Astronomy

Epsilon Eridani: An early solar system?

Among the handful of young stars known to be encircled by thinning rings of dust—a signpost of planet formation—one nearby star stands out from the rest. New observations reveal that Epsilon Eridani may have a planetary system similar to our own. In age, mass, and the position of its newly discovered dust ring, the star bears a close resemblance to what the solar system is thought to have looked like when it was just a few hundred million years old.

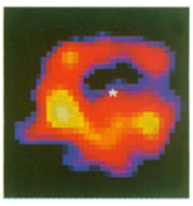
Examining the star by light emitted at submillimeter wavelengths, astronomers have found a ring of dust at roughly the same distance at which the Kuiper belt, a reservoir of comets, orbits the sun. A bright spot within the ring could represent a dense patch of dust trapped by the gravity of an unseen planet, says Jane S. Greaves of the Joint Astronomy Centre in Hilo, Hawaii.

Greaves and her colleagues observed the star with a high-resolution camera attached to the James Clerk Maxwell Telescope atop Mauna Kea in Hawaii. Although comets radiate too faintly at submillimeter wavelengths to be seen, she notes, collisions of comets could generate a dust ring like the one her team found.

"What we see looks like the comet belt on the outskirts of our solar system, only younger," says Greaves. She notes that the region inside the ring is relatively dust-free, but it still has 1,000 times as much material as the inner part of the present-day solar system. The new images of the star fit with the standard model of the early solar system at a time when most dust had coalesced into planets, but "there was still lots of stuff whizzing around and impacting the Earth," Greaves says.

Visible to the naked eye, Epsilon Eridani lies only 10 light-years from the solar system and is nearly as massive as the sun. At 500 million to 1 billion years old, it is a youngster compared with the 4.5-billion-year-old sun but still old enough to have fully formed planets. In contrast, three other stars now known to have dust rings—Vega, Fomalhaut, and Beta Pictoris—are much younger and more massive than the sun (SN: 4/25/98, p. 260).

Greaves reported the findings last month in Santa Barbara, Calif., at a conference on protostars and planets. She and her collaborators will also describe the observations in an upcoming ASTROPHYSICAL JOURNAL LETTERS. —*R.C.*



Greaves *et al.*

False-color view of dust ring surrounding the star Epsilon Eridani (star shape). Yellow and red indicate highest concentrations of dust; purple and black the lowest.

Solar craft contacted

Radio telescopes have detected a wayward solar observatory, and ground controllers have received intermittent signals from the unmanned craft, which lost power on June 25 (SN: 7/4/98, p. 6). The satellite, known as SOHO (Solar and Heliospheric Observatory), is spinning at about 1 revolution per minute near its original orbit, 1.5 million kilometers from Earth.

On July 23, the Arecibo radio telescope in Puerto Rico transmitted a signal toward the location where SOHO had last been detected. A radio dish in Goldstone, Calif. briefly detected the signal reflected from the missing craft.

On Aug. 3, SOHO briefly answered signals sent from a radio telescope at Canberra, Australia. The craft's response, however, contained no data. Engineers are hoping that the craft's solar panels will eventually power SOHO's transmitter long enough for ground-based antennas to reestablish communication with the craft. —*R.C.*

Biology

Why do pigeons get so romantic?

Female pigeons may be offering sex to get a male's protection, suggest researchers in England.

Ornithologists have long observed what they call "mate guarding" behavior in males who stay close to their female partners during the avian equivalent of a honeymoon, the 10 days or so before egg-laying. Previous theories explained this behavior as a way for males to assure that the chicks they end up taking care of really are their own offspring.

But what about the female's interests in the honeymoon period? Does she benefit or suffer from the male's staying close by?

To answer these questions, Claire Lovell-Mansbridge and T.R. Birkhead of the University of Sheffield kept score during 248 matings between pigeon partners to determine who started the action. Females invited the attention of males more than 80 percent of the time. The mates of those who solicited most actively did the most intense guarding. When researchers temporarily removed the closely hovering males, interruptions from would-be suitors resulted in females spending significantly less time feeding.

"We conclude that female pigeons trade pair copulations for protection (mate guarding) against sexual harassment from other males," the researchers say. Their results appear in the July ANIMAL BEHAVIOUR. —*S.M.*

Downstream trout swim but can't hide

Little shrimplike creatures called amphipods can detect danger ahead even when that predator—a hungry trout—is lurking downstream.

"In running waters, chemical cues have generally been assumed to always come from upstream locations," reports an article by Jonas Dahl and his colleagues of Lund University in Sweden. Yet, observations in the wild and in laboratory tests show that the amphipods somehow pick up cues of downstream hazards.

Given a choice of two paths in an artificial stream, the amphipod *Gammarus pulex* avoided drifting along with water flowing toward predatory brown trout. The little crustaceans also avoided water where researchers had dropped trout scents downstream but did not respond to visual cues—trout in glass tubes.

The amphipods' secret may be to check for trout chemical signs in backflows, little stray currents that do not follow the main flow of a stream. The amphipods' skill at detecting danger could change models of predator effects in running water, say the authors, whose analysis appears in the July 22 PROCEEDINGS OF THE ROYAL SOCIETY OF LONDON B. —*S.M.*

Slime coating counts in love darts

Snails may strive for fatherhood by throwing darts at their mates.

Some snails shoot little calcareous sticks coated with mucus into a partner's skin while mating. These love darts may be more than a gesture of affection, suggest Joris M. Koene and Ronald Chase of McGill University in Montreal. The slime carries biologically active substances that could boost the sperm's chance of fertilizing eggs, they report in the July 14 JOURNAL OF EXPERIMENTAL BIOLOGY.

The researchers took extracts of the glands that make the mucus in *Helix aspersa* and applied them to the female genitalia of the hermaphroditic snails. The gland preparation triggered a temporary reconfiguration of the copulatory canal that made the sperm's travels easier and closed off a tract leading to a sperm-destroying organ. The extract also made the reproductive path contract faster, speeding the sperm's trip. Effects last at least an hour, Koene and Chase report.

The species they studied mates several times before laying eggs. The researchers speculate that mucus injections help the snails compete to become a dad. —*S.M.*