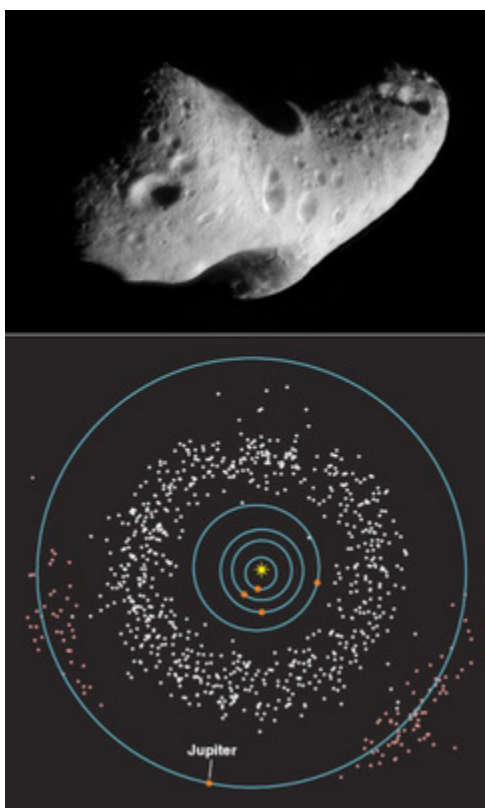


Strange Asteroid Shapes Explained

Lee Pullen
Live Science
Thu, 03 Jul 2008 16:47 UTC

The asteroids that pepper our solar system come in all shapes, sizes and ages. What causes such a variety among space rocks has been something of a mystery, until now.

Researchers have been using a vast database to study a staggering 11,735 asteroids. They have discovered that asteroids change shape over time, and they think they know the reason why.



©Diagram: Minor Planet Center, Image: NASA/Johns Hopkins University Applied Physics Laboratory
The main belt is between the orbits of Mars and Jupiter, and contains countless asteroids.

Gyula Szabó from the University of Szeged [Hungary] is the lead author of the study, which was published in the July edition of *Icarus*. He explains, "There are several hundred thousand asteroids in our solar system. They orbit the sun, but because they are small their surface gravity is low. This means that many have strange, irregular shapes."

Scientists like Gyula think that about one third of known asteroids belong to groups called "families." These clusters probably formed from piles of debris after [larger objects collided](#).

Resolved to save time

Determining the shapes of these asteroids presented difficulties for Gyula and his colleague Laszlo Kiss from the University of Sydney. The most accurate data about asteroids comes from spacecraft fly-bys, but only a few asteroids have been examined that way. Radar observations can only be made of objects that get close to the Earth. Telescopes produce detailed images, but only for the largest asteroids.

Another option for obtaining information about asteroids is called "time-resolved photometry." The technique is surprisingly simple: By observing asteroids as they spin in space and then studying the amount of light reflected, scientists can get an idea of their shape. Getting accurate results from this method can take a long time, but the researchers realised that digital sky surveys could speed up the process. Such projects study thousands of objects every night. The Sloan Digital Sky Survey, for instance, mainly looks at stars and galaxies, but it also has gathered data on asteroids.

"This procedure was very economical," says Gyula. "Using photometry, astronomers have determined shapes for about 1,200 asteroids in the past 30 to 40 years. We derived the shapes for ten times more asteroids, but in half an hour!"

Surprising results

"The results were really surprising," says Gyula. "We saw there were families that included many elongated asteroids, and there were other ones which consisted of mostly spheroidal bodies."

In young groups of asteroids there are a great variety of shapes, hinting that they formed relatively recently from fragments of rock that later bound together. Asteroids in older families tend to be rounder. It seems to take one billion to two billion years for irregular asteroids to be transformed into smooth balls.

But what changes the asteroids' shape? Gyula and his team have shown that asteroids change shape from elongated to roughly spherical due to being impacted during their lifetimes. They are like pebbles on the beach that become worn smooth over many years -- only in space, erosion is caused by small impacts as rocks knock into each other and chip pieces off.

Impact specialist Jonti Horner from the UK's Open University agrees with Gyula. "The results make sense," he says. "Catastrophic impacts create a huge slew of fragment shapes, like the shards of a broken bottle. The debris then are weathered over time and smoothed towards sphericity by small impacts."

Impacts are part of the fundamental processes in our solar system. They were part of the planet formation process 4.5 billion years ago, and [still occur](#) today. "Sometimes astronomers have to be archeologists, too," says Gyula. "This work is a fine example of how we can deduce a billion-year process from the world we observe today."

Hopefully, this research will not only teach us more about how the solar system operates, but will help us prepare for future impact events. Learning all we can about asteroids could help us avoid disaster if we ever detect a large, fast-moving one on a [collision course with the Earth](#).

See Also:

- [African bird's intricate feather design inspires new ways to store water](#)
- [Even more mammoth devolution](#)
- [SpaceX's first Starship orbital launch attempt ends in dramatic "unexpected rapid disassembly"](#)