

Two Extrasolar Planets May Hold Water

They'd been hunting for planets since 1987, but last October, Geoffrey W. Marcy and R. Paul Butler moved into the fast lane. That's when they confirmed another team's landmark finding of an unseen planet circling the ordinary, sunlike star 51 Pegasi (SN: 10/21/95, p. 260).

From that point on, Marcy, of San Francisco State University, and Butler, of San Francisco State and the University of California, Berkeley, have run their search in high gear. Working 14-hour days to crunch their data on six high-speed computers, the astronomers hoped that at least 1 of the first 60 stars in their 120-star survey would exhibit the wobble characteristic of a planet's tug.

Last week, their work had a double payoff.

At a meeting of the American Astronomical Society in San Antonio, Marcy announced before a standing-room-only crowd that he and Butler have discovered two new, unseen planets orbiting nearby stars. One of the planets, nicknamed Goldilocks, lies at just the right location from its parent star—not too close and not too far—for liquid water to exist on its surface. The other body might contain liquid water but only in its atmosphere. Water is thought to have hastened the development of life on Earth.

The astronomers found the two new planets around sunlike stars—70 Virginis in the constellation Virgo and 47 Ursae Majoris in Ursa Major, also known as the Big Dipper. Although both stars are visible to the naked eye, the planets are too small, and thus too faint, to be seen against the glare from the parent bodies. The researchers used an indirect technique—measuring small shifts in wavelengths of light emitted by the stars—to find evidence of the planets.

Marcy and Butler monitored the motion of 120 stars, including 70 Virginis and 47 Ursae Majoris, for more than 7 years with a spectrograph mounted on a 120-inch telescope at Lick Observatory on Mount Hamilton in California. A recent computer analysis revealed that light emitted by the two stars appears alternately redder and bluer, indicating that they move back and forth along the line of sight to Earth. In each case, says Marcy, the wobbles describe a nearly perfect sine curve—a motion so periodic that only an unseen object pulling the star toward and away from Earth can account for it.

Coming on the heels of the discovery of a planet orbiting 51 Pegasi, the latest findings are ushering in a new era in the search for extrasolar planets, astro-

mers say. "It's almost like the second coming of Marco Polo or Columbus. We're finding new worlds," says William J. Borucki of NASA's Ames Research Center in Mountain View, Calif.

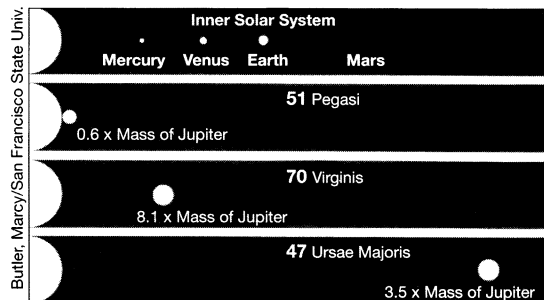
"After the discovery [the planet circling] of 51 Pegasi, everyone wondered if it was a freak, a one-in-a-million observation," says Marcy. "The answer is no. Planets aren't rare after all."

Marcy and Butler report that the body orbiting 47 Ursae Majoris has a mass about three and one-half times that of Jupiter. Circling the star at about twice the distance of Earth from the sun, the planet takes roughly 3 years to complete one revolution. "This almost smells like a planet that formed in our solar system," Marcy says. The surface temperature of the planet would be a chilly -90°C, but its atmosphere could contain liquid water, the astronomers calculate.

In contrast, the unseen object orbiting 70 Virginis has a mass about eight times that of Jupiter. Its orbit lies, on average, less than half Earth's distance from the sun. The body has a surface temperature of 83°C, roughly the same as tepid tea. "This planet could conceivably have rain or even oceans," Marcy says.

That's not to say that such a planet could sustain life as we know it. Assuming that the body has a solid surface, its enormous gravity and high pressure would prove literally crushing.

Moreover, the data indicate that this planet has a highly elliptical orbit. Because of its gravity, a massive planet on an elliptical path tends to destabilize the paths of nearby planets. Thus, 70 Virginis is unlikely to possess an array of orbiting bodies akin to our solar system, notes David C. Black, director of the Lunar and Planetary Institute in Hous-



The relative locations of planets in our solar system and the newly discovered planets orbiting 51 Pegasi, 70 Virginis, and 47 Ursae Majoris.

ton. However, notes Butler, if the planet has a moon, that smaller body might support life.

Butler speculates that the body orbiting 70 Virginis may belong to a new class of objects—superplanets, which have a mass greater than that any planet in our solar system and less than that of failed stars, known as brown dwarfs.

Alan P. Boss of the Carnegie Institution of Washington (D.C.), puts a different spin on the findings. He notes that the process of planet formation, in which material accumulates from a dusty disk rotating around a star, does not permit a massive planet to have an elliptical orbit. Therefore, he asserts, the object circling 70 Virginis is a brown dwarf.

In fact, Boss maintains, the object circling 70 Virginis is undoubtedly the lowest-mass brown dwarf ever found, and the object circling 47 Ursae Majoris is the most massive planet known.

"My hat's off to them [Marcy and Butler]," says Boss. "They set two new records in one news conference."

—R. Cowen

Debating BST 'til the cows come home

Milk from cows receiving a drug that boosts their milk production puts people who drink it at greater risk of developing breast and colon cancer, contends a new report by a long-time opponent of the drug.

The Food and Drug Administration continues to consider the milk safe, an agency spokesperson said this week in response to the allegations.

In November 1993, the FDA approved the sale of milk from cows treated with recombinant bovine somatotropin (rBST), a genetically engineered version of a naturally occurring growth hormone. Most dairy products sold in the United States now include at least some milk

from rBST-treated cows.

Samuel S. Epstein, a physician at the University of Illinois at Chicago School of Public Health, has reviewed 66 studies relating to rBST milk and concludes that they "raise very significant questions about the carcinogenic risks" of the liquid. He spoke this week in Washington, D.C., at a press conference organized by the Cancer Prevention Coalition, which he chairs, and Food & Water, a consumer group in Walden, Vt.

Officials from FDA and Monsanto Co., which produces the drug, accuse Epstein of rehashing concerns he raised in 1994, which they reviewed and disputed at the time. Epstein's report includes no origi-