



**FIGURE 8.1** Estimated mass (in units of the Earth's mass) as a function of semimajor axis for bodies orbiting the Sun. Planets are labeled with their initials. (The dwarf planets Ceres, Pluto, Makemake, Haumea, and Eris are labeled with lowercase initials.)

from the Sun.<sup>2</sup> The characteristics of the two families are compared and contrasted in Table 8.1.

Any useful theory for the origin of the solar system must explain the observed differences between terrestrial and Jovian planets. In addition, the following questions should be addressed:

- Why are planetary orbits nearly circular?
- What is the nature and origin of the small “debris,” such as comets and asteroids?
- What is the origin of the planetary satellites?
- Why are there differences in chemical composition among bodies in the solar system?

<sup>2</sup>The dwarf planets Ceres, Pluto, Makemake, Haumea, and Eris don't fit into this scheme. Ceres resembles the rocky satellites of the solar system, while Pluto resembles the icy satellites. The properties of Makemake, Haumea, and Eris are as yet poorly known, but their high albedo, or reflectivity, indicates that they have icy surfaces.