Stringing out a cosmic image, perhaps

A cosmic string is a relic of the cosmic past, an isolated region where the way things used to be persists, where the density (4×10^{23} grams per centimeter) and geometric characteristics of a previous eon survive (SN: 5/12/84, p. 294). In a newly discovered gravitational lens effect, some astronomers believe they may have found a cosmic string.

A gravitational lens effect (GLE) is a double image of a single quasar, produced by the bending of the quasar's light by some massive object. The newly found GLE has a much wider spread between the images than any of the others, 2.6 minutes of arc, which indicates that the object doing the lensing is exotic: a massive cluster of galaxies, a supermassive black hole (10^{15} times the sun's mass) or a cosmic string.

The finding is part of a search for cosmic strings, J. Richard Gott of Princeton (N.J.) University told SCIENCE NEWS. Gott had predicted that strings should produce GLEs with widely separated images. Another Princeton astronomer, Bohdan Paczynski, had searched records for such wide pairs. Quasar pair 1146+111B,C was on the list he published. Edwin L. Turner of Princeton and six others took spectra of those images and showed that they meet the criteria for a GLE, they report in the May 8 NATURE.

Strings should make double images, Gott says, because they render spacetime cone-shaped. (We are at the apex of the cone looking to the base.) Light from any distant point must follow the surface of the cone, and in so doing takes two paths, giving two images. This doubling can be illustrated by flattening the cone after making a cut up the side from the distant point to the apex. One gets a "PAC-MAN shape," Gott says, a circle with a wedge cut in it. The sides of the wedge make two different paths from the apex to what is really only one point on the base.

A cluster of galaxies should give three images, so one test is to look for a third image. A black hole would give two images, but it would have to be exactly between them, and it should give symmetrically placed doublings of other quasars within the 2.6-minute circle. A point in favor of a string, says Gott, is that the images are equally bright and seem to be too faint to be much magnified. A cluster or a black hole would magnify them.

A string should make a difference in our perception of the temperature of the cosmic microwave background radiation on opposite sides of it. Looking for such a variation, Anthony Stark, Mark Dragovan and Robert L. Wilson of AT&T Bell Labs in Holmdel, N.J., and Gott have made a radio map of the area. The result is inconclusive, but they hope to do better next year. On the other hand, they did not find the expected evidence for a cluster: a drop of 3 millikelvins due to gas in the cluster.

All in all, Gott does not expect the question to be settled quickly or easily. It will take a painstaking examination of everything in that 2.6-minute circle – a huge field to astronomers – looking for multiple images and other effects of the different possible lensing agents.

– D.E. Thomsen

War-on-cancer numbers

We're losing the war on cancer, according to John C. Bailar III of Harvard University and Elaine M. Smith of the University of Iowa in Iowa City. Bailar and Smith note in the May 8 NEW ENGLAND JOURNAL OF MEDICINE that the number of deaths from cancer increased between 1950 and 1982, even after adjustments were made for the aging population.

But the National Cancer Institute in Bethesda, Md., looking at length of survival after diagnosis as well as death rates, sees an improvement. The mortality rate alone can be slow to reflect progress, says Peter Greenwald of the institute. For example, smoking has been on the decline since the 1960s, but the first decrease in lung cancer mortality didn't come until 1983, he says.

Greenwald questions whether lung cancer deaths should be included in the analysis at all. Both sides agree that, not counting lung cancer deaths, there has been a decline in cancer mortality. Since lung cancer incidence has until recently been on the upswing and has a high mortality rate, it masks progress in other cancers, Greenwald says. But Bailar notes that the improvement essentially disappears if deaths from stomach and cervical cancer, which are both decreasing in incidence, are also left out. "What it boils down to is if you leave out what's going up, the rest is coming down," he says. *– J. Silberner*

New ideas in fighting clots, heart attacks

Almost every heart attack is associated with a narrowed coronary artery and a clot to block it. Researchers see promise in a number of clot-dissolving substances, particularly the up-and-coming recombinant tissue plasminogen activator (r-tPA). But none remedies the underlying problem – the narrowing of the artery – that sets the stage for a clot.

Now, researchers are studying several therapies that, when combined with r-tPA, may not only clear the clot but also prevent a recurrence. These were described earlier this month at the annual meeting of the American Federation for Clinical Research in Washington, D.C.

The strategy closest to clinical application adapts a technique now used for chronic, heart-related chest pain. In coronary angioplasty, a balloon-tipped catheter is threaded into an artery to a point of obstruction and inflated to push the vessel open (SN: 11/29/80, p. 341). Researchers at the University of Michigan in Ann Arbor have compared the use of r-tPA alone with the use of r-tPA combined with coronary angioplasty.

In patients receiving r-tPA alone, the affected arteries were up to 75 to 80 percent narrower than normal after treatment. Patients getting the combined treatments showed only half that narrowing, and clot recurrence in that group was greatly reduced as well. Measurements of cardiac function after treatment showed that immediately widening the artery allowed the starved area of the heart to recover function, while after clot-dissolving treatment alone there was no recovery in the affected area. "I think all of us would agree that coronary angioplasty has a role [in treating victims of heart attacks]," says Eric Topol, who presented the study. But, he adds, adjustments in the r-tPA dose regimen could mean "it won't always have to be done on an emergency basis."

Even after the combination of angioplasty and r-tPA, two of the eight patients in that treatment group had a recurrence of the clot. But another technique, in an early stage of research, may short-circuit such a clotting reaction, which can occur where arteries are unhealthily narrowed. As part of the normal repair process, platelets adhere to the walls of a vessel wherever there are breaks. But when the vessel is narrowed and coated with deposits, adhering platelets can clump and start to obstruct the blood flow. A monoclonal antiplatelet antibody, developed by researchers at Massachusetts General Hospital in Boston and the State University of New York at Stony Brook (SUNY), binds to a receptor on the platelet and blocks a necessary step in that clotting process. In the study (on dogs), the antibody did not appear to affect the ability of the platelets to adhere to vessel walls – and therefore caused no excess bleeding.

In an optimistic scenario, Barry Coller of SUNY speculates that r-tPA could someday be combined with the antiplatelet antibody to prevent an immediate recurrence of the clot. Once the patient is stabilized, angioplasty might be used to widen the artery. Researchers would then be left "merely" to deal with the question of why the artery narrowed in the first place – and how to prevent it from narrowing again. *– L. Davis*