

Some like it cold?

It's the very model of a maladjusted marriage.

At first, both partners held their own. Little by little, however, the stronger drained the resources of the weaker, leaving it cold and underweight.

Astronomers came upon this odd couple in the course of observing the life cycles of pairs of stars that have been orbiting each other for 5 to 10 billion years. In one elderly pair, WZ Sagittae, a small but extremely dense star known as a white dwarf has stripped so much material from its average-density companion that this partner has only about 5 percent of the mass of the sun and a temperature of just 1,700 kelvins.

That's the coldest star on record, David R. Ciardi and Steve B. Howell of the University of Wyoming in Laramie and their colleagues will report in an upcoming *ASTROPHYSICAL JOURNAL*. By comparison, the visible surface of the sun has a temperature of 6,000 kelvins.

Although the white dwarf's partner remains a bona fide star, its mass is as low as that of a brown dwarf, an object that never acquired enough material to shine as stars do. Howell and his collaborators estimate that WZ Sagittae took at least 10 billion years to evolve to its present state, indicating that the pair's home galaxy, the Milky Way, must be at least that old. —R.C.

Backwards ring around Jupiter

Combining computer simulations with data gathered by a dust detector aboard the Galileo spacecraft, researchers have found evidence of a vast, faint dust ring around Jupiter.

Astronomers calculate that the doughnut-shaped ring, too tenuous to be imaged, has an average diameter of 1.6 million kilometers. Surprisingly, most of the particles in the ring appear to have a retrograde orbit—that is, they rotate in the opposite direction of Jupiter and its main moons.

Dust created by rocky debris striking the main moons isn't likely to end up in retrograde orbits, and not enough material could have been knocked off Jupiter's four small, retrograde moons to account for the ring, the researchers assert. The team proposes instead that the dust, mostly the size of smoke particles, consists of grains that come from outside the Jovian system—interplanetary material mixed with a small amount of interstellar particles.

The dust generated when Comet Shoemaker-Levy 9 broke up near Jupiter in 1992 may have contributed to the ring's formation, note Joshua E. Colwell and Mihály Horányi of the University of Colorado at Boulder and Eberhard Grün of the Max Planck Institute for Nuclear Physics in Heidelberg, Germany. They describe their study in the April 3 *SCIENCE*. —R.C.

Ulysses marks a milestone

The Ulysses spacecraft has completed a lap around the sun, making it the first craft to have orbited above and below the poles. Launched in 1990, Ulysses began its journey sunward 2 years later. As it ventured near Jupiter's orbit, it received a gravitational kick. That kick enabled it to tour the sun's poles in 1994 and 1995, during the quiet phase of the 11-year solar cycle.

Ulysses revealed that the solar wind blows at different speeds in the polar and equatorial regions (SN: 11/19/94, p. 326). In an equatorial region extending to 30° latitude, the wind moves at about 350 kilometers per second. A wind of about double that speed dominates higher latitudes in both the north and the south.

Having now returned to the vicinity of Jupiter's orbit, Ulysses will make its second trip around the poles at the turn of the century. This time, the sun will be at the peak of its activity and the simple division between fast and slow winds may no longer hold, says Ulysses project scientist Richard Marsden of the European Space Agency in Noordwijk, the Netherlands. —R.C.

Breast milk component assails rotavirus

Breast milk comes equipped with antibodies that a woman generates and passes on to her infant. Babies have immature immune systems, less stomach acid to destroy foreign substances, and unsanitary eating habits, so these antibodies improve their chances of survival. One such antibody works against rotavirus, the most common cause of diarrhea in infants.

Now, researchers in the United States and Mexico have discovered that a complex carbohydrate in breast milk affords babies even more protection than the antibody specifically made to fight the disease.

The compound, called lactadherin, is manufactured in the breast and doesn't break down in the baby's stomach. Instead, it mimics natural carbohydrates found along the child's intestinal walls. The rotavirus mistakenly identifies lactadherin as this home-grown carbohydrate and latches onto it in order to anchor itself in the gut. Both lactadherin and the bound virus are then flushed out of the child's system, says David S. Newburg, a biochemist at Harvard Medical School in Boston and coauthor of the study, which appeared in the April 18 *LANCET*.

Researchers tracked 200 breast-fed infants in Mexico City, documenting any cases of diarrhea and taking regular blood and stool samples to check for rotavirus infections. Of 31 babies with the infections, 15 had diarrhea and 16 had no symptoms. Breast milk consumed by the asymptomatic infants had higher quantities of lactadherin, indicating that the carbohydrate effectively suppresses the symptoms of viral infection and that some women make more of it than others.

Breast milk contains other complex carbohydrates that may protect against disease-causing organisms, says study coauthor Ardythe L. Morrow, an epidemiologist at Eastern Virginia Medical School in Norfolk. "A lot of work is going into that area," she adds.

If further tests prove lactadherin can prevent diarrhea effectively on its own, researchers may be able to develop a synthetic version for treating the disease, Newburg said. —N.S.

Kidney stones and beverage choice

Most people don't think much about kidney stones unless they've had one. Those people know that, once a stone has passed, doctors routinely recommend drinking plenty of fluids. But which ones? A new study in women indicates that some fluids may help a person avoid kidney stones and some may not.

Researchers tracking the diets of more than 80,000 female nurses nationwide between 1986 and 1994 documented 719 cases of kidney stones. Analysis of the nurses' diets in the years preceding the diagnosis of a stone showed that tea decreased the risk of stones by 8 percent, coffee—regular or decaffeinated—lowered it by about 9 percent, and moderate wine intake cut the risk by at least 20 percent, says Gary C. Curhan, a nephrologist and epidemiologist at Harvard Medical School and Brigham and Women's Hospital in Boston. The researchers, who took into account factors such as age and other nutrient intake, reported the findings in the April 1 *ANNALS OF INTERNAL MEDICINE*.

Strangely, an 8-ounce glass of grapefruit juice daily boosted the risk of stones by 44 percent, the data showed. Of the 17 beverages studied, no other drink had such a negative impact. The reason for grapefruit's effect, which had shown up in an earlier study of men, remains unclear, Curhan said.

Milk intake lessened slightly the chance that a woman would get kidney stones, the researchers found.

The average man faces a 3 in 1,000 chance of getting a kidney stone in any given year. For women, the risk is 1 in 1,000, but it soars to 1 in 5 for those who have already had a stone. "Modifying beverage intake might make a difference," says Curhan, but only as part of a broad treatment strategy. —N.S.