however, is the claim that chain galaxies are common in the distant universe, which would make them the standard ancestral form. Analyzing an HST image as deep as the ones Cowie studied, Windhorst says that he, ASU's Simon Driver, and their colleagues have seen a few chain galaxies—but plenty of other extremely faint objects, which are not chain galaxies, lying equally far away. Windhorst says he thinks Cowie may have found just one of many ancestral forms: "It's not the whole story."

Cowie agrees that his images show "a variety of wild and wonderful morphologies—including a fair number of chains but also some other weird beasts." But if his finding is at least part of the story, says Richard Griffiths of the Space Telescope Science Institute in Baltimore, galaxies like our own may finally be gaining a coherent history. "I think there's a sort of self-consistent picture taking shape that's more plausible than anything we've had for the last 20 years," says Griffiths. If so, astronomers may finally be glimpsing some order in the cosmic fossil beds.

–Tim Appenzeller

ASTRONOMY

Hints of a Planet Orbiting Sunlike Star

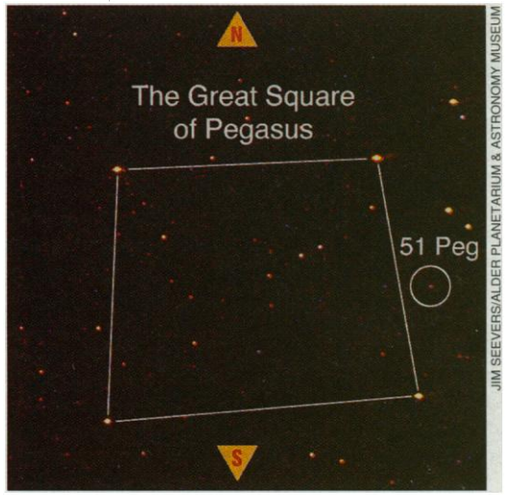
The Great Square of Pegasus catches many stargazers' eyes this time of year as the steed glides above the Northern Hemisphere's horizon. This year, however, it's going to attract not just star-watchers, but planet-hunters as well. Two astronomers at the Geneva Observatory in Switzerland, Michel Mayor and Didier Queloz, believe they have found the first planet outside our solar system that orbits a sunlike star. Their putative planet, at least half the mass of Jupiter, appears to be circling in a tight orbit around the star 51 Pegasi, visible just beyond the Great Square's leading edge. "The result is obviously incredibly exciting if it's true," says Philip Nicholson, an astronomer at Cornell University.

The excitement—tinged with some skepticism—isn't just because extrasolar planets have never been seen around a sunlike star, but also because standard theories suggest that planets this large don't form so close to stars. As a result, astronomers have been frantically casting about for information on the finding. The evidence is an apparent wobble in 51 Pegasi, which could be caused by a massive planet whirling around it with a period of about 4.2 days and an orbital radius of just one-sixth that of Mercury. Further details, however, have been hard to come by: Since they first presented their results at a conference in Florence, Italy, 2 weeks ago, Mayor and Queloz have declined further comment because a paper describing their findings is under review at *Nature*.

They did, however, authorize Douglas Duncan, an astronomer at the University of Chicago who is familiar with the work, to present an outline of their results at an astrophysics conference in College Park, Maryland, early last week. And *Science* has learned that astronomers Geoff Marcy and Paul Butler of San Francisco State University and the University of California, Berkeley, have already verified the detection of wobble—or "radial velocity"—of 51 Peg during a 4-day observing run on the Lick Observatory's 3-meter telescope just last week. The observations add up to "the first reliable detection of a planet orbiting another [sunlike] star," says Duncan.

The wobble the two groups have seen in 51 Peg is characteristic of the kind of motion an orbiting mass would produce. Like the balls of a bola thrown through space, all members of a planetary system whirl about each other, faster for the lighter planets and much slower for the heavier, central star. The star's wobble can be detected because atoms at the star's surface emit photons of light at discrete wavelengths, forming spectral "lines" that shift to shorter wavelength when the star is moving toward us and longer wavelength when it is moving away. Although the picture is blurred by the star's rotation, which causes photons emitted from different points to have slightly different wavelengths, Duncan says Mayor and Queloz managed see the wobble by monitoring about 5000 lines throughout the visible spectrum.

> **"The result is obviously incredibly exciting if it's true."**
> **—Philip Nicholson**



Square dance. An apparent wobble in the star 51 Peg may be caused by a giant planet.

Mayor has been using these techniques to make "radial-velocity surveys" of dozens of stars for more than a decade, says Duncan. But 16 months ago the team upgraded its setup at the 1.9-meter telescope at Haute-Provence near Nice, France, isolating their spectrograph in a temperature-controlled room and operating it remotely via fiber optics. Then 51 Peg's wobble velocity of roughly 50 meters per second—much faster than would be produced by a lighter planet or one further from the star—leapt out of the data. But why wasn't the star seen by other groups with comparable or better accuracy making similar surveys? "That star was not being monitored by anyone else—including us," says Marcy, who says his measurements last week "confirmed everything [Mayor and Queloz] have discovered."

A canvas of half a dozen planetary scientists last week suggested that they will pore through Mayor and Queloz's data when they are published, looking for an effect that could be mimicking the signature of an orbiting planet. Among the possibilities: a previously unknown type of stellar pulsation; a large spot on the star's surface that might rhythmically suppress one side of the broadened emission lines, then the other, creating the appearance of a wobble; or an unseen binary companion whose orbit is seen nearly face-on from Earth. Although arguments can be made that each of these possibilities is unlikely, astronomers will "start out with a pretty skeptical view," says Cornell's Nicholson.

If the Geneva group's interpretation holds up, planetary scientists will have to confront a difficult question: How did the planet get there in the first place? Standard models of planetary evolution suggest that giant planets form with ice-and-rock cores much further away from a star. But Alexander Wolszczan of Pennsylvania State University, who last year found the first extrasolar planets orbiting a pulsar, is keeping an open mind. Wolszczan points out that his own discovery defied conventional thinking about where planets should exist. "I think it is important to be cautious about expecting, by default, to find an exact copy of the solar system," he says. "We should really keep our eyes open and expect anything."

–James Glanz