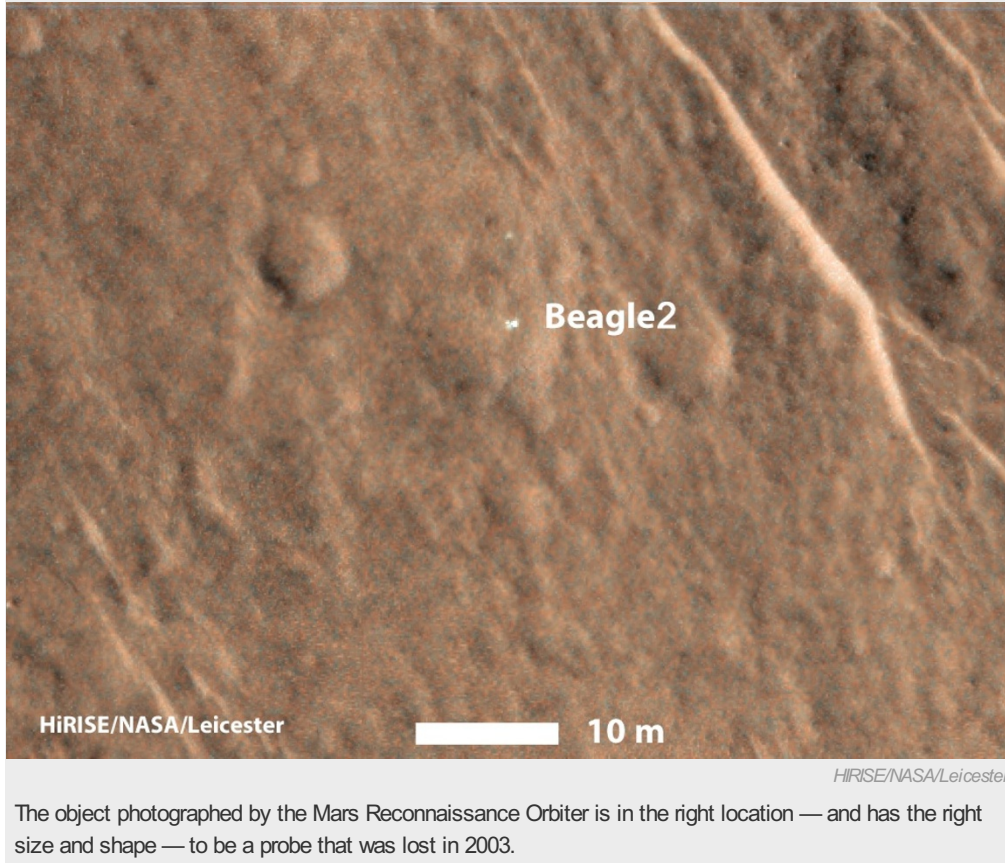


British Mars lander find is bittersweet victory

Beagle 2 touched down softly in 2003 but failed to deploy or contact home.

Elizabeth Gibney

16 January 2015



Beagle 2, the British-built Mars lander that mysteriously disappeared on Christmas Day 2003, has probably been spotted on the red planet. Images from NASA's Mars Reconnaissance Orbiter suggest that the craft landed successfully but then failed to open fully.

Although the images are not conclusive, mission manager Mark Sims told journalists at a briefing in London that he was "very confident" that NASA had found the missing craft.

The blurry images (see [picture](#)) show a reflective shape on the surface that fits with a scenario in which Beagle 2 landed and opened some, but not all, of its solar panels. Only with all four panels opened would it have been able to unfold its antenna and call home.

The £50-million (US\$76-million) mission was led by a group of British scientists on a relative shoestring, and was designed to detect organic matter and search for traces of life on Mars.

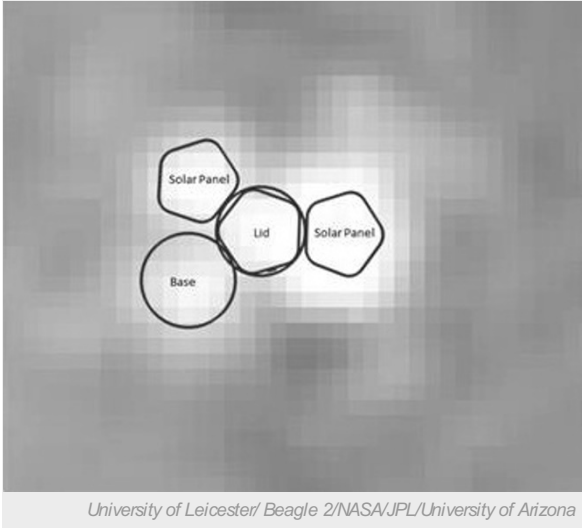
Having hitched a lift on the European Space Agency's Mars Express mission, Beagle 2 separated from the parent craft on 19 December 2003. It should have landed at the Isidis Planitia region on Christmas Day, but was never heard from again.

If the images do show Beagle 2, they suggest that the craft's complicated entry, descent and landing sequence — which involved a parachuted descent followed by a series of bounces across the Martian landscape that was cushioned by air bags — worked as planned, says Sims. But the team can only speculate as to why after bouncing about 500 metres from an initial touch-down it then failed to open, he adds. "The most probable scenario is bad luck," says Sims.

Even though multiple spacecraft orbit Mars and have been photographing the planet's surface, finding Beagle 2 took 11 years largely because of the difficulty in spotting a 2-metre-wide craft in a landing zone that was 60 kilometres long by 10 kilometres wide, says Sims.

Only with the Mars Reconnaissance Orbiter's High Resolution Imaging Science Experiment camera, which has a pixel resolution of about 25 centimetres and came online in 2006, was there a decent chance of finding it with any certainty, he adds. "There are an awful lot of rocks the size of Beagle 2. It was a needle-in-a-haystack job."

At the briefing, John Bridges, a planetary scientist at the University of Leicester, UK, who commissioned the latest images, laid out the evidence for the object being Beagle 2. The site is just 5 kilometres from the centre of the target landing area, he said, and it is the right distance from other objects that could be its jettisoned parachute and rear cover.



The object thought to be the lander also has the right shape, size, colour and reflectivity, and casts almost no shadow, as would be expected for the pocket-watch-shaped Beagle 2, said Bridges. "This not a pile of rocks or sand, it is an alien object," he added. The site differs from the patch of Mars where the team thought it might have found the lander in 2005.

The resolution of the pictures makes it difficult to determine the craft's exact configuration. Beagle 2 may have unfolded one, two or three of its solar panels. Its lid was designed to open up and unfurl each of four panels in turn, so the opened craft would resemble a flower.

Why this did not happen is a matter of speculation, says Sims. When bouncing, the probe could have come down on a rock, or been unfortunate to land edge-on, where it was least protected by its air bags. Just like a tin of beans is more difficult to open if its lid is dented, a damaged probe would

have struggled to deploy some of the solar panels, says Sims.

Beagle 2 might also have landed with a bigger bump than it was able to withstand. Data taken by the Mars Express orbiter after it released the lander suggests that the planet's atmosphere may have been thinner than usual, so it might not have slowed the descent sufficiently.

Yet another scenario is that one of the air bags failed to detach during landing and interfered with the deployment of the solar panels. Some interpretations of the images suggest that an air bag is still attached, although the tan colour of the bags makes them difficult to pick out, Sims adds.

Sims says that there are lessons to be learned from Beagle 2's fate. If he were to do the mission again, he would use a crushable air-bag system that deflates on landing. He would also put the antenna on the outside, so that contacting Earth would not depend on all the solar panels unfolding. Constraints on the mass and volume of Beagle 2 meant that this was not possible at the time, he adds.

Beagle 2 may well have images of its landing site and accelerometer data from its descent still stored in its memory, says Sims, which makes it bittersweet to find it still in one piece but be unable to communicate with it. "I've spent every Christmas Day since 2003 thinking about Beagle 2. I'm elated that we've found it, but at the same time it's extremely frustrating," he says.

The discovery is also tinged with sadness because Colin Pillinger, the mission's charismatic leader, did not live to see the mystery solved. Pillinger, a planetary scientist at the Open University (OU) in Milton Keynes, UK, died in May last year.

Monica Grady, also a planetary scientist at the OU and a long-time friend of Pillinger, says that he was always convinced that Beagle 2 had landed safely and suffered only from bad luck, not poor design.

"He would have been in his element today," she says. Finding Beagle 2 intact would no doubt have led him to speculate about launching a mission to get it working again, however unlikely it would be that such a plan would get funding, she says. "I could imagine going back to the OU on the train with Colin, with him already drafting the grant proposal."

