

FYI

Objects in the Solar System

The solar system is full of rubble, most of it left over after our solar system's sun, planets, and moons formed 4.6 billion years ago. The rubble orbiting around the sun is divided into different types:

- **Meteoroids** are solid objects moving in interplanetary space. They are composed of rock, a combination of nickel and iron metals, ice, or a mixture of these materials. Scientists prize all types of meteoroids, which are known as **meteorites** once they reach Earth's surface. They hold clues to the nature and composition of the early solar system as well as to the possible existence of life on other worlds.
- **Asteroids** are also solid objects in orbit around the sun. In fact, there is no difference between asteroids and meteoroids other than size, with asteroids larger than meteoroids. Most of the asteroids in our solar system orbit the sun between Mars and Jupiter in what is called the **asteroid belt**. This "belt" contains about 100,000 asteroids. However, some asteroids orbit the sun in very elliptical paths that cross planets' orbits. A collision between Earth and one of these asteroids was likely responsible for a mass extinction of life, which included the dinosaurs, that occurred on Earth 65 million years ago.
- **Comets** are also part of the debris left over from solar system formation. They are small astronomical bodies that are a mix of rocks, dirt, and ice. Billions of these chunks orbit the sun far out in the Oort Cloud, well beyond the planets. At that distance, these chunks of ice and dust cannot be seen. However,



Figure 1-6: Photograph of a meteorite—the name given to a meteoroid once it has landed on a planet—found on the surface of Mars

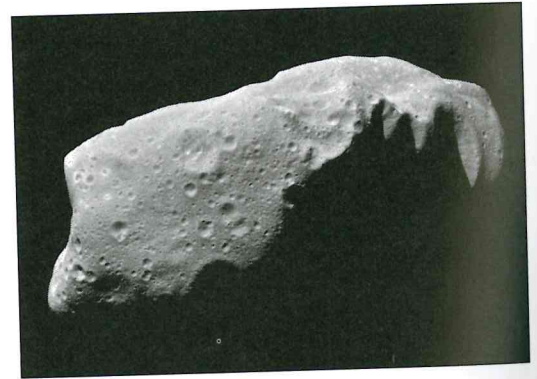


Figure 1-7: Photograph of the asteroid Ida



Figure 1-8: Photograph of Comet Halley

occasionally something happens to change the orbit of one of the chunks and bring it much closer to the sun as it orbits. When this occurs, the sun's heat causes the ice to sublime—to change directly from a solid to a gas. The resulting gas and released dust, pushed by the solar wind, flow out from the chunk, or nucleus, forming a tail. The nucleus is almost invisible as it is surrounded by gas streaming out from it. The tail is visible because the dust in it reflects light and the gas in it fluoresces in sunlight.

- **Dwarf planets** are defined in the IAU resolution from August 2006. At the time of the definition, the solar system contained three worlds recognized as dwarf planets: Pluto, Ceres, and Eris. Eris, the largest known dwarf planet in the solar system at about 2400 kilometers in diameter, orbits the sun in a region just beyond the Kuiper belt. (The Kuiper Belt is a region of the solar system that extends from the orbit of Neptune out to a distance of 55 AUs.) Ceres, considered an asteroid before the August 2006 IAU resolution, is about 1000 kilometers across, or about one-third the diameter of the moon, and is located within the asteroid belt.



Checking In

1. In what ways are the various types of objects in the solar system different from one another?
2. In what ways are they similar?



The worlds in our solar system (diameters to scale, distances between planets not to scale)