given some theorists reason to believe that that is, in fact, possible. Now, however, in the March 2 NATURE, N. D. Birrell and P. C. W. Davies of Kings College of the University of London argue that that expectation is based on assumptions that are too ideal. The situation that is likely to exist in an actual black hole, they say, destroys the expectation.

Black holes are a prediction of Einstein's theory of general relativity. The first solution to Einstein's equations that describes a black hole, the Schwarzschild solution, makes it truly the land from whose bourne no traveler returns. Whatever falls into a black hole never comes out. Everything just stops at the singularity.

But the Schwarzschild solution is for a nonrotating, electrically neutral body. In the real case, rotation is almost certain to be present, and electrical charge may be. In solutions for rotating and/or charged black holes things don't just disappear. If something comes into the black hole in a certain way, it can go through and be reflected, not back into our universe, but into a different, through-the-looking-glass universe. The other universe is an existence parallel to our own. In that universe and in ours is a black hole with a singularity, and between the singularities is a so-called space bridge that permits communication between the universes. Otherwise they are inaccessible to each other. In some cases a chain of such bridges connects several universes in succession. How these ideas develop is described in detail by William J. Kaufmann III in his book *The Cosmic Frontiers of General Relativity, A Layman's Guide to the New Universe* (Little, Brown and Co., 1977).

The objection of Birrell and Davies is that the conditions under which these possibilities of interuniverse travel are derived do not take into account the effects of certain quantum force fields on the interior of the black hole. When these quantum fields are taken into account, Birrell and Davies write, the space bridge is destroyed. The mathematics that they lay out to support this contention applies specifically to the electrically charged, nonrotating case, but they see no reason why it should not extend to the rotating case as well. They make no judgment on the existence of other universes; they content themselves with declaring such universes unreachable. □

Laetrile: The "cure" that can kill

Those who take the controversial cancer drug Laetrile should be careful about the fruits and vegetables they eat. Otherwise they may suffer hydrogen cyanide poisoning and may even die. This warning comes from a report in the March 6 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION.

Laetrile (the chemical amygdalin) is found in the kernels of many fruits, notably apricots, peaches, plums and bitter almonds. These kernels also contain two enzymes known as beta-glucosidases and another enzyme known as hydroxynitrile lyase. The enzymes are activated when the kernels are crushed through eating, and together they conspire to break down amygdalin into hydrogen cyanide. The medical literature is replete with examples of people being poisoned from eating apricot pits, cherry seeds or apple seeds. For instance, several Californians who ate apricot pits as a health food suffered cyanide poisoning (SN: 8/6/77, p. 52). Just as noteworthy, however, a number of fruits and vegetables also contain beta-glucosidase enzymes — sweet almonds, celery, peaches, lettuce, bean sprouts, alfalfa sprouts and some others. So if one ate any of these foods before or after consuming Laetrile, might the enzymes in the plants help release hydrogen cyanide from the Laetrile?

Eric S. Schmidt and his colleagues at the University of California at Davis attempted to find out with an animal study. They purchased unroasted, fresh, sweet almonds from a local health food store and obtained Laetrile from California's department of health. They blended the almonds into a paste, incubated them with Laetrile, then fed the mixture to nine healthy dogs via a gastric tube. The amount of Laetrile the dogs received was comparable to that consumed by cancer patients — 500 to 2,500 mg daily. They fed another healthy dog almonds only. Whereas the latter showed no harmful effects, the former nine all gave evidence of hydrogen cyanide poisoning — breathing difficulties, trouble walking, seizures and coma. Six of the nine dogs, in fact, died from poisoning.

Although humans would probably not consume fruits and vegetables in a paste incubated with Laetrile, nor take them via a gastric tube, the investigators still believe that their results have implications for cancer patients who might eat fruits and vegetables before or after taking Laetrile. Critically ill cancer patients, they contend, are especially susceptible to hydrogen cyanide poisoning because they often receive drugs to suppress vomiting, may have their Laetrile tablets mashed for easier swallowing and may experience delayed emptying of food from their stomachs. Because of poor health, the researchers believe, such patients may also be inclined to eat "health foods" — notably those fruits and vegetables that contain the enzymes that break down amygdalin into hydrogen cyanide.

These results, Schmidt and his team conclude in JAMA, "draw attention to the hazard of hydrogen cyanide poisoning in patients who take Laetrile. . . ." □

Corning develops rainbow glass

Scientists at Corning Glassworks in Corning, N.Y., keep making fortunate mistakes. The latest one, a multi-colored photosensitive glass called Polychromatic glass, was announced at this week's American Chemical Society meeting in Anaheim, Calif.

More than 20 years ago, S. D. Stookey heated a plate of chemically modified glass to 600°C, but the furnace malfunctioned and shot up to 900°C. He expected to find a pool of glass, but the piece didn't melt. While removing it from the oven with tongs, Stookey dropped the glass and naturally expected it to shatter. But instead, it clanged on the floor like a plate of steel and, thus, Corning Ware and Pyroceram were born.

This time serendipity delivered a glass rainbow. Stookey and senior technician J. E. Pierson started with a sodium fluoride opal glass — a milky-white substance that contains particles of silver metal. They exposed the glass to a short blast of ultraviolet light to arrive at the desired opalescent effect. But by following this first procedure with a longer ultraviolet exposure and simultaneous high heat (300° to 410°C) a full range of brilliant colors appeared unexpectedly. They modified the chemical content of the original opal glass to produce a transparent glass with the same photosensitive properties.

The treatment appears to create pyramid-shaped nonmetallic crystals with silver nuclei. Short initial exposure to UV light creates fewer crystals with more silver at the tip of the pyramid and green or blue tones. Longer exposure creates more crystals containing less silver and red or yellow tones. The glass thus acts like photographic film in certain ways, displaying different colors in response to different UV light exposures.

It has been possible for centuries, of course, to create colored glass with gold, silver and copper — a tour of European cathedrals demonstrates that ancient technology. But by placing a black and white negative over the glass to regulate UV exposure, a pattern of varying colors and shapes can be created on a single piece of glass and can display the entire color spectrum from pale yellow to blue, purple and red.

While stained glass and other artwork are obvious applications, they are not the only ones Corning researchers foresee. Since the colors are stable, permanent glass slides could be made for museum archiving or photographic storage. And since the glass can also be molded into three-dimensional objects, it could be used for fancy glass packaging and for multi-colored beverage glasses and dishware without the problem of erodable lead coating. □

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