighbors in the sky.

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