Astronomy

New array of planet finds

A year ago, planetary scientists didn't know of a single sunlike star that possessed a planet. By last month, they had found evidence of five unseen planets, each orbiting a different nearby star similar in mass to the sun (SN: 6/15/96, p. 373). Now, within the past 3 weeks, researchers have reported signs of three additional planets.

With announcements coming this fast and furious, it's probably no surprise that scientists revealed the first of the new finds with little fanfare, on the World Wide Web. Planet hunters reported in mid-June that the back-and-forth motion of the star tau Boötes indicates that a body about 3.8 times as massive as Jupiter orbits it.

With a sensitive spectrograph at Lick Observatory atop Mount Hamilton in California, Geoffrey W. Marcy of San Francisco State University and R. Paul Butler of San Francisco State and the University of California, Berkeley measured the star's wobble along the line of sight to Earth. The planet whips around the star every 3.3 days, they report on their Web site (*http://cannon.sfsu.edu/~williams/planetsearch/planetsearch.html/*).

A team led by Swiss researchers Michel Mayor and Didier Queloz of the Geneva Observatory, codiscoverers of the first planet detected around a sunlike star (SN: 10/21/95, p. 260), has also measured tau Boötes' periodic wobble and corroborates the find. Turnabout is fair play—last year, Marcy and Butler confirmed the Swiss team's headline-making find, the planet circling the star 51 Pegasi.

Intriguingly, the newly found planet circles tau Boötes at a distance of 6.8 million kilometers, well within the furnace of the star's outer atmosphere. That's one-tenth the distance at which Mercury, our solar system's innermost planet, orbits the sun and closer than any known planet and its parent.

Tau Boötes has a higher than average abundance of elements heavier than helium. So does 51 Pegasi, whose planet also orbits tightly.

All of this excites theorist Doug N.C. Lin of the University of California, Santa Cruz. The tight orbits of these planets "make me very happy," Lin says. He believes that no planet could form that close to a star, so the planets must have originated relatively far out in the disk of gas and dust that surrounds young stars and subsequently spiraled inward. Some planets fall into the star, where they may enhance the abundance of heavier elements at the star's surface. At the same time, their death enables other planets traveling behind them to migrate to a niche just short of immolation (SN: 12/16/95, p. 412).

In addition, Lin says, his work predicts that stars with closely orbiting planets also harbor planets much farther out.

Indeed, 2 weeks ago, during a meeting on binary stars and planet formation at the State University of New York in Stony Brook, Marcy reported the tentative discovery of a distant planet orbiting the star 55 rho^1 Cancri. Researchers had previously inferred the presence of a planet orbiting the star at a smaller distance, equal to one-third Mercury's distance from the sun (SN: 4/27/96, p. 267). Marcy and Butler calculate that the more distant planet, about five times as massive as Jupiter, lies 35 times farther away, about the same distance as that between Jupiter and our sun. This finding remains uncertain because it would take the planet 20 years to orbit 55 rho^1 Cancri and the researchers have measured the star's wobble for only about half that time.

Finally, on June 23, at the annual meeting of the Astronomical Society of the Pacific in Santa Clara, Calif., Marcy announced that the motion of another nearby, sunlike star, upsilon Andromedae, also betrays the presence of a planet. This object would have a mass about 60 percent of Jupiter's and an orbit about 15 percent of Mercury's orbit about the sun.

Behavior

Biology and family, partners in crime

Boys who exhibit neurological and motor problems as infants and who grow up in unstable families commit many more crimes as young adults than do boys who encounter only one alleged risk factor for later crime, according to a new study.

The results suggest that biological and social influences on criminal activity often work together and begin to exert their effects years or even decades before law-breaking occurs, contend Adrian Raine, a psychologist at the University of Southern California in Los Angeles, and his colleagues.

Raine's group studied 397 Danish boys born between September 1959 and December 1961. When the boys were between ages 17 and 19, their mothers were interviewed. A national database yielded criminal records for the boys at ages 20 to 22.

All the boys selected for the study fell into one of three roughly equal groups. The "obstetric" group had survived pregnancy or birth complications, were born prematurely, or showed delays in holding their heads up and other motor skills. The "poverty" group had faced economic hardship throughout their lives, but members had had no birth problems, their early motor skills had developed smoothly, and their parents had generally gotten along well. The "biosocial" group experienced a variety of difficulties—neurological problems shortly after birth (including inadequate reflexes), slow motor development (shared with the obstetric group), early maternal rejection (such as placement in a public institution for at least 4 months during infancy), family discord and divorce, and parental law-breaking—but not economic hardship.

Boys in the biosocial group committed 70 percent of all violent and property crimes recorded for the entire sample, the researchers report in the June ARCHIVES OF GENERAL PSYCHIATRY. About one in three of these boys ended up with a criminal record. Mothers also cited significantly more behavioral and academic problems for boys in this group.

Boys in the poverty group had a slightly lower crime rate than those in the obstetric group; fewer than one in six had committed serious offenses. "Good parenting and good early health development may compensate for the otherwise ill effects of low income," Raine says.

Signs of left-brain language

Scientists have long noted that damage to the brain's left hemisphere dramatically impairs the ability to speak and understand language. A new line of evidence, derived from people who use sign language to communicate, challenges the notion that the left brain contains low-level functions on which language depends.

Neuropsychologists Gregory Hickok, Ursula Bellugi, and Edward S. Klima, all of the Salk Institute for Biological Studies in La Jolla, Calif., studied 13 signers with damage to the left hemisphere and 10 with damage to the right hemisphere.

Left-brain-injured signers performed much worse on language tests, but markedly better on visual and spatial tasks, than signers with right-brain injuries, the researchers report in the June 20 NATURE. They conclude that efficient signing does not rely on a facility for manipulating spatial information.

Other scientists have proposed that the left hemisphere fosters language by enabling people to discern rapidly presented information. But because shifts in hand shape during signing take far longer to complete than transitions from one speech sound to the next, processing speed does not appear crucial, the Salk scientists add.

Moreover, a general disruption of muscle control cannot account for the poor sign-language performance of the left-brain-damaged volunteers, Hickok and his coworkers report.

Further work will address whether the left brain underwrites specific forms of grammatical knowledge.