

## *Year of the Red Planet*

An International Wave of Interplanetary Exploration

It looks like 2004 will be a banner year for Mars exploration, as no less than seven unmanned spacecraft converge on the planet. Two are already there: NASA's Mars Global Surveyor and Mars Odyssey, which have been in orbit for some time. NASA has now launched another two spacecraft toward Mars, expected to arrive around the same time as two European probes and one from Japan.

Earlier this summer, NASA launched the twin rovers Spirit and Opportunity on their seven-month trip to the Red Planet. The dynamic duo together cost \$800 million. Each rover is nearly the size of a Volkswagen bug and weighs almost four hundred pounds.

The rovers will use the same landing method as the one employed by NASA's successful Pathfinder probe in 1997. During the descent through the Martian atmosphere, each rover will deploy a parachute to slow its fall, and then an air bag to cushion the landing. After bouncing and tumbling across the surface a few times, the entry vehicle will blossom like a flower, revealing the rover inside, which will then be free to poke around.

NASA has programmed the rovers to touch down on opposite sides of the planet. Their mission is to scour rock formations and soil for signs of a long-gone watery environment. The 1997 NASA mission found some evidence that water once flowed along the Martian surface—a possible indication that the planet was

once home to life. NASA's two orbiting satellites subsequently detected rock formations and soil movement that could signal the existence of underground water.

To accomplish their mission, the rovers are equipped with an array of geological tools, including a number of cameras, chemical and mineralogical analyzers, and a rock abrasion tool (the "RAT") which chews up rocks to expose new surfaces for study. They will comb the Martian surface for three months—or longer, if their solar panels can withstand Martian dirt and dust particles.

The European spacecraft, the Mars Express, was launched in June; it will enter Martian orbit in December and will proceed to map the planet's surface from above in more detail than any earlier effort. It will also deploy an additional craft, the British-made Beagle 2 lander, which will touch down on the planet's surface to study the climate and soil. Beagle 2, named for Darwin's ship *HMS Beagle*, will remain in one spot once it touches down, using a robotic arm with a drill attachment to obtain samples of rock. The lander will bake the samples at high temperatures until organic materials and rocks break down, leaving behind isotopes of carbon. An onboard mass spectrometer will then measure the levels of the different isotopes given off at each stage of the baking process. Different levels of carbon 12 and carbon 13 at various temperatures could offer researchers clues about the possibility of Earth-like life on Mars.

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The Japanese probe Nozomi (“Hope”), launched in 1998 and also set for arrival in December, will orbit Mars to study the planet’s upper atmosphere. With its sophisticated imaging camera, the craft will take pictures of sandstorms and other atmospheric phenomena, and study the interaction of the Martian atmosphere with the solar wind, and the process by which oxygen escapes from Mars into space.

The impetus for the sudden flurry of Mars missions is an unusually close approach be-

tween Earth and Mars. At 5:46 a.m. (Greenwich Mean Time) on August 27th of this year, the two planets will be only 34,646,418 miles apart, closer to one another than they have been since the long-gone morning of September 12, 57537 B.C. But we will not have to wait quite as long for the next near approach: the two planets will next come that close (in fact, a little closer) in August of 2287.

By then, perhaps all that Earthlings will notice is that the routine commute takes a bit less time.