



# REMNANTS OF THE PAST

Orbiting our sun are planets and small bits of rocky and icy debris that did not get incorporated into planet building (usually because they were disrupted by the gravitational fields of competing planets). **Asteroids** are rocky space debris. **Comets** are icy space debris. **Meteoroids** are tiny asteroid or comet fragments, commonly the size of pebbles. 3000 metric tons worth of meteoroids collide with Earth's orbit every day. During descent, frictional heat causes meteoroids to glow, producing a **meteor**—a streak of light that shows up against the night sky.

Most meteoroids completely burn up enroute to the surface. About 100 each year survive the fall. These are called **meteorites**. Most meteorites are tiny and are never recovered. Larger meteors fall on a more infrequent basis, every couple thousand or million years depending on size. These often break up during descent into smaller pieces that create impact **craters** when they land.

While a few rare meteorites are pieces of the crusts of the Moon or Mars, all the rest are **4.6 billion years old and remnants of the formation of our solar system**. By studying meteorites, we learn about the age, composition, and formation of the planets (spheres of accreted asteroids and comets and gas). 8% of all meteorites are made primarily of iron (like in Earth's core). The remaining 92% are composed mostly of silicate minerals (like in Earth's crust and mantle) with small amounts of nickel and iron. Many of these meteorites also contain materials such as water, carbon, and even primitive amino acids—the building blocks of life!



What was likely a sofa-sized meteor hurtles across the skies of England. This image is one of the more spectacular meteor images yet recorded. It was captured by teenager Jon Burnett while skateboarding with his friends on October 1, 2003. Jon Burnett ©

Header image: Barrington Crater, near Flagstaff, Arizona. Yann Arthus-Bertrand © 2008

The Barrington Crater was produced by the 50-m-wide Canyon Diablo meteorite, which hit the Earth 50,000 years ago at a speed of 64,000 km/h. Its impact resulted in a magnitude 5.5 earthquake and destroyed all life within a radius of 4 km. The crater is 170 m deep and 1.2 km wide. It is believed that about half of the meteorite's 300,000-ton bulk was vaporized during its descent, before it hit the ground, and that the bulk of the remaining unvaporized 150,000 tons is under the crater's south rim. The impact produced a massive explosion equivalent to a thermonuclear explosion about 150 times the yield of the atomic bombs used at Hiroshima and Nagasaki.