

Two distant galaxies provide new puzzles

Astronomers exploring the nature of galaxy formation and evolution have shed new light on two of the most distant galaxies known in the universe. Both bodies were initially identified by their unusually intense radio emissions, and both lie so far away from Earth that astronomers observe them as they appeared billions of years ago, when the universe was just 10 percent of its current age. Nonetheless, the galaxies sport several differences.

"It's like looking at a roomful of babies ranging from 1 day to 1 year old," says Mark Dickinson of the University of California, Berkeley. "A small difference in age can make a big difference in appearance — and in the case of galaxies, not all were born at the same time."

One of the two studies examined in unprecedented detail the radio galaxy 4C 41.17, the most distant galaxy ever observed. Using the Hubble Space Telescope, George K. Miley of Leiden University in the Netherlands and his colleagues discovered that the galaxy's core has a chain of luminous clumps that are aligned with its jets of radio emissions. Miley suggests that these clumps are knots of star formation triggered by the high-intensity radio jets. Alternatively, he says, the clumps may not be stars at all. Instead, they may represent light scattered by gas or dust caught in the searchlight of a bright energy source — possibly a quasar — buried at the galaxy's center. Miley says his team will need further Hubble observations, examining 4C 41.17 at a second wavelength, to decide between the two possibilities.

In studying another distant radio galaxy, B2 0902+34, which lies only slightly closer to Earth, Dickinson and Peter R. Eisenhardt of the Jet Propulsion Laboratory in Pasadena, Calif., have solved an old puzzle. The researchers began their ground-based infrared study after astronomer Simon J. Lilly, now at the University of Toronto, reported that although the galaxy is observed soon after the birth of the universe, it has very red stars — indicating that the stars are more than 1 billion years old (SN: 4/23/88, p.262). That finding spells trouble for most cosmology theories, which can't explain how a galaxy could have evolved so rapidly after the Big Bang.

Eisenhardt and Dickinson now report that Lilly's view of B2 0902+34 was colored by the red glow of ionized oxygen gas in the galaxy. They say that the stars at the center of the galaxy are actually bluer, and thus younger, than believed — no more than 300 million years old. Indeed, B2 0902+34 could be a proto-galaxy, a galaxy caught in the act of formation, the researchers report in the



Hubble image of the galaxy 4C 41.17

NOV. 1 *ASTROPHYSICAL JOURNAL LETTERS*. In contrast to 4C 41.17, light from the galaxy is not aligned with its radio emissions, they note. In addition, B2 0902+34 has a somewhat younger star population and a blobby, less elongated shape.

The study also revealed an unsettling finding. The team detected what appears to be a bright red halo around B2 0902+34. If the halo is confirmed, it suggests that stars at the outskirts of the galaxy are redder, and possibly older, than those at the core — a phenomenon never before observed. — R. Cowen

Dante breaks four legs

Dante, an eight-legged robot equipped with stereoscopic vision and electronic measuring tools, was built to explore the hellish interior of a smoldering volcano in Antarctica (SN: 6/6/92, p.376). But last week, days before its mission was to begin, Dante was waylaid by another hell: a slag heap in Pittsburgh.

For some 19 hours, beginning on the morning of Nov. 3, researchers who designed Dante at Carnegie Mellon University in Pittsburgh put the climbing robot through a trial run on the roughest terrain available — a mile-wide pile of metal cinders left over from one of the city's old steel mills. But as the \$2 million robot climbed up part of the slag heap at about 4 a.m. on Nov. 4, its four hind legs broke off and the robot sat down, unharmed but immobile, on its rear end.

David Pahnos of Carnegie Mellon attributes the accident to improper welding and calls the setback only temporary. After its builders complete repairs — either rewelding all of Dante's aluminum legs or outfitting it with new ones — researchers will continue testing. They hope to fly Dante to Antarctica around Christmas. If all goes well, the robot will explore the crater floor of volcanically active Mt. Erebus during the first two weeks of 1993 — just before the end of austral summer, when such studies must halt for the year. □

Flabby teenage years presage health risks

Overweight teens may jeopardize their future health, even if they slim down later in life, concludes a new scientific report.

Aviva Must and her colleagues wanted to find out the long-term health effects of being overweight as a teenager. They began by collecting data gathered during the Harvard Growth Study, an effort conducted from 1922 to 1935. The Harvard investigators had recorded height and growth measurements for more than 3,000 public school children annually from the first or second grade through high school. Must and her co-workers homed in on the records for 238 participants who had a body-mass index above the 75th percentile for their age and sex.

The people in this group were at least 20 pounds overweight when they were teenagers, says Must, who works at the U.S. Department of Agriculture's Human Nutrition Research Center on Aging at Tufts University in Boston. For comparison, the researchers looked at data from 270 people in the Harvard study with lean to average weights during adolescence.

Must's team then began the task of tracking what had happened to the 508 Harvard Growth Study participants. To obtain medical histories, the researchers interviewed those who were still alive at the time of the Tufts study, all of whom were in their 70s. They searched death certificates for information about people who had died.

The researchers linked a broad range of ill effects to being overweight during the teen years. Their statistical analysis revealed that men who had been fat as teenagers were 2.3 times as likely to die from heart disease as men who had been lean. Both men and women who had been fat teens were more likely as adults to develop atherosclerosis. That finding underscores the notion that coronary artery disease starts early in life, Must says.

The study, published in the Nov. 5 *NEW ENGLAND JOURNAL OF MEDICINE*, also shows that men who had been fat as teenagers faced an increased risk of gout and colon and rectal cancers compared with men who had been slim.

Women who were overweight as teens were 1.6 times as likely to develop arthritis, an inflammation of the joints. Even if they were not afflicted with arthritis, women who had been overweight as teenagers reported greater difficulty climbing stairs and walking.

The increased risk of heart disease, arthritis, and other problems remained even for those overweight teens who shed the excess weight as adults, notes George A. Bray of the Pennington Biomedical Research Center in Baton Rouge, La. Bray wrote an editorial to accompany the research report. — K.A. Fackelmann