Asteroid is leading Earth in strange dance, astronomers say

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Courtesy of NASA
and World Science staff

A newfound asteroid is locked in a strange dance with our planet—traveling ahead of Earth in its path around the Sun, but adding some moves of its own along the way, astronomers say.

Researchers say the finding now puts Earth in company with at least five other planets or moons in the Solar System that also have so-called "Trojan" companion bodies. These are objects that follow behind, or lead in front of, a planet or moon in its orbit.

An animation illustrates the orbit of 2010 TK7 (green dots). (Courtesy NASA)

"Trojans" inhabit areas where the gravitational forces between the central body and the larger orbiting body balance out, so that the Trojans can stay in that same place relative to them for many years. Each orbiting body is associated with two such "triangular points": one behind, one in front it along the orbit. Each point is separated by the main orbiting body by one-sixth of the distance covered by the whole orbit.

In this case, "it's as though Earth is playing follow the leader," said researcher Amy Mainzer of NASA's Jet Propulsion Laboratory in Pasadena, Calif., principal investigator of the project that led to the finding. "Earth always is chasing this asteroid around." They are not expected to collide, she added.

The "Trojan," dubbed 2010 TK7, isn't just blandly plowing through space along the same, roughly circular path that Earth follows, astronomers say. Instead—if we envision Earth as a point moving along the edge of a plate, with the Sun in the middle—the Trojan would be snaking around and around a point in front of Earth. Our planet's own gravity contributes to the weird play of forces that make this happen.

The tiny dancer ahead of us is rather different from another asteroid reportedly discovered as a companion to Earth earlier this year. That object is not believed to be a Trojan, though scientists say it may have been one once. It's instead described as a "horseshoe" companion, because of the shape of the path it traces out in the sky with respect to our point of view. That object is also expected to probably leave Earth's neighborhood within the next million years or so. The authors of the new study didn't venture predictions that far ahead for their "Trojan," but did say it will

keep doing what it's doing for at least 10,000 years.

Trojans are so called because the first known ones, associated with the planet Jupiter, were named after figures from the Trojan war saga.

Scientists had predicted Earth should have Trojans, but they were hard to find because they're small and "dwell mostly in the daylight, making them very hard to see" for us, said Martin Connors of Athabasca University in Canada. "But we finally found one, because the object has an unusual orbit that takes it farther away from the sun than what is typical for Trojans," added Connors, lead author of a paper on the finding in the July 28 issue of the research journal *Nature.*

The discovery finally came thanks to NASA's Wide-field Infrared Survey Explorer, or WISE, satellite, astronomers said. It "was a game-changer, giving us a point of view difficult to have at Earth's surface," Connors explained. WISE's telescope scanned the whole sky in infrared light from January 2010 to February 2011. Connors and his team began their search for an Earth Trojan using data from NEOWISE, an addition to the WISE mission that focused in part on near-Earth objects, such as asteroids and comets.

The newfound object is roughly 1,000 feet (300 meters) wide, the researchers said, and lies about 50 million miles (80 million kilometers) from Earth. They added that it would be impractical to send a probe there because it would take too much fuel to reach it—given its funny path—but that other Earth-companion asteroids could make great targets for exploration.