

# THE MOON

The Moon is Earth's single natural satellite. The first human footsteps on an alien world were made by American astronauts on the dusty surface of our airless, lifeless companion. In preparation for the human - crewed Apollo expeditions, NASA dispatched the automated Ranger, Surveyor and Lunar Orbiter spacecraft to study the Moon between 1964 and 1968.

NASA's Apollo program left a large legacy of lunar materials and data. Six two - astronaut crews landed on and explored the lunar surface between 1969 and 1972, carrying back a collection of rocks and soil weighing a total of 382 kilograms (842 pounds) and consisting of more than 2,000 separate samples.

From this material and other studies, scientists have constructed a history of the Moon that includes its infancy. Rocks collected from the lunar highlands date to about 4.0 - 4.3 billion years old. The first few million years of the Moon's existence were so violent that few traces of this period remain. As a molten outer layer gradually cooled and solidified into different kinds of rock, the Moon was bombarded by huge asteroids and smaller objects. Some of the asteroids were as large as Rhode Island or Delaware, and their collisions with the Moon created basins hundreds of kilometers across.

This catastrophic bombardment tapered off approximately four billion years ago, leaving the lunar highlands covered with huge, overlapping craters and a

deep layer of shattered and broken rock. Heat produced by the decay of radioactive elements began to melt the interior of the Moon at depths of about 200 kilometers (125 miles) below the surface. Then, for the next 700 million years - from about 3.8 to 3.1 billion years ago - lava rose from inside the Moon. The lava gradually spread out over the surface, flooding the large impact basins to form the dark areas that Galileo Galilei, an astronomer of the Italian Renaissance, called maria, meaning seas.

As far as we can tell, there has been no significant volcanic activity on the Moon for more than three billion years. Since then, the lunar surface has been altered only by micrometeorites, by the atomic particles from the Sun and stars, by the rare impacts of large meteorites and by spacecraft and astronauts. If our astronauts had landed on the Moon a billion years ago, they would have seen a landscape very similar to the one today. Thousands of years from now, the footsteps left by the Apollo crews will remain sharp and clear.

The origin of the Moon is still a mystery. Four theories attempt an explanation: the Moon formed near Earth as a separate body; it was torn from Earth; it formed somewhere else and was captured by our planet's gravity, or it was the result of a collision between Earth and an asteroid about the size of Mars. The last theory has some good support but is far from certain.

\* First spacecraft impact on the Moon: Luna 1 (USSR), 1959.

\* Discovery that the lunar farside consists almost entirely of highland regions, with no maria (large dark basins): Luna 3, 1959.

\* Investigation of the details of the lunar surface by the U.S. Ranger 7, 8, and

9 spacecraft in 1964-1965 revealed a gently rolling terrain with no sharp relief; there is a layer of powdery rubble, with rocks and craters down to at least one meter in diameter everywhere.

- \* Diana, or Luna, is the Roman goddess of the Moon, animals, and hunting.
- \* The Moon is the Earth's natural satellite.
- \* The Moon's average distance from the Earth is 238,328 miles.
- \* The Moon has only one-sixth of the Earth's gravity.
- \* The Moon's diameter is 2,155 miles.
- \* The Moon's surface is either hot or cold.
- \* The Moon has no magnetic field.
- \* The Moon has light and dark areas (highlands and seas).
- \* Huge meteorites bombarded the Moon's surface and left hundreds of thousands of impact craters.
- \* The Moon passes through phases as it travels around the Earth.
- \* Human beings have landed six times (12 men) on the Moon.
- \* Eight hundred and forty-two pounds of rock and soil samples have been returned from the Moon.
- \* No life, no water, and no oxygen have been found on the Moon.
- \* The Moon has also been studied by the unmanned Ranger, Surveyor, Lunar

*Page 4*

Orbiter and Russian Luna landings.

\* High and low tides on Earth's oceans are affected by the Moon's gravitational pull.

\* The question "Where did the Moon come from?" has not been answered.

Source: NASA