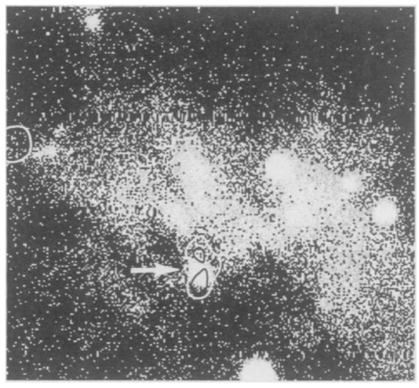
# What a gas! First star in a new class

A novel breed of star, predicted by theory but never before detected, has emerged in telescope observations and satellite data. The young, unnamed object strikes a rare energy balance: While it's hot enough to break up nearby hydrogen molecules, causing them to dissociate into atomic gas, the star lacks the energy to ionize the atomic hydrogen it creates.

Located some 3,200 light-years from Earth in the Milky Way constellation Cassiopeia, the new find represents the first known example of a "dissociating" star. Astronomer Peter E. Dewdney, who took part in the discovery, estimates that several thousand dissociated stars may lie within 6,000 light-years of Earth, hidden from view within thick gas clouds.

At the Dominion Radio Astrophysical Observatory in Penticton, British Columbia, Dewdney and his colleagues used data from the Infrared Astronomical Satellite to zero in on areas of warm dust—likely settings for starbirth. Later, using a radio telescope, they noticed that some of the dusty zones emitted radio signals at a wavelength of 21 centimeters, a telltale sign of atomic hydrogen. These and subsequent observations, says Dewdney, revealed a star enveloped by several layers of gas.



Dewdney et al./ASTROPHYSICAL JOURNAL

*"Dissociated" star (arrow) surrounded by a thin shell of ionized hydrogen (circles).*

A thin shell of ionized hydrogen gas lies closest to the star, followed by a thick shroud of atomic hydrogen, as heavy as 1.4 solar masses, all surrounded by a large cloud of molecular hydrogen, says Dewdney. He estimates that the star is about 10,000 years old.

Studies of such youthful stars and the interaction of their gas layers can offer new insights into starbirth, Dewdney notes. He and his co-workers at the observatory and the University of British Columbia in Vancouver describe their discovery in the March 20 ASTROPHYSICAL JOURNAL. *— R. Cowen*

# Coherent light from a field of microlasers

A single pinpoint of light streams from a microscopic laser built into a specially prepared semiconductor wafer. It follows, then, that a wafer dotted with an array of 400 such lasers would sprout 400 individual light beams. But by carefully controlling the size and spacing of these tiny semiconductor lasers, researchers can now lock them into operating in step. Although each laser emits its own light, the individual beams merge just above the wafer's surface into a single, coherent beam.

"What we get out of this work is a very clear, clean beam coming out of a semiconductor wafer — cleaner than has ever been seen before for a two-dimensional, surface-emitting laser array," says Paul L. Gourley of the Sandia National Laboratories in Albuquerque, N.M. He and his coworkers describe their techniques for fabricating, operating and testing such arrays in the March 4 APPLIED PHYSICS LETTERS.

To elucidate the details of how such laser arrays function, the Sandia team used light pulses to activate microscopic lasing elements fabricated in semiconductors consisting of alternating layers of gallium arsenide and aluminum gallium arsenide. By changing the area illuminated by the pulse, the researchers could activate different numbers of lasers in the array, then observe the beam emerging from the wafer surface.

The researchers found that individual laser beams merge above the wafer surface into a single beam with a distinctive four-lobed pattern resembling a four-leaf clover. Such a pattern is consistent with that expected from an array in which each laser produces light that is 180° out of phase with its nearest neighbors. Expanding the array from four to 400 lasers generates the same basic pattern but produces a sharper beam with significantly less spreading.

"These observations provide further impetus and guidance for the development of [two-dimensional] laser diode arrays," the researchers conclude.

Because semiconductor laser arrays can span wide areas, they may prove useful as light sources for applications such as medical imaging or optical computing, in which photons rather than electrons carry information. Moreover, by utilizing much of the area on a wafer's surface, researchers foresee the possibility of fabricating high-power light sources for semiconductor applications. *— I. Peterson*

# Aspirin may decrease risk of colon cancer

Three years after the discovery that regular aspirin use can help prevent heart attacks — and barely a year after reports that it can lower the risk of strokes — new research hints that an aspirin a day helps keep colon cancer away.

The new epidemiologic study, involving more than 6,000 people, uncovered a statistical correlation between regular aspirin use and a reduced risk of colorectal cancer, the second leading cause of cancer deaths in the United States.

Earlier lab experiments had indicated that aspirin and other nonsteroidal anti-inflammatory drugs (NSAIDs) inhibited the development of colon cancer in rodents. Inspired by those findings, Lynn Rosenberg of the Boston University School of Medicine and her colleagues decided to look for a similar connection in humans. Rodents serve as good models for the disease, she says, because they develop colon cancer in much the same way as humans.

Rosenberg's retrospective study focused on men and women treated in 16 East Coast hospitals between 1977 and 1988. At the time of admission, hospital nurses had administered questionnaires on past drug use to approximately 1,300 patients with colorectal cancer, 1,000 patients with other types of cancer and 4,000 patients with no personal history of cancer. In analyzing the questionnaires, the researchers accounted for known and suspected risk factors for colorectal cancer, including age, sex, family history, and alcohol and coffee consumption.

Men and women aged 30 to 69 who reported taking NSAIDs regularly — at least four times weekly for at least three months in the year preceding the study — appeared to have cut their risk of colorectal cancer in half, the team reports in the March 6 JOURNAL OF THE NATIONAL CANCER INSTITUTE.

Because almost all the frequently used NSAIDs contained aspirin, the researchers conclude that "the sustained use of aspirin-containing NSAIDs may inhibit the development of large-bowel cancer."

NSAIDs appeared to confer no colorectal benefit in people who had stopped taking the drugs regularly at least a year before the study — a finding that parallels experimental results with rats, the investigators note.

Although Rosenberg says the new data offer the first indication that aspirin may help inhibit colorectal cancer in humans, she cautions against drawing firm conclusions before a "large, population-based study" verifies the findings.

"This study fits in very well with our present understanding of colorectal can-