



FIGURE 3.4

Model of Solar System drawn to approximate size. The nine planets orbit around the Sun in the same direction and in nearly the same plane with clockwise regularity -- implying a common origin. The density chart shows the relative densities of the Sun and its planets; the density (ratio of mass to volume) of water is 1.0. The Earth has the highest density -- 5.5. The Sun contains 99.9% of the total mass of our Solar System! Thus, the planets are held in orbit by virtue of the Sun's gravitational attraction.

The terrestrial or inner planets consist chiefly of the earthy materials (silicon, magnesium, iron, etc., combined with oxygen), while the outer planets consist mostly of gaseous and icy materials. The terrestrial planets are thought to have lost considerable mass and size due to their gaseous components being driven off by solar winds.

Stars are born, live, and die within their galaxies. Toward the end of their lives, a few very large stars will collapse and then explode into supernovas.

One or more such supernova explosions, scientists believe, manufactured the basic elements of which the Solar System, including planet Earth, is composed. About 4.6 billion years ago, the Solar System is thought to have condensed from the nebular cloud of gas and dust particles produced by its most recent ancestral supernovation. The basic formation of any solar system includes a dominating, central proto-sun which is surrounded by lesser planets that have also condensed from the original disk-shaped nebular cloud.

The Sun, of course, is the star of our Solar System. It is a giant nuclear reactor, which by its constant conversion of hydrogen to helium supplies energy to Earth. Figure 3.4 depicts the Earth's position in the Solar System and helps visualize the giant mass of the Sun which holds the planets in captive orbit around it through the force of gravitational attraction.

The Planet Earth. Earth is in many respects a very special cosmic body. Most stars appear to be composed chiefly of hydrogen and helium, while the Earth is composed largely of heavier elements.

Moreover, while the Earth appears to have received an allotment of materials not greatly different from that of its close neighbors, the