

# Astronomers Find Planetary System

We are not alone. Astronomers this week reported the first evidence that a star similar to the sun has a system of planets circling it.

By studying variations in the to-and-fro movement of the bright star Upsilon Andromedae, just 44 light-years from Earth, two teams of researchers have independently deduced that a trio of planets orbits the body. Among the 19 or so other nearby, sunlike stars believed to harbor planets, studies have so far revealed but a single orbiting body around each.

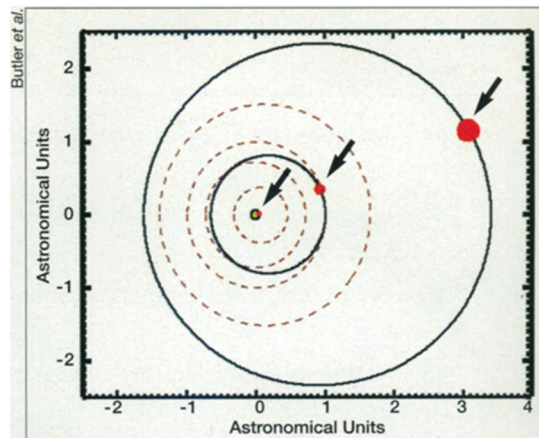
"This is the one we've been waiting for," says astronomer Stephen P. Maran of NASA's Goddard Space Flight Center in Greenbelt, Md., a spokesman for the American Astronomical Society. "This clearly shows that there are solar systems, not just stars with individual odd-ball planets."

The newly discovered planetary system bears little resemblance to our own. Two of the three planets are at least twice as massive as Jupiter. The inner-

most one lies within roasting distance of Upsilon Andromedae—about one-eighth the distance at which Mercury circles the sun.

Two groups of astronomers announced the findings at an April 15 press briefing in San Francisco. One team includes Peter Nisenson of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass. The other team is led by R. Paul Butler of the Anglo-Australian Observatory in Epping, Australia, and Geoffrey W. Marcy of San Francisco State University and the University of California, Berkeley.

Three years ago, while studying wobbles in the motion of Upsilon Andromedae with a spectrograph at the Lick Observatory on Mt. Hamilton, Calif., Butler and Marcy detected the gravitational influence of a single, closely orbiting planet that whips around the star once every 4.6 days (SN: 7/6/96, p. 11). They noted at the time that a single planet could not completely account for the star's wobble.



A trio of planets (arrows) orbit Upsilon Andromedae. Their gravitational interactions may account for the elliptical paths. Dotted lines indicate the orbits of Mercury, Venus, Earth, and Mars superimposed on the new findings.

Tracking the star's motion at the Fred Lawrence Whipple Observatory atop Mt. Hopkins, Ariz., another team, including Nisenson, had come to the same conclusion. Last summer, with both teams hot on the trail of a second planet, the two groups began sharing data. Collectively, they have made some 140 observations of the star since 1995.

"It's very difficult to find multiple planetary systems since you have to have many years of data," says Butler.

Early this year, both teams concluded that Upsilon Andromedae must have a second planet in a much larger and more elongated orbit than the first. This planet, at least 4.1 times the mass of Jupiter, circles the star about once every 3.5 years at an average distance of 2.5 astronomical units (AU). One AU is the separation between Earth and the sun.

A few weeks ago, the researchers realized that a subtle variation in the star's motion remained unexplained. Further analysis revealed that a third companion orbits the star every 242 days at an average distance of 0.83 AU.

"By having two independent [data] sets, we're just extremely positive that this is all real," Nisenson says.

The findings, says Alan P. Boss of the Carnegie Institution of Washington (D.C.), could quell critics, including himself, who maintain that some of the extrasolar planets previously detected are actually failed stars known as brown dwarfs. Finding a system of bodies rather than individual objects "is one of the hallmarks of planets," he says. "This discovery goes a long way toward reassuring us about what has been found so far." —R. Cowen

## Inca mummies emerge from deep freeze



Archaeologists have made an explosive find at a South American volcano. Investigators announced last week that they have recovered the mummified remains of three children sacrificed around 500 years ago as part of an Inca ritual. The bodies were discovered last month in burials on top of Argentina's Mount Llullaillaco.

Interred under 5 feet of rock and earth, the two girls and a boy lay in separate graves surrounded by offerings to Inca gods, including statuettes, pottery, and bundles of woven material.

Frigid weather at the volcano's 22,000-foot-high summit freeze-dried and mummified the youngsters' bodies. "They appear to be the best preserved of any mummy I've seen," says archaeologist Johan Reinhard of the Mountain Institute in Franklin, W. Va., coleader of a U.S.-Argentine-Peruvian team supported by the National Geographic Society in Washington, D.C. Reinhard has helped to recover 16 other Inca mummies.

In the photo above, Reinhard sits with two of the mummies near their burial sites.

Initial analyses of the mummies, done in the nearby city of Salta, revealed intact internal organs and some blood remaining in the heart and lungs. The means of the deaths remain unknown. Lightning had partially damaged one of the female mummies. —B. Bower