Astronomy

Another planet outside the solar system

There's nothing very unusual about the nearby sunlike star 55 rho^1 Cancri—except that it wobbles back and forth at a rapid 72 meters a second along the line of sight to Earth.

That wobble betrays the gravitational tug of an unseen planet, nearly as massive as Jupiter, that circles the star closely, two California astronomers report. The finding, the latest in a flurry of discoveries that began 6 months ago, brings to four the number of planets orbiting sunlike stars within a few tens of light-years of our solar system (SN: 10/21/95, p. 260).

Like the other newfound planets, the newly identified behemoth is hidden in the glare from its parent star. Moreover, it has a special feature in common with 51 Pegasi B, the first of these planets to be detected. Each resides in the hot zone—in or near the blistering outer atmosphere—of the star it orbits. Indeed, the newly discovered body lies only 16 million kilometers from 55 rho^1 Cancri—one-third the distance at which Mercury, the innermost planet of our solar system, orbits the sun, report Geoffrey W. Marcy of San Francisco State University and R. Paul Butler of San Francisco State and the University of California, Berkeley.

A member of the constellation Cancer, 55 rho^1 Cancri is almost as massive as the sun and lies a mere 45 light-years from Earth. Its planet completes one revolution every 14.7 days, Butler reported April 12 during a lecture at the University of Maryland in College Park.

Butler and Marcy were able to detect the star's wobble by measuring periodic shifts in the wavelengths of light it emits. The spectra, says Marcy, also hint that a second planet or a companion star tugs on 55 rho^1 Cancri.

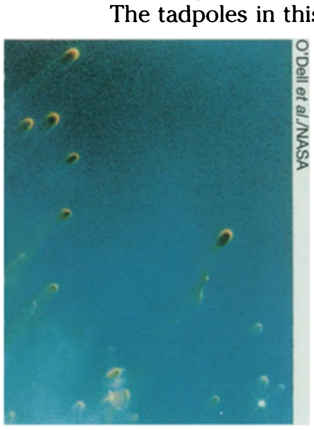
The astronomers have completed an initial analysis of spectra from 100 of the 120 stars they have surveyed since 1987 at Lick Observatory on Mount Hamilton in California. They used the technique to discover three of the four recently identified planets. This summer, Marcy and Butler plan to begin a more sensitive survey of another 300 nearby stars, using the High-Resolution Spectrograph at the W.M. Keck Telescope atop Hawaii's Mauna Kea.

Theorist Douglas N.C. Lin of the University of California, Santa Cruz believes that neither 51 Pegasi B nor the newest planet could have formed at its current hot locale. Rather, they spiraled in from more distant regions (SN: 12/16/95, p. 412).

Knotty curiosities

"Sperm in Space!" "Cosmic Tadpoles Sighted!" The tabloids could have a field day with this heavenly image. Despite their glowing heads and gossamer tails, however, the objects in a recent Hubble Space Telescope picture are neither flora nor fauna. Instead, they represent huge knots of gas that formed when spherical shells of material, known as planetary nebulae, were ejected from the surface of a dying, sunlike star.

The tadpoles in this image come from the Helix nebula, the planetary nebula closest to Earth. Researchers believe that the knots, whose tails extend 160 billion kilometers, arise when low-density gas from a fast-moving shell runs into slower moving, higher density gas cast off by the same dying star some 10,000 years earlier. This encounter fragments the gas into tadpole-shaped clumps distributed around the dying star like spokes on a wheel, report C. Robert O'Dell and his colleagues at Rice University in Houston in the April Astronomical Journal.



O'Dell et al./NASA

Gas clumps that surround the Helix nebula.

Botany

How does your garden grow roots?

A gene that activates cell division regulates the tempo of plant root growth, researchers report. Moreover, by manipulating the gene, scientists may someday speed up root development.

Certain proteins, encoded by a group of genes called *cyclin*, trigger plant cell division. In the new study, Peter Doerner and his colleagues at the Salk Institute for Biological Studies in La Jolla, Calif., spliced *cyclin1* onto a regulatory sequence of DNA, forcing *cyclin1* to make its protein throughout the cell cycle instead of just before cell division. They then transferred this gene package into *Arabidopsis*, a much-studied weed.

These transgenic plants reached a standard size, but they grew faster than other *Arabidopsis* plants. Although their roots grew about 40 percent faster than those of unaltered *Arabidopsis*, the plants had regular root patterns, the team reports in the April 11 Nature.

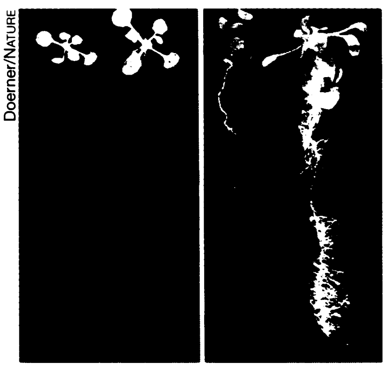
The researchers don't know whether the altered *cyclin1* gene stimulated growth throughout the plant or the speedy root development gave the rest of the plant a boost.

However, they do know that having the gene active throughout the cell cycle reduces the effectiveness of a mechanism that normally turns off growth. When treated with auxin, a growth hormone, the altered *Arabidopsis* grew for a longer period than the unaltered plants.

Because they were able to influence growth rates simply by souping up the *cyclin1* gene, the researchers conclude that plant growth depends entirely on cell division. In contrast, promoting cell division in animals increases only the likelihood of cancer, not normal growth.

In a few years, the team's findings may enable scientists to genetically engineer plants that grow roots more quickly and therefore tolerate dry conditions better, Doerner asserts.

Before that happens, he says, the researchers need to understand the role of the eight other *cyclin* genes, which are probably also involved in cell division.



Doerner/Nature

Left to right: Normal and transgenic 7-day-old Arabidopsis; *10-day-old normal and transgenic plants treated with a growth promoter.*

And how do your plants' cells wither?

The cells of plants, like those of animals, must undergo apoptosis, or genetically programmed cell death, as a part of normal growth, report Hong Wang and his colleagues at the University of California, Davis.

Scientists had suspected that apoptosis occurs in plants, but this report demonstrates it more clearly than any other, says Neal K. Van Alfen of Texas A&M University in College Station.

Wang and his group observed the tissue of healthy tomato plants and plants exposed to a toxic fungus. In both cases, they found cells in which the DNA in the nucleus underwent changes that match apoptosis in animals, they report in the March Plant Cell.

"They show certain features of apoptosis . . . not the whole shebang," cautions Jeff Dangl of the University of North Carolina at Chapel Hill.

The Davis researchers are looking for genes that regulate plant apoptosis. Such a find might enable scientists to improve plants' ability to fight the viruses that reproduce in their cells and the fungi that live on dead or dying tissue, explains coauthor David G. Gilchrist.

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