Two teams find planet orbiting nearby star

Astronomers this week reported that one of the sun's nearest neighbors—a star just 15 light-years from Earth—possesses a planet at least 1.6 times as massive as Jupiter.

The unseen planet betrayed its presence through the characteristic wobble of its parent, a star called Gliese 876. Of all the stars thought to have planets, Gliese 876 is the closest to Earth. Weighing in at just one-third the mass of the sun, it is also the lightest of these stars.

In hunting planets, researchers had previously focused on stars similar in mass to the sun. Finding a planet around one of the first low-mass stars to be examined offers a hint that planetary systems "may be a common occurrence among stars that are quite different from the sun," says Geoffrey W. Marcy of San Francisco State University and the University of California, Berkeley. He presented the findings at a symposium of the International Astronomical Union in Victoria, British Columbia.

The newly detected planet takes 61 days to go around the star, and its average distance from its parent is one-fifth the separation between the sun and Earth. That's closer to the star than Mercury, the innermost planet of the solar system, is to the sun. Marcy says that this discovery brings to 12 the number of planets revealed by the wobble in a star's motion (SN: 5/17/97, p. 305).

Theorist Didier Saumon of Vanderbilt University in Nashville, Tenn., told SCIENCE NEWS that preliminary calculations indicate the surface of the planet—presumed to be gaseous—has a temperature around -75°C. That's far below the freezing point of water. The calculations also suggest, however, that in warmer layers not far below the surface, water could exist as liquid droplets.

Although liquid water is thought to be a key ingredient for the development of life, "we shouldn't go into a feeding frenzy about this," cautions Marcy. He notes that within a gaseous planet, water cannot puddle and form an environment that can readily support organisms. Saumon adds, however, that if the planet has solid moons, they might lie within a temperate zone and could offer a foothold for living material. Jupiter's moon Europa, for example, is suspected of harboring a vast ocean and is a likely place to look for life (SN: 11/1/97, p. 284).

Marcy and his colleagues, R. Paul Butler of the Anglo-Australian Observatory in Epping, Steven S. Vogt of the University of California, Santa Cruz, and Debra Fischer of San Francisco State, began studying Gliese 876 in 1994 at Lick Observatory on Mt. Hamilton in California. The faintness of this low-mass star, which has only about one-fortieth the intrinsic luminosity of the sun, made it difficult to analyze. Last year, the researchers began using one of the world's largest visible-light detectors, the Keck I Telescope atop Hawaii's Mauna Kea, to study 400 nearby stars, including Gliese 876.

Observations with a high-resolution spectrometer attached to Keck I, including data recorded on June 18 and 19, revealed the presence of a planet. "It was the data from Keck that really nailed this planetary companion down," says Marcy.

Two hours after Marcy announced the results at the Victoria meeting on June 22, a colleague presented him with a startling e-mail. Another team, led by Xavier Delfosse of Geneva Observatory in Switzerland and Grenoble University in France, wrote that it had independently found evidence of the same planet. The researchers analyzed light from Gliese 876 using spectrometers at the Haute-Provence Observatory in France and the European Southern Observatory in La Serena, Chile.

"It's very convincing that they have confirmed [the finding]," says Marcy.

Marcy notes that although gravitational interactions between a star and a nearby planet tend to make orbits circular, the new planet follows a path more elongated than that of Pluto. He told SCIENCE NEWS that another star under study by his team appears to have a planet in an equally close but even more elongated orbit. "All of the planets in our solar system have more nearly circular orbits than these two new planets. They raise questions about how common the architecture of our solar system is," he says.

One notion is that an elliptical orbit arises from the gravitational interaction of two giant planets that initially lie near each other but far from their parent star. After a close encounter between the planets, one ejects the other and then heads inward, in a smaller elliptical orbit (SN: 11/23/96, p. 328).

In 2 weeks, a team led by astronomers in Geneva plans to announce the discovery of two planets orbiting stars farther from Earth than Gliese 876. —*R. Cowen*

Cesarean + AZT = Almost no HIV transmission

Pregnant women with HIV, the virus that causes AIDS, can in nearly all cases prevent their babies from contracting the disease during birth. These mothers must take the drug AZT and deliver by planned cesarean section, two studies show.

French scientists report that of 133 HIV-positive women who took AZT and then gave birth by elective cesarean before contractions started, only one transmitted HIV to an infant, a rate of less than 1 percent. The researchers had followed the progress of 2,834 HIV-positive mothers between 1985 and 1996.

They found that babies born vaginally to 625 mothers taking AZT in this group contracted HIV 6.6 percent of the time. Emergency cesarean sections that were required by complications after contractions started in 114 other women taking AZT yielded an HIV transmission rate of 11.4 percent.

Of 1,877 HIV-positive mothers not treated with AZT, 17.2 percent transmitted HIV to their infants. The method of birth didn't affect their risk, the researchers report in the July 1 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION and at the 12th World AIDS Conference this week in Geneva.

The results match those of Swiss researchers who have found in an ongoing study that all 42 children born by planned cesarean to HIV-positive mothers being treated with AZT tested negative for HIV. The Swiss findings, first described in the Jan. 22 AIDS, were updated this month.

The report documented HIV infections in 20.3 percent of 271 infants born vaginally to mothers who were not receiving AZT. Of infants born by cesarean section to mothers in this group, 16.7 percent (4 of 24) were HIV-positive. Mothers receiving AZT passed the virus along in 8.1 percent (7 of 86) of the infants born vaginally.

During vaginal childbirth, the infant can swallow blood or other fluids from the mother, or these fluids can come into contact with the child's mucous membranes or abrasions on the baby's skin, says Swiss study coauthor Christian Kind, a neonatologist at Kantonsspital in St. Gallen, Switzerland.

Opportunities for infection can arise before delivery as well. Labor contractions place the child at risk because the placenta may leak maternal blood that can carry viruses to the baby. Also, if the amniotic sac surrounding the fetus ruptures at least 4 hours before delivery, the child can become exposed to HIV, Kind says. Thus, having the cesarean section before contractions start "is absolutely essential," he concludes.

Although the research is valid, any public health approach that includes mass cesareans "has a lot of practical limitations," says Ruth E. Dickover, a virologist at the University of California at Los Angeles School of Medicine. Many women who come to the UCLA clinics arrive late in their pregnancies, have no health insurance to pay for a cesarean delivery, don't have an accurate due date, and don't know their HIV status, she says. For women in the developing world, prenatal care is often nonexistent, and the possibility of widespread cesareans is remote, she notes. —*N. Seppa*