Rendezvous with the RED PLANET

Have a desire to meander on Mars? Yearn to say things like "Greetings Earthlings", and mean it? Feel a need to travel with others, packed like sardines, for months at a time? If you answered "yes" to all three, here's the bad news: you've got Martian madness. The good news is: you could be rolling in the red dust during your lifetime.

Mars might still be a mystery, but we're learning more all the time. And with each scientific breakthrough, we're one step closer to making more extraterrestrial footprints. For a rendezvous with the Red Planet, just find some room, strap yourself in, and blast off...

Courtesy NASA; Shuttle by Eyewire

MARS IN YOUR FUTURE

BY KEN HEWITT-WHITE

You're a time traveller and you've turned back the clock three ***billion*** *years. You're standing on a sandy beach looking out across a vast ocean. The water looks inviting. You wonder what creatures are swimming beneath the waves. The sea breezes are warm and the sky is blue.*

Returning to today's date, you look around the same area and realize that something has gone terribly wrong. The ocean has disappeared! The air is incredibly thin and contains poisonous carbon dioxide instead of oxygen. (Relax, you're wearing a protective suit.) There's more: the wind is howling and the temperature is almost 100° below zero. The entire planet has turned into a frozen, dusty desert.

What planet, you ask? Try Mars. Planetary scientists think that Mars may have enjoyed a warm, wet climate early in its life but eventually it turned cold and dried up. What went wrong? The experts hope to find out as they explore Mars "up close and personal" with the latest fleet of spacecraft.

As I write these words, *2001 Mars Odyssey* has just begun orbiting the Red Planet. It joins another probe, *Mars Global Surveyor*, that's been circling Mars for five years. *Global Surveyor* is imaging the surface of Mars in minute detail. *Odyssey* will help out, then stick around to act as a relay station for the next wave of Martian explorers now under construction.

We've been fattening the file on Mars for nearly four decades now. In fact, more probes have sailed to Mars than to any other planet. There are two main reasons for this. First, Mars is the only planet that displays identifiable ground-level features in our telescopes. While Mars is only half as big as Earth, it has roughly the same surface area as all the continents put together. Those unexplored landscapes beckon us.

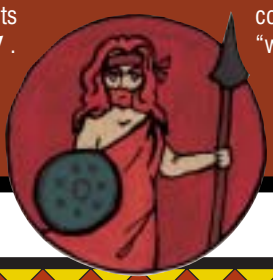
Second, Mars is not far away—at least in astronomical terms. Because our robotic probes can get there in only a few months, the Sun's fourth planet has become a prime target for astronomers. But there's a catch.

Our launches are restricted to the brief intervals when Mars is closest to Earth. The periods occur 26 months apart during an alignment called "opposition". At worst, Mars can be almost 400 million kilometres away, but an opposition closes that gap to less than 100 million kilometres. Once every 15 to 17 years, an especially favourable opposition allows Mars to swing to within 56 million kilometres of Earth. This provides mission planners

Spaceship by Eyewire; Others courtesy NASA

THE MARTIAN CHRONICLES

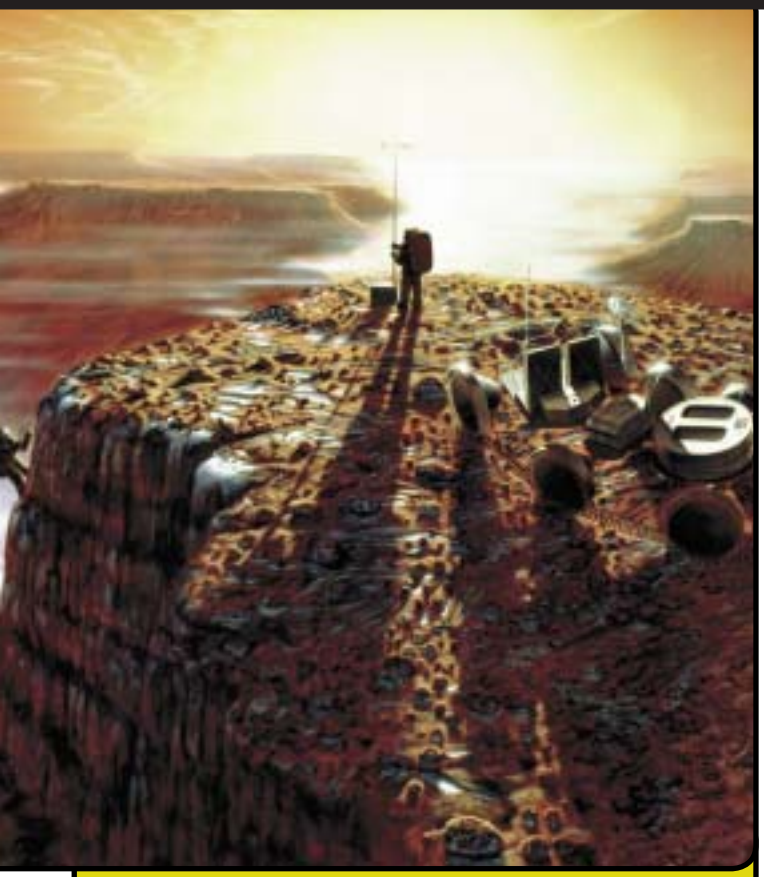
Roman Mythology Associated with the colour red, the Roman god of war, Mars, gives the fourth planet from the Sun its name. The god's shield and spear also give the planet its symbol: ♂ .



500 BC The Greeks recognize that some heavenly bodies—including Mars—are not stationary but instead wander across the night sky. As such, our word "planets" comes from the Greek word for "wanderers".

140 AD Greek astronomer and geographer Ptolemy believes Earth is the centre of the universe and that all the planets revolve around it. His geocentric (or Earth-centred) view of the universe stays in favour for about 1,400 years!

Illustrations by Karen Miyakawa © 2001



An artist's vision of astronauts setting up a weather station just after sunrise in the Noctis Labyrinthus area of Valles Marineris.

with the ultimate launch window.

That window is wide open right now. Mars has been inching closer and closer to Earth at recent oppositions and will be at the minimum possible distance of 55.1 million kilometres during its next line-up in August 2003. Partly because of this sequence of close encounters, six spacecraft have been directed at Mars in the last five years—and more are being planned.

Some of those probes have opened our eyes to new Martian vistas. For example, in 1997 *Mars Pathfinder* landed in a vast, sloping plain strewn with rocks. Scientists think that the boulders were swept into the area during a huge flood over two billion years ago. Signs of water are everywhere. Where did all the water go?

In 2000, *Mars Global Surveyor* gave us another eye-opener. While charting Mars's northern hemisphere, *Global Surveyor* discovered a remarkably flat lowland that might have been a seabed billions of years ago. If an ocean existed there, did life get a chance to develop?

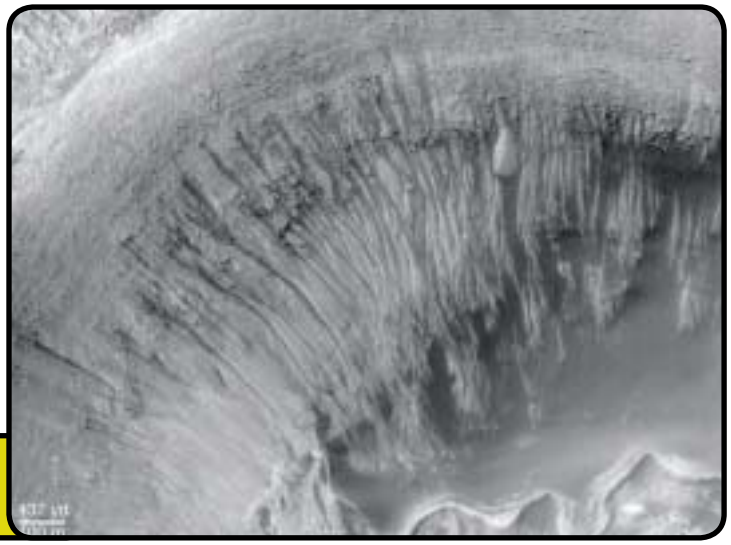
One of the goals of *Mars Odyssey* will be to look for evidence of water-ice on or near the surface of the planet, especially in those northern lowlands. *Odyssey* will also use special sensors to detect minerals that would most likely have formed in water.

Water is the key. Did water flow on Mars long ago? Is any liquid water left today? Could thirsty microbes be hibernating in the Martian rocks? These are the biggest questions scientists have about Mars today. The answers might come from the orbiters, landers, and rovers that will explore Mars in the coming years.

You can be part of that exploration. It's easy to keep track of the ongoing adventures on the Internet and in magazines. This issue of *YES Mag* is a good place to start. Our special theme section has lots of information and pictures about the discoveries mentioned here, plus more on the prospects for Martian life, and even a feature describing what life would be like during a human mission to Mars.

After all, you might go there someday. Ultimately, astronauts will stroll across the rust-coloured sands of Mars and examine all that fascinating geology in person. Study hard and you could be part of the crew.

The exploration of the famous Red Planet is just now beginning. Buckle up and enjoy the ride.



A Martian meteor crater shows many narrow, eroded gullies, an indication that a liquid—probably water—once flowed.

Courtesy NASA, JPL, Malin Space Science Systems

1543 Polish astronomer Nicolaus Copernicus publishes a book in which he concludes that the Sun must be the centre of the solar system and that the planets must revolve around it. Legend has it that Copernicus first receives a printed copy of his book as he lies on his deathbed.

1609 Galileo Galilei, an Italian astronomer, hears about a new invention called a telescope. Unable to run down to a Renaissance version of Wal-Mart and buy one, Galileo makes his own telescope and starts studying the Sun, Moon, and planets.

1609 Abandoning the long-held belief that the planets move in perfect circles, German astronomer Johannes Kepler proves the orbit of Mars is an ellipse, not a circle.

1659 Best known for inventing the pendulum clock and discovering Saturn's rings, Dutch philosopher and scientist Christiaan Huygens makes a drawing showing surface features on Mars.