Return of the Sponge Moon

One of the coolest things about Saturn is its funky moons. Titan's the most Earthlike. Enceladus has those awesome ice volcanoes, and Iapetus has black and white halves that are so different, the moon looks like an Oreo cookie. Growing up, my favorite was Mimas — not enough people know that the Death Star is alive and well in our solar system.

Hyperion highly pitted surface was seen up-close for the first time when Cassini flew less than 1,000 kilometers (620 miles) from Saturn's moon on September 26, 2005. The image scale is 362 meters (1,200 feet) per pixel.
Courtesy NASA/JPL/Space Science Institute

But as my tastes got more refined, my new favorite became Hyperion. This week two papers in *Nature* try to explain a bit more about this oddball satellite. The first strange thing about Hyperion is that it spins chaotically — you never know what side of it you're going to see whenever you snap a picture. In the parlance of scientists, mapping Hyperion is "a royal pain."

Second, the thing looks more like a sea sponge than a rocky satellite. Back in 2005, I wrote a news story speculating why there was a moon masquerading as a piece of coral around Saturn. It turns out, according to Peter Thomas (Cornell University) and his team, that my 2005 story is dead wrong.

Back then the experts thought that Hyperion's pitted appearance was due to "Sun cups". The effect happens all the time in the polar regions on Earth. A bit of soot or dark material falls on a white surface, then this material heats up in sunlight, melts, and creates a pit where more dirt can accumulate. The added dirt then heats up even more, more ice melts, lather, rinse, repeat, and you get a deep crater-like spot.

Try again. Now it seems that the craters really *are* craters, and it's Hyperion's amazingly low density that causes the deep pits. The body is incredibly porous overall (more than 40%), so when a rock hits it, there's little ejecta from the impact. In fact, given this moon's weak gravity, Thomas and his team write, "It may be difficult for large fractions of any ejecta produced to escape." They go onto say that Sun cups don't work because the craters are just too big and deep.

The second paper this week, written by Dale Cruikshank (NASA/Ames Research Center) and others, reports that the dark stuff in the bottom of the craters contains complex hydrocarbons, some of the basic building blocks for life. Can't say that that came as a shock — hydrocarbons are showing up everywhere including on comets and meteorites. But it's always nice when a result makes perfect sense.

Want to learn more? You can read the various press releases here and here. Meanwhile, I'm suddenly in the mood to go snorkeling.
Posted by David Tytell, July 5, 2007