

Studies suggest galaxies formed very early

Two new findings may help solve an old riddle in astronomy: When were galaxies born?

University of Hawaii astronomers Esther M. Hu and Susan E. Ridgway came up with a surprising answer when they began searching for distant, youthful galaxies in the neighborhood of a quasar.

Though the glow of hot, newborn stars would suffuse a young galaxy with blue light, the Honolulu-based team figured that some of the galaxies in their survey might appear red. A cocoon of dust surrounding a newborn galaxy would absorb the blue light and provide a reddish tinge, as would the red glow from a high concentration of ionized gas.

Hu and Ridgway did see red — and how. Two galaxies in their near-infrared and visible-light survey appear three to four times redder than any galaxy ever observed at these wavelengths, they report in the April *ASTRONOMICAL JOURNAL*.

To the researchers' puzzlement, however, observations with two telescopes atop Hawaii's Mauna Kea revealed that neither dust nor the glow of ionized gas could explain the galaxies' red appearance. For example, the galaxies abruptly increased in brightness over a narrow range of wavelengths instead of brightening gradually, as they would if dust had reddened them.

If dust or ionized gas didn't color the

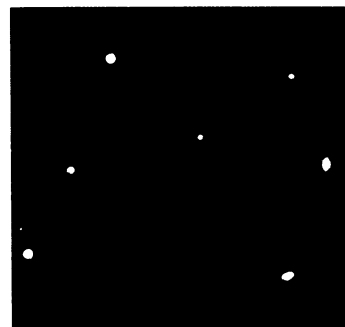
galaxies, what did? Hu and Ridgway suggest that instead of being newborns, the two galaxies are actually old — and thus intrinsically red.

The abrupt increase in brightness, they note, resembles the pattern of emissions from elderly, elliptical galaxies near the Milky Way — with one significant difference. The nearby ellipticals show a surge in brightness in visible light, whereas the two red galaxies show the same jump at a longer, near-infrared wavelength.

That discrepancy could have an intriguing explanation: The red galaxies have a structure identical to that of nearby ellipticals, yet they may lie so far away that the visible light they emit has been stretched, or redshifted, to the infrared. Indeed, Hu and Ridgway propose that light now reaching Earth from these galaxies reveals how the bodies appeared when the universe was half its current age.

The researchers don't have the spectroscopic measurements to prove where the two galaxies actually lie. But if they're right, it would indicate that some galaxies already had old, red stars when the cosmos was very young.

According to Hu, this suggests that some galaxies must have formed when the universe was only about 5 percent of its current age. If the red galaxies are representative of others in the universe, this finding could set a minimum age for the



Circled objects depict reddest galaxies ever observed in visible light and the near-infrared.

universe of about 15 billion years, she says.

In a separate, unpublished finding, another group of astronomers has discovered what appears to be the most distant galaxy yet observed, *SCIENCE NEWS* has learned. According to Steve Rawlings and Mark Lacy of the University of Oxford in England and their coworkers, several lines of evidence suggest that the radio galaxy dubbed 8C 1435+635 lies some 12 billion light-years from Earth.

The faintness of the galaxy in the infrared, its brightness at radio wavelengths, and the detection in visible light of what appears to be the redshifted glow of hydrogen gas all indicate that the team sees the galaxy as it appeared when the universe was just 8 percent of its current age, Rawlings says.

The discovery, he adds, suggests that this galaxy, and perhaps others, had begun making stars only a billion years after the birth of the cosmos. — R. Cowen

Detecting asthma before the last gasp

Approximately 5,000 people in the United States will die this year because they can't catch their breath. They suffer from asthma, a disorder in which the lung's airways become narrowed. For some people, asthma produces only mild wheezing. For others, however, the disease can prove lethal.

A Japanese study published in the May 12 *NEW ENGLAND JOURNAL OF MEDICINE* helps characterize asthmatics who are prone to life-threatening episodes of breathlessness. The report suggests that such people may be slow to recognize a dangerous drop in the blood's concentration of oxygen.

"It's an important study," comments asthma specialist Peter J. Barnes of the National Heart and Lung Institute in London. "It looks like you might be able to predict patients who have a high risk of dying from an asthma attack," he says. Barnes wrote an editorial that accompanies the study.

Kunio Shirato and colleagues at the Tohoku University School of Medicine in Sendai, Japan, studied 11 people who had experienced at least one near-fatal wheezing episode. The team knew that such people face an increased risk of

such attacks in the future. They compared these individuals to 11 patients who also suffered from asthma but had never had a potentially deadly bout. The researchers also recruited 16 healthy controls.

The team instructed recruits to breathe through a series of tubes in which resistance increased in stepwise fashion. They discovered that people with a history of near-fatal asthma reported less sensation of breathlessness than other study participants. At high levels of resistance, these patients said they felt out of breath, but they lagged far behind the other asthmatics in their perception of discomfort.

In addition, patients with near-fatal asthma suffered an impaired ability to compensate for low concentrations of oxygen in their blood. Normally, when the oxygen dissolved in blood dips too low, a group of nerve cells (the carotid body) detects the problem and triggers corrective action — the person starts to breathe more deeply and rapidly.

The scientists found this same drive in people who had had an almost fatal asthma attack, but it was blunted compared to the reactions of other asth-

matics and controls.

It may be that some people with asthma inherit an impaired ability to sense and correct low oxygen concentrations in the bloodstream, says Richard J. Martin of the National Jewish Center for Immunology and Respiratory Medicine in Denver.

Such asthmatics may not recognize that they're in deep respiratory trouble until it's almost too late. This tendency to underestimate breathing difficulties may, in turn, lead to a delay in taking medication or going to the hospital, Martin adds. In fact, deaths from asthma have increased in several countries, including the United States, in the last decade.

Additional research may someday provide doctors with an easy-to-use method of identifying patients who run the risk of a near-fatal episode. Until then, Martin believes, all asthmatics should monitor their lung function with a device called a peak flow meter.

Just as a diabetic must monitor his or her blood sugar, asthmatics should rely on an objective measure of their respiratory health, he says. That way, patients who don't feel terribly breathless can recognize a threatening turn in their respiration. — K.A. Fackelmann