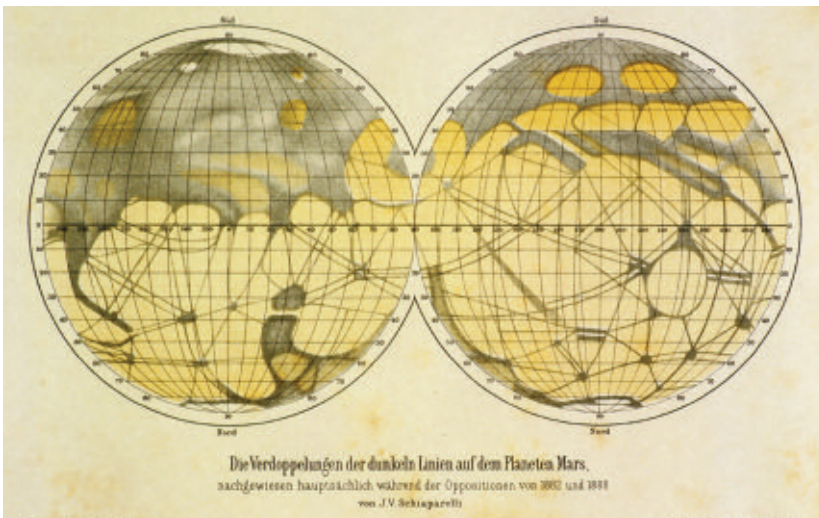


Mars Express

GCSE key words
Ideas and evidence

The idea of life on Mars has intrigued scientists for centuries. The Mars Express mission aims to find out more.



A map of the surface of Mars made by the Italian astronomer Giovanni Schiaparelli between 1882 and 1898. Schiaparelli called the straight surface features *canali*, and noticed that the patterns on the surface changed with the Martian seasons. He wrongly assumed this to be due to seasonal changes in vegetation. It is now known that Mars is swept by powerful dust storms which alter the surface features

On 2 June, at 6.45 p.m., the Mars Express mission blasted off from the Russian launch site at Baikonur in Kazakhstan. This is the first European mission to another planet. It is due to reach Mars on Christmas Day — look out for the nail-biting moments as the UK-built *Beagle 2* lander descends to the planet's surface!

Nineteenth-century astronomers had telescopes which were good enough to allow them to see some detail on the surface of Mars. In 1877, Giovanni Schiaparelli drew maps showing what he thought were channels — *canali* in Italian. Unfortunately, English-speakers translated this as canals, and decided they were evidence of major engineering works on the planet. They thought that the canals linked major Martian settlements, and that they carried water from the wetter poles to the deserts close to Mars's equator.

Better telescopes showed that this was simply wrong, an incorrect interpretation of limited information. However, even in the 1960s, many scientists believed that Mars might be a lush planet supporting life similar to that on Earth. The first spacecraft to visit the planet, *Vikings 1* and *2* in 1976, showed that the surface of Mars, at least, is dry and rocky.

Detlev van Ravenswaay/SPL

http://beagle2.open.ac.uk



Above: False-colour scanning electron micrograph showing a tube-like structure found on a meteorite which came from Mars. These structures could be fossils of primitive microscopic organisms that lived on Mars more than 3.6 billion years ago

Left: A simulation of Beagle 2 on the surface of Mars

A SHORT TRIP

Mars Express is called 'express' because it has been designed and built quickly, not because it will be travelling especially quickly. In fact, its cruising speed is about 10 800 km/h. It has been built to catch a window of opportunity, as Mars's orbit brings it close to Earth, something which happens roughly every 22 months. This means that the distance it has to travel is at a minimum. Even so, it will take over 6 months to complete its journey of over 75 million km.

The spacecraft was launched on a large Soyuz rocket. An extra stage, the Fregat ('freight'), was needed to carry the craft, which is about the size of a small car. The craft is in two parts:

- the orbiter, which will travel around Mars
- the lander, *Beagle 2*, which will drop down to the surface

The orbiter carries seven different instruments which will look at such things as the land surface, minerals and the planet's atmosphere. It will also take high-resolution stereo photographs. At the same time, it will upload data from *Beagle 2* and radio it back to Earth.

MINIATURE DEVICES

Beagle 2, designed by a team based at the Open University, is a remarkable device. The developers were told that there was a limit of 60 kg within which they must work. The instruments they felt they needed would normally occupy a large lab; they have been miniaturised and automated within the limit set by the European Space Agency (ESA).

On Mars *Beagle 2* will be able to analyse gases and rocks. It carries a range of environmental sensors and



Above: Professor Colin Pillinger, the scientist leading the Mars Express project, with a model of Beagle 2

a stereo camera, and it will even be able to dig down below the soil surface to collect rocks unaffected by the Martian atmosphere. All this is contained in a package less than 1 m across.

SIGNS OF LIFE

What will *Beagle 2* be looking for in the materials it samples? Surprisingly, we already have samples of Martian rocks to examine. These arrived in the form of meteorites. It seems that, at some time in the past, a major collision, perhaps with a comet, blasted rocks from the surface of Mars. A few pieces ended up on Earth, attracted by its gravity, and have been collected. These meteorites have a different composition from others, suggesting a different origin.

There was great excitement in 1996 when NASA scientists announced that they had found traces of ancient life, similar to earthly bacteria, in one of these meteorites. There was also great scepticism, and everyone agrees that more evidence is needed to confirm the hypothesis. Hence *Beagle 2*. It will look for oxygen and methane in the atmosphere — since methane is readily oxidised, any free methane would be a sign of an existing source.

It will also measure the proportions of different isotopes of carbon in the soil and rocks. On Earth, living organisms tend to have a higher proportion of the lighter isotope, carbon-12, than is generally found. Rocks formed from living material therefore have more carbon-12. If this is the case in the Martian rocks it will be a sign that Mars once supported life.

Mars Express is a project of ESA, the European Space Agency. ESA has 15 member states, including the UK.

- Find out more about Mars and the Mars Express mission at <http://www.new-media.co.uk/space/>