

SCIENCE

A Closer Unexplored World: Oceans

By Margaret Wertheim

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By any assessment, the landing of the Spirit rover on Mars was a technological triumph. After a seven-month journey of more than 300 million miles, Spirit touched down with near-perfect precision at the center of the 40-mile-long ellipse that Jet Propulsion Laboratory scientists had marked out as the ideal site.

At the first jubilant press conference a week ago Saturday, an exultant NASA Administrator Sean O'Keefe said, "This was the functional equivalent of trying to get a hole-in-one with a ball hit from Tokyo to Paris."

The entire deployment and landing sequence proceeded like a dream. Rockets fired when they were supposed to, counteracting the destabilizing effects of wind; the parachute deployed at just the right moment — a fraction of a second later and the landing capsule could have been badly damaged. The final auspicious symbol of success was summed up in a phrase that echoed throughout the evening's commentary: the capsule had landed "base petal down." Given the tetrahedral configuration of the airbag-encased lander, there were four possible ways it could have ended up, three of which would have necessitated a tricky maneuver once the rover emerged from its protective sheathing. But NASA hit the jackpot. Spirit, had, so to speak, landed on its feet.

After the humiliating failure of the agency's last two Mars missions, no one involved this time around had dared to hope for such a spectacular outcome. O'Keefe's ecstasy was understandable. "We're back!" he declared.

The primary mission of Spirit and its robotic twin Opportunity (which is due to arrive on the opposite side of Mars on Jan. 24) is to look for water — or at least for concrete signs that water might once have flowed across this now-barren landscape. On Earth, water is the defining signature of life; there are organisms that can live without oxygen, but none that we know of that can live without water. The presence of H₂O at some point in Martian history would signal that the evolution of life there was at least possible.

The dual missions of Spirit and Opportunity have come with a price tag of \$840 million. In all, NASA has spent \$3 billion on Mars exploration over the last decade, much of it propelled by the dream that our nearest planetary neighbor might offer proof we are not alone in the universe.

Life is a miraculous thing, and evidence of it on another planet would be wondrous news indeed. But amid all this hoopla about microbes on Mars, I cannot help wondering why we aren't just a little more excited about the tremendous unexamined riches of life here on Earth.

Water is indeed the cradle of evolution, and our oceans teem with creatures we have barely begun to examine. Last October, the global Census of Marine Life reported on the first phase of its decade-long endeavor to catalog the marine world. About 210,000 marine life forms of all types are known to science, the report said. But it is estimated that perhaps up to another 2 million are waiting to be discovered.

During the first three years of the census, which involves more than 300 scientists from 53 countries and is the most comprehensive aquatic survey ever undertaken, nearly 500 new species of fish have been discovered. Just off the Florida Keys a new species of sponge has been found, maybe even a new genus. Bright red in color, it has been nicknamed the "Rasta sponge." According to the census report, chemical compounds within this organism could one day help to treat cancerous tumors.

Off Angola, census scientists exploring a deep-sea abyss have discovered an environment with more species per unit area than any other aquatic region known on Earth. About 80% of the collected species are entirely new to science — 500 so far, with perhaps another 500 to come.

Despite their importance for human life, oceans remain mostly unexplored and their inhabitants poorly understood. Tracking ocean life can "help policymakers respond appropriately to the consequences of changes in the ocean," says chief census scientist Ronald O'Dor.

Especially mysterious are the organisms that live at the bottom of deep-sea areas known as abyssal plains. Repositories of millions of years of sediment called "marine snow," abyssal plains are piled high in silt that in some places reaches a depth of about 3.1 miles, making it as voluminous as the ocean above. Abyssal plains turn out to be astonishingly fecund environments. So far they are known to contain at least 100,000 species and may harbor millions more. Many of those are likely to be various types of crustaceans and worms, but their sheer abundance and diversity are staggering.

Compared to the acres of newsprint devoted to the search for life on Mars, the Census of Marine Life has received scant press attention. Many scientists believe that if life ever existed on Mars, it is likely to have been millions of years ago and only in very simple form.

Rovers such as Spirit or the European Space Agency's Beagle 2, which presumably landed on Mars over Christmas but has failed to make contact with Earth, are not necessarily expected to find living organisms but, more likely, evidence of *past* biochemical activity. We cannot rule out the possibility of life on Mars today, but given the sterility of its current environment, the chances are slim.

While Spirit is scouting the Martian landscape and making front page headlines, marine creatures here on Earth, along with those of the tropical rain forests, are being killed off by pollutants and other human activities before we can even catalog them.

If life is so precious that we are willing to spend billions of dollars seeking it on another world, ought we not to be a tad more protective of its manifestations on our own? While I applaud the engineering skill that has landed Spirit on Mars, I cannot help but feel that anything it finds is unlikely to be as important — or frankly as interesting — as the Rasta sponge.