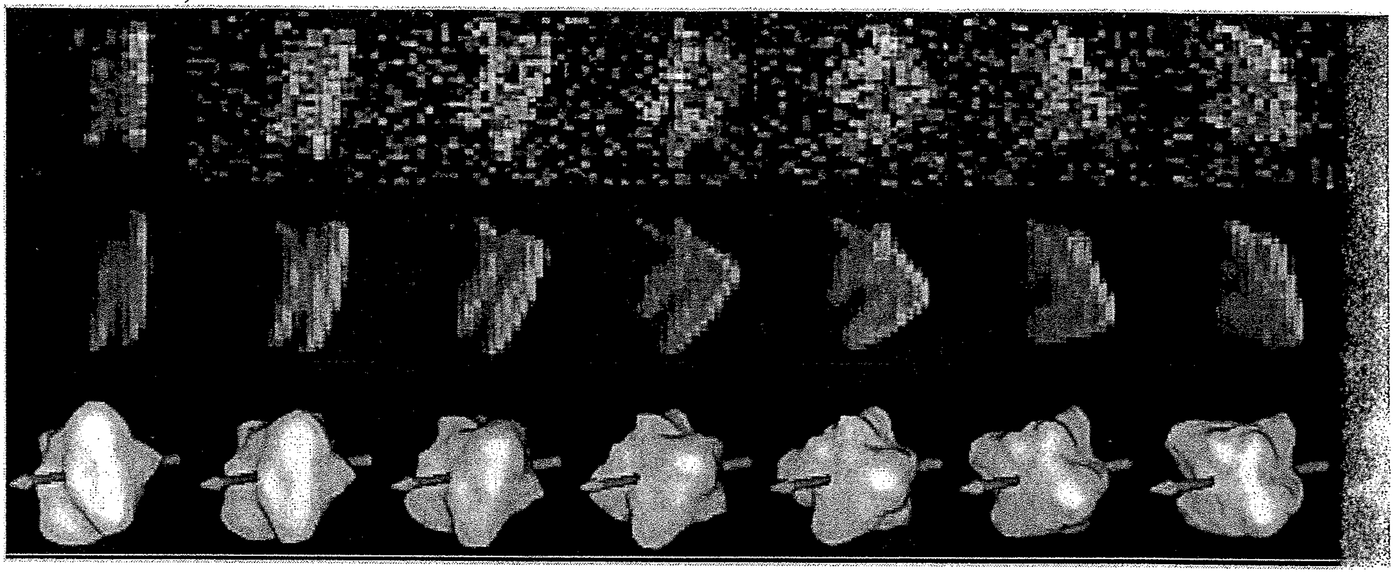
1-3 sentence summary of significance of this publication.

"TYPE=PICT;ALT="



1. P.Taylor and J.L. Margot/Cornell University

Images of the asteroid 2000 PH5 show its rotation affected by sunlight.

By KENNETH CHANG

Published: March 13, 2007

Although entirely without mass, particles of light have enough force to push an asteroid around, and possibly to spin it so fast that it breaks apart.

This sun-driven spin-up is known as the YORP Effect, after the last names of the four scientists who predicted it long ago: Ivan Yarkovsky, a Russian civil engineer; John A. O'Keefe, an American planetary scientist; V.V. Radzievskii, a Russian astronomer; and Stephen J. Paddack, a NASA aerospace engineer.

Last week, two teams of astronomers reported that they had observed the YORP Effect in action.

From 2001 to 2005, a team led by Stephen C. Lowry, a planetary scientist at Queen's University in Belfast, watched the asteroid 2000 PH5, which looks something like a spinning tooth, with a rotation period of just over 12 minutes. Rotation refers to the object spinning on its axis. Over the four years, the rotation period of the 380-foot-wide asteroid shortened by about one-thousandth of a second a year, the astronomers said. Their findings were published last week on the Web site of the journal Science.

Meanwhile, writing in an article on the Web site of the journal Nature, a team led by Mikko

Kaasalainen of the University of Helsinki reported a quickening in the spin of a 4,500-foot-wide asteroid, 1862 Apollo.

The YORP Effect is somewhat similar to how a blowing wind makes a windmill turn. **Particles of light, or photons, have no mass, but they carry momentum**. Thus, like particles of air bouncing off the blades of a windmill, some of the photons reflect off an asteroid and impart a **smidgen of momentum to the asteroid**.

But unlike wind, most of the photons are absorbed by the surface of the asteroid, then radiated as heat. "It gives rise to a very gentle recoil effect," Dr. Lowry said.

For an odd-shaped object like the asteroid 2000 PH5, the recoil forces act in different directions, applying a slight twist that can make the asteroid spin faster — or slower.

"It's a small effect on human time scales," said Jean-Luc Margot, a professor of astronomy at Cornell University and a member of the 2000 PH5 team. "It's an enormous effect on geological time scales."

In a second paper in the journal Science, Dr. Margot, and Patrick A. Taylor, a Cornell University graduate student, led scientists in making radar measurements that determined 2000 PH5's shape and computer simulations that showed that YORP is a reasonable explanation for the asteroid's increasing spin.

The magnitude of the torque depends very sensitively on the shape of the asteroid and the composition of the surface, so even though the simulations and the observations differed by as much as a factor of 7, "We're very happy with that agreement," Dr. Margot said.

In half a million years, the asteroid 2000 PH5 will be spinning twice as fast, its rotation period at six minutes. In about 35 million years — a short time compared with the 4.6-billion-year history of the solar system — the rotation period could be just 20 seconds, the researchers said.

This is a faster spin than that of any known asteroid, which suggests that 2000 PH5 could **spin itself apart before then.**

That, in turn, could explain the curious observation that one in six near-Earth asteroids has a moon circling around it. Asteroids were thought to be too small to capture a moon, but the moon might be a fragment that broke off. That could also explain why there are more fast-spinning and slow-spinning asteroids than statistics would predict.

"Who would think sunlight would change how asteroids spin?" said Mr. Taylor of Cornell University.

Next month, the International Astronomical Union will bestow on 2000 PH5 the official name of YORP.