

## Breaking the redshift-4 barrier

For cosmologists, a redshift value of 4 used to seem like the 4-minute mile in footracing. For a long time, in spite of diligent searching, no object with a redshift greater than 4 could be found. Cosmologists wondered whether the horizon of the universe might be somewhere around the distance represented by redshift 4, and so we would never be able to see beyond it. However, it has turned out not to be the horizon, and we do see beyond it.

As with the 4-minute mile, once the barrier was broken, new records were posted swiftly. There are now at least three known quasars with redshifts beyond 4, two of which were reported in the last few weeks, including the most distant object now known, with a redshift of 4.11.

In nature, the most common cause of redshift—a systematic reddening of an object's light—is motion away from the observer. According to the expanding-universe theory, the greater an object's recession velocity, the farther away it is. The redshift of 4.11 translates to a velocity of 93 percent of the speed of light, according to an announcement by the European Southern Observatory (ESO) in Cerro La Silla, Chile.

The first object with a redshift greater than 4 was the quasar 0046-293, with a redshift of 4.01 reported in the Jan. 8, 1987 *NATURE* by S.J. Warren, and colleagues. from the Institute of Astronomy in Cambridge, England. In the Oct. 1 *ASTROPHYSICAL JOURNAL LETTERS* Maarten Schmidt of California Institute of Technology in Pasadena, Donald P. Schneider of the Institute for Advanced Study in Princeton, N.J., and James E. Gunn of Princeton University report what—at the time they wrote—was the second, PC 0910+5625, with a redshift of 4.04.

The third, Q0000-26, found by Cyril Hazard of the University of Pittsburgh and Richard McMahon and Mike Irwin of the Institute of Astronomy, has the record-breaking redshift of 4.11. That means we are seeing Q0000-26 as it was when the universe was only a tenth of its present age, or approximately 18 billion years ago if we accept the most widely used value for the age of the universe.

John Webb of ESO has obtained detailed spectra of Q0000-26. Early results from the analysis of these spectra “are causing great excitement among astrophysicists,” says the ESO announcement. These spectra “will permit the investigation of matter in the universe at an earlier time than ever before possible,” says ESO.

## Matter flow from a Seyfert nucleus

Active galactic nuclei are bright, concentrated sources of energy inhabiting the centers of certain galaxies, the class called Seyfert galaxies particularly. Astrophysicists infer that these active nuclei interact powerfully with their surroundings, spewing out large amounts of fast-moving matter, but until now clear evidence of such an outflow has been lacking, according to Jean W. Goad of the National Optical Astronomy Observatories in Tucson, Ariz.

In the Seyfert galaxy NGC 3516, Goad and John S. Gallagher III, formerly of Kitt Peak National Observatory, now director of the Lowell Observatory in Flagstaff, Ariz., have found such evidence in the form of a pattern of velocities indicating a flow of matter out of the active center of that galaxy.

Many galaxies with active nuclei are accompanied by lobes and “jets” of radio-emitting material with shapes that suggest they are matter spewn out of the galactic nuclei, although as Goad and Gallagher remark in their report in the September *ASTRONOMICAL JOURNAL*, “actual kinematic measurements are scarce.” Also, the jets and lobes tend to lie at large distances from the galactic nuclei. What Goad and Gallagher have found is an indication of matter fairly close to the center of NGC 3516, flowing away from the center in an S-shaped, bipolar pattern.

## Cholesterol guidelines released

The National Heart, Lung and Blood Institute's (NHLBI) National Cholesterol Education Program last week issued a report telling physicians how to evaluate and treat adults with high blood cholesterol, including those in various risk groups.

“This is the first time we have had this level of practical advice produced by a national panel reaching consensus recommendations,” said program coordinator James Cleeman at the Oct. 5 news conference announcing the report.

The report establishes lower cutoffs for high cholesterol than the ones currently being used, thus putting about one of four U.S. adults, or 40 million people, in the “high cholesterol” range (240 milligrams per deciliter of blood and above). The “borderline high” range is 200 to 239 mg/dl.

But because of the lower cutoffs, improved cholesterol testing will be needed. Such testing is the subject of a companion report by the program's Laboratory Standardization Panel.

According to the newly issued report, adults over age 20 should be tested every five years. If they fall into the borderline range but do not have coronary heart disease or two other risk factors, such as cigarette smoking, hypertension, diabetes, a family history of premature coronary heart disease or being male, they should receive dietary information and be retested a year later.

If, however, they do have coronary heart disease or two other risk factors or if they are in the high cholesterol range, their LDL-cholesterol level, which is the more specific and more causally connected risk factor in coronary heart disease than the overall level, should be tested.

Those with LDL levels of 160 mg/dl and above are considered high risk and require treatment. In addition, those with LDL levels between 130 and 159 mg/dl and with coronary heart disease or two other risk factors require treatment, which includes a two-step dietary program. Drugs are a last resort.

According to a 1986 NHLBI survey, half the physicians did not use dietary therapy until cholesterol levels were above 240 mg/dl, and about 25 percent waited until 260 mg/dl and above.

“Many of these physicians were deterred from more actively using dietary therapy by their not having available practical guidance about to how to go about it,” Cleeman says.

The survey also showed that more than 75 percent of physicians did not prescribe drug therapy with patients who had cholesterol levels of 260 mg/dl, and more than one-third never prescribed drug therapy.

While the panel's report recommends more cholesterol testing, a problem exists: Accurate results are not always reported. About 47 percent of the laboratories in a 1985 College of American Pathologists Comprehensive Chemistry Survey did not fall within 5 percent of actual readings, says Herbert Naito, the Laboratory Standardization Panel chairman.

The companion report recommends a maximum 5 percent accuracy range initially and a maximum 3 percent range within five years. This will be accomplished, Naito says, when cholesterol-detector manufacturers supply laboratories with calibration materials from the federal Centers for Disease Control. Previously, many manufacturers had supplied inaccurate calibration samples.

The panel must next examine the accuracy of LDL-cholesterol readings, Naito says.

According to the 1986 NHLBI survey, fewer than half of U.S. adults had ever had their cholesterol checked and only 10 percent knew their cholesterol level.

Although the association between coronary heart disease and high cholesterol has been known for many years, it was not until 1984 that research showed that lowering cholesterol reduced the number of heart attacks and heart-attacks deaths.