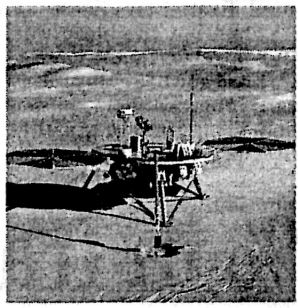
Landings on Mars



Mars, amongst all extraterrestrial planets of our solar system, continues to attract our attention most, as it is relatively close to the Earth, seems to bear resemblance to it and holds out the possibility of life, in the past if not in the present. That is why it is part of space programmes of the leading nations possessing space technology.

Historically the Soviet Union got there first. In 1971 the Soviet probes Mars 2 and Mars3 reached Mars but in the process of getting down to the surface, their landers did not survive: they crashed. But they can be identified as the first terrestrial hardware to touch the Martian surface. The orbiter parts of these probes, however, performed successfully, producing pictures and data of the Martian surface, between December 1971 and March 1972. Thus important information was obtained on Martian gravity and magnetic fields. Relief maps of the surface were also provided.

A more spectacular visit to Mars was in 1976, by the American probes Viking 1 and 2. These had landers that managed to achieve soft landing and so could work with on-board instruments which had remained intact. There was a provision for conducting a couple of chemical and biological experiments to check if primitive life is present on Mars. On the basis of their results it was claimed that life does not exist on Mars.

Nevertheless, these experiments are now considered to be rather inconclusive and the issue of life on Mars remains open. After a gap of over twenty years, NASA began a new series of Martian probes with the aim of robotic observations of the red planet. Thus in 1996 the Global Surveyor was launched, followed by the Pathfinder. Two exploration rovers were sent to Mars and they soft-landed on the planet in 2004, on January 4 and 25 respectively: about five years ago today. The robotic technology had advanced over this period so that these rovers could be commanded to do several things, including of course, moving in the neighbourhood. The primary goal set for them was to find evidence, if any, for the presence of water on the planet, if not today, then in the past. There are several indications that canals of water existed on Mars in the past. Geological evidence for example, in the Meridiani Plenum shows mineral deposits of hematite which suggest a wet past for Mars.

Only time will tell if these conjectures are correct. Eventually human landing will be attempted. But for that to happen, the logistics of landing, survival and take off will have to be thoroughly mastered. For example, the tried and trusted method of parachute does not work on Mars because of the low density of its atmosphere.

To avoid crashing on hard ground the method of retro-rockets is used to reduce the downward speed. Although we are today considerably better informed about the atmosphere and surface topography of Mars, the tantalising question about life on Mars remains unanswered.

Astrophysician Jayant Narlikar and Thanu Padmanabhan, theoretical physicist, will contribute to **DNA**'s *special series through 2009, designated the International Year of Astronomy.*