

## Quasar missing link colored infrared

When quasars were first discovered more than two decades ago, it was as "blue stellar objects" that they attracted attention. They looked like blue stars — most stars are not blue — but emitted energy like galaxies. They don't necessarily have to be bluish to be quasars any more, but now there is one at the opposite extreme: an "infrared-loud quasar."

Catalogued as I3349+2438, this quasar appeared in data taken by the Infrared Astronomy Satellite (IRAS). Its discoverers believe it to be the precursor of many more infrared quasars waiting to be found if astronomers use infrared techniques to look for them. Quasar I3349+2438 is very dim in visible light and quiet in radio. Its discoverers — Charles A. Beichman, B. Thomas Soifer, George Helou, Thomas J. Chester and Gerry Neugebauer of Caltech in Pasadena, Frederick C. Gillett of the National Optical Astronomical Observatory in Kitt Peak, Ariz., and Frank J. Low of the University of Arizona at Tucson — present their findings in the Sept. 1 *ASTROPHYSICAL JOURNAL LETTERS*.

The discoverers believe this quasar represents a "missing link," a very early stage of quasar evolution. One theory has it that a quasar forms as two galaxies collide. If one of them contains a black hole,

the collision may provide a large cloud of fuel for the black hole to process in the energy-producing activities that characterize a quasar. The cloud surrounding the black hole would absorb all kinds of radiation and reemit it as infrared, thus providing the infrared bias.

Quasar I3349+2438 is rather near to us, its redshift of 0.106 translating to about a billion light-years of distance. This nearness, Beichman told *SCIENCE NEWS*, is very important. It indicates that there could be a lot of infrared quasars nearby, and it implies that new quasars may be forming even now. A lot of astronomers have believed quasar formation a feature of the early history of the universe only.

The infrared quasar was very nearly at the lowest intensity seen in the current IRAS catalog, Beichman says. As the catalog stands, to count an object as truly there, the astronomers require it to appear in each of the 12 pictures IRAS took of each section of the sky. Now they are combining the 12 passes to build up images of objects three to four times fainter. They are also looking at selected regions that IRAS probed to 10 times its usual sensitivity. As candidates are found, ground-based infrared and other telescopes can observe them.

— D. E. Thomsen

## Common herbicide linked to cancer

Exposure to a common herbicide significantly increases the risk of non-Hodgkin's lymphoma (NHL), according to a National Cancer Institute report. The broadleaf plant killer, a phenoxyherbicide called 2,4-dichlorophenoxyacetic acid (2,4-D), is one of the active ingredients in Agent Orange, used during the Vietnam war.

Swedish researchers reported in 1979 and 1981 associations between phenoxyherbicide use and not only NHL but also two other cancers, soft-tissue sarcoma and Hodgkin's disease. In the current study, headed by Shelia K. Hoar and reported in the Sept. 5 *JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION*, only the NHL connection was found.

Hoar and her colleagues tracked down all cases of the three cancers diagnosed between 1976 and 1982 in white Kansas men, and questioned the patients or their survivors about occupation and exposure to herbicides. To further check the herbicide information, the researchers interviewed local pesticide suppliers.

When the researchers compared the herbicide exposure among the cancer patients and among age-matched white men from the general Kansas population, they found that the incidence of NHL, but not of the other two cancers, increased with increased exposure to 2,4-D.

The more exposure to that particular herbicide, they found, the greater the risk — the incidence of NHL among farmers exposed 20 days or more per year was six times that of the general population, while those who used it six to 10 days per year were at 1.6 times the risk. The greatest danger was to people who had handled the chemical extensively — people who mixed or applied it were at eight times the risk.

The study did not show any increased risk among backyard gardeners. "We can't say they're at risk," notes Hoar, "but there's reason for caution and concern. I think when we know anything is carcinogenic we have to consider that even a low dose may be hazardous."

The report has sparked concern in the federal government. Lois Rossi of the Environmental Protection Agency, who monitors the agency's 2,4-D program, says, "We're going to review the entire study. We feel that the conclusions in the report are well-founded. It's of obvious concern." In the meantime, she recommends that farmers and backyard gardeners follow label instructions carefully, wear protective clothing and handle 2,4-D with caution.

The report is evidently being taken se-

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## A U.S. rocket does something right

The latest experiment in the U.S. Strategic Defense Initiative (SDI) or "Star Wars" program accomplished a lot more than just pleasing the project's planners on Sept. 5, when two sensor-laden instrument packages were destroyed by explosives on one of them. Perhaps the most valuable contribution of the whole exercise was the sorely needed morale boost given to the U.S. space program by the fact that the Delta rocket that carried both payloads simply worked correctly. It was the first successful flight by an orbit-bound U.S. launch vehicle since before the Jan. 28 explosion that destroyed the space shuttle Challenger and killed its seven-member crew.

The last Delta to try for space took off on May 3 carrying a \$575 million GOES weather satellite, but was deliberately destroyed by a radioed signal from the ground after its main engine unexpectedly shut off only 71 seconds into the flight (SN:5/10/86,p.292). Already grounded, besides the shuttle, was another big U.S. booster, the Titan 34D, which blew up April 18 only seconds after liftoff (SN:4/26/86,p.260). Soon to join the rubble heap would be the latest of the European Ariane rockets, blown up from the ground May 30

(SN:6/7/86,p.359).

Besides occasioning the welcome return of the Delta — to repeated cheers from ground controllers at Florida's Cape Canaveral Air Force Station — the SDI test included the successful flight of a suborbital sounding rocket called the Aries, whose previous use, on Aug. 23, had also ended in a radioed "destruct" signal. It was a type that had not malfunctioned in a decade, and the cause was promptly found to be a wrong-sized resistor that had been installed by the booster's builder, Space Vector Corp. of Northridge, Calif. Despite the Aries's long list of earlier successes, however, the seemingly jinxed recent history of the whole U.S. space effort appeared yet gloomier with the rocket's loss, including that of the 2,600-pound X-ray telescope that was its payload.

Another type of sounding rocket, in fact, called the Nike-Orion, had failed on April 25. On that occasion, says a NASA spokesperson, "the second and first stage sort of stuck together, and it blew itself apart." Two other Nike-Orions, however, were launched successfully thereafter, and a single-stage Orion and a two-stage Taurus-Orion were awaiting launch this week for meteorological studies.

— J. Eberhart