

# NASA pays the price of its dash for Mars

## Washington

The coming reorganization of NASA's Mars programme in the wake of last year's double spacecraft disaster effectively ends a short but intense chapter in the saga of Red Planet exploration. The story began on 7 August 1996, when a team of researchers told a packed audience of news reporters that they had found evidence of fossil life in a Martian meteorite known as ALH84001 (see *Nature* **382**, 565; 1999).

Almost four years later, few people believe that ALH84001 really does contain fossils, and there is little scientific interest in pursuing the matter any further. The ambitious Mars exploration programme inspired by that announcement, which was to have culminated in bringing samples back to Earth in 2008, has followed roughly the same arc — initial excitement, reality check and a pause to regroup.

That reassessment includes a fundamental question — should sample return still be the main focus of the project? Before the 'Mars rock' hit, NASA had a plan for Martian exploration — a patient, methodical approach blessed by the National Academy of Sciences and other advisory bodies. Returning samples from Mars was a goal, but not the priority.

But publicity from the Martian meteorite kicked the programme into a higher gear, and the space agency soon committed itself to launching a Mars lander and orbiter at every 26-month opportunity and starting sample collection in 2003. NASA asked for, and Congress approved, a little more money for this accelerated programme, but not enough.

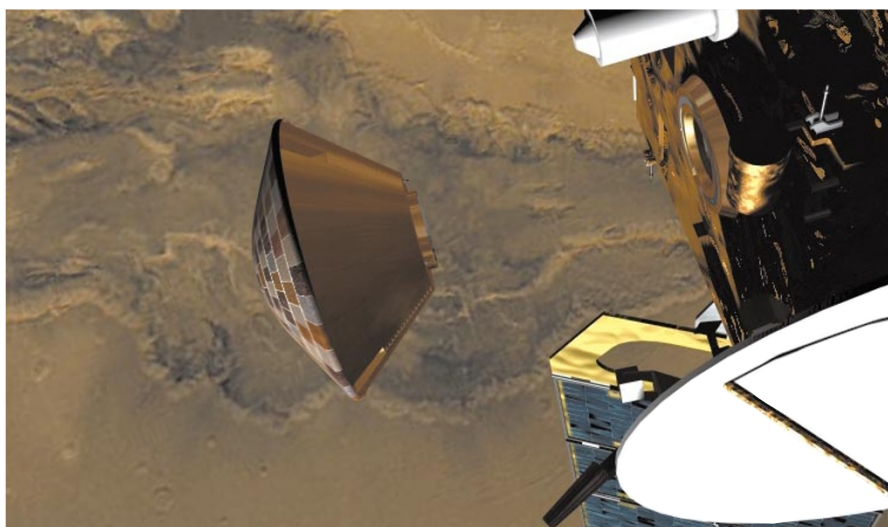
Two reports issued last week on the loss of the Mars Polar Lander and Mars Climate Orbiter (see [www.jpl.nasa.gov/marsreports](http://www.jpl.nasa.gov/marsreports)) make a convincing case that the projects were doomed from the outset by a lack of money, people and time.

## Leisure programme

Now, as Cornell planetary scientist Steven Squyres, who is building the scientific payload for the next US Mars lander, says, "we have pushed the reset button". The 2001 lander is cancelled, and the 2003 sample return will almost certainly be delayed two years or more.

NASA science chief Ed Weiler now talks about a more leisurely ten-year programme instead of the enforced every-two-years pace. "Everything is on the table," says Squyres, as NASA sits down once again to reshape its Mars exploration "architecture", the next version of which is due this summer.

It is not even certain that the existing, worryingly complex plan for sample return — involving a US lander and rover, a small US rocket to lift samples off the surface, and a French orbiter to collect the samples and bring them back to Earth — will survive in its



Better luck? Britain's Beagle 2 is set to be the next craft to land on the surface of Mars.

current form. That undoubtedly is causing some anxiety at the French space agency CNES, which has signed up for a \$400 million role in the sample return mission.

But scientists may be relieved. Arizona State University planetary scientist Ronald Greeley, who chairs a NASA advisory committee on Mars exploration, says this hiatus gives us an opportunity to look at science goals from grass roots with all "artificial constraints" removed.

## Landing problems

Most planetary scientists believe a Mars sample return is still called for eventually, but it will have to overcome several hurdles, starting with the landing on Mars. The last — and so far only — precise touchdown on the planet's surface were by the Viking spacecraft in 1976. Following the Mars Polar Lander's crash, says Squyres, "we don't have a validated way to land, other than the Mars Pathfinder airbags". Engineers considering the next generation of lander will have to choose between airbags, legs or some other mechanism such as crushable skids.

NASA will also need to develop a means of avoiding very rough landing sites, which may require that a small, cheap lander, airplane or other scout be sent to investigate the site beforehand — a conclusion reached by a NASA-sponsored sample return workshop held several months before the Mars rock accelerated the programme.

If the driving force behind a sample return mission is the search for evidence of past or present life, scientists will have to develop clear "biomarkers" that can unambiguously settle the question of whether a returned sample contains evidence of biology. Those biomarkers do not yet exist, which partly accounts for some scientists' reluctance to rush headlong into sample return. According

to Greeley, the research community is divided between those who believe any returned rock would teach us much about Mars, and those who think we should wait until we know what we are searching for.

"Sample return has to take place in the context of a broader understanding of the planet," says Squyres. "There's clearly a place for both sample return and *in-situ* science. The real questions is, in which order does it make the most sense to do things."

That matter has already been settled by NASA's abdication of the 2001 landing opportunity. The next spacecraft firmly scheduled to touch down on Mars — if private funding comes through to supplement the British government's \$13 million investment — is the tiny Beagle 2 lander that will ride along with the European Space Agency's Mars Express orbiter to be launched in 2003.

The \$40 million lander, the brain child of Colin Pillinger of the Open University, has an exobiological focus but modest scientific goals, according to Andre Brack of the Centre de Biophysique Moléculaire in Orleans, France, who chairs the science team for Beagle 2.

The lander, which will use Pathfinder-style airbags to cushion its fall to the surface, will be equipped with a robot arm and a 'mole' for digging a few tens of centimetres below the surface. The main objective, says Brack, is simply to find organic material underneath the topmost layer of soil.

Viking failed to find organic material on the surface, and effectively killed interest in returning to Mars for two decades, says Brack. If Beagle 2 could pick up where Viking left off, it would be a great contribution. Not fossils perhaps, but the beginning of a new and more patient effort to understand Mars.

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