Track 12

Mars: Our Neighbor in Space

Ever since people first looked up at the night sky, they have been fascinated by the planet Mars. When scientists started using telescopes to try to see the Red Planet, they wondered if there could be life on Mars. However, for hundreds of years, they could only ask questions. There was no way to actually travel to another planet.

When space exploration began in the 1960s, many countries sent unmanned spacecraft to Mars to find out everything they could about our nearest planetary neighbor in space. Unfortunately, only half were successful. Twelve missions landed on the surface, but only seven sent information back to Earth.

In spite of the numerous failures, astronomers all over the world are hopeful as each Mars mission approaches the Red Planet. For example, *Mars Observer,* an American spacecraft, was scheduled to move into orbit around Mars and begin sending new information back to Earth. *Mars Observer* was going to study the Martian atmosphere and surface. Unfortunately, scientists lost contact with *Mars Observer*, and the mission, which cost $845 million, failed.

In contrast, the United States' mission to Mars in 1996 was a great success. *Mars Pathfinder* sent back more images of Mars than all the previous Mars missions combined. More recently, in 2007, the *Mars Reconnaissance Orbiter* sent back to Earth more information than all other Mars missions put together. The *Phoenix Mars Lander*, in 2008, returned an enormous amount of data as well.

What kinds of information did the successful Mars missions obtain? In 1976, the *Viking* spacecraft searched for signs of life, but the tests that they performed had negative results. However, scientists wanted to investigate further into the possibility of life on Mars. This was the purpose of the unsuccessful *Mars Observer* mission in 1993.

Scientists' interest in the Red Planet is based on an assumption. They believe that 4.5 billion years ago, Mars and Earth began their existence under similar conditions. During the first billion years, liquid water—in contrast to ice—was abundant on the surface of Mars. This is an indication that Mars was much warmer at that time. Mars also had a thicker atmosphere of carbon dioxide (CO_2). Many scientists think it is possible that life began under these favorable conditions. After all, Earth had the same conditions during its first billion years, when life arose. At some point in time, Earth developed an atmosphere that is rich in oxygen, and an ozone layer. Ozone (O_3) is a form of oxygen. The ozone layer protects Earth from harmful ultraviolet light from the sun. While life not only began on Earth, it also survived and became more complex. In contrast, Mars lost its thick atmosphere of carbon dioxide. Ultraviolet radiation intensified. The planet eventually grew colder, and its water froze.

A biologist at NASA (the National Aeronautics and Space Administration), Chris McKay, has suggested three theories about life on Mars. One possibility is that life never developed. A second possibility is that life arose on Mars just as it did on Earth and survived for at least a billion years. The third is that life arose and simple organisms developed. When environmental conditions on Mars changed, life ended.

Since the early missions, spacecraft have mapped the planet's surface and have landed in better locations. The spacecraft have searched for simple life forms (microorganisms) as well as for signs of water. To date, none of the Mars missions has discovered any sure signs of past or present life. Nonetheless, scientists worldwide are not discouraged. If life ever existed on Mars, they believe that future missions might find records of it under sand, or in the ice. They are thrilled with the data they have obtained so far, and are planning a number of missions in the future. These missions might include airplanes or balloons, which can explore many different sites on the planet's surface.

Even if future missions discover no evidence of past or present life on Mars, scientists will look for the answers to other, intriguing questions. How is Earth different from Mars? Why did life develop here on our planet and not on Mars? Are we alone in the universe?