The Cloning of a Man: Debate Begins

A millionaire, with the aid of scientists, creates an infant that is an exact genetic copy of himself. True or false? David M. Rorvik, author of a book soon to be published, says that he helped arrange the first cloning of a human being and has seen the asexually produced boy, now 14 months old. Yale scientist Clement Markert, whose own research involves asexual reproduction in mammals, calls that claim "an absolute fraud." Other scientists, Jonathan Beckwith and Ethan Signer, say whether or not the claim is true, cloning of humans will be possible before long, and society must now consider its implications.

In a statement issued by the publisher, J. B. Lippincott Co., Rorvik says, "A refinement of existing cell-fusion techniques was used in the first cloning of a man — a feat achieved by a team with millions of dollars at its disposal." But Rorvik refuses to identify any of the participants or to offer corroborative evidence. Another publisher, Simon and Schuster, earlier declined to publish the book because Rorvik would not document his claims.

Prompted by public interest in the book, a group in Washington has requested information about federally funded research on asexual reproduction of mammals, including human beings. Peoples Business Commission sent Freedom of Information requests to NIH, NSF, CIA, FBI, and Departments of Defense and Agriculture. They also filed a court suit to expedite the requests' processing. Jeremy Rifkin and Ted Howard of the group say the public needs immediate access to research on cloning, fertilization and gestation in the laboratory, and in embryo implantation "to ascertain the nature and extent of government involvement in the alleged creation of human clone[s]." Beckwith, who finds the claims of the book "incredible," sees it as a mechanism for opening discussion. "What is relevant is that such a clonal man is *conceivable* given the progress in medical and biological research," Beckwith says. "It is time for the establishment of some kind of national forum for discussion in the implications of this research." According to Signer, the research raises such questions as: Who are to be donors of nuclei for cloning? Who will be responsible for cloned offspring? Should money and time be invested in cloning at the expense of other medical needs? Who is to make the decisions regarding cloning?

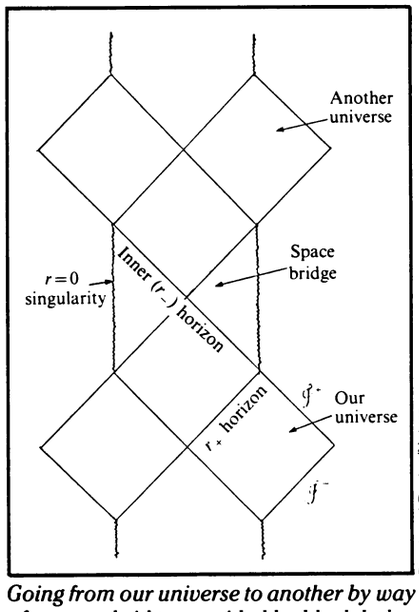
Scientists questioned were skeptical of the claims of human cloning. Markert says that no one known to the scientific community has given public evidence of successful cloning with any vertebrate animal. Even in the experiments with frogs, the transplanted nucleus comes from a tadpole, not an adult animal. Markert estimates that there are only 12 laboratories in the world able to do the requisite microsurgery. "It's not possible to have an unknown so-called scientist succeed working in his basement," he says.

Although he does not believe cloning is possible as described in Rorvik's book, Markert told SCIENCE NEWS that a limited type of cloning is already possible and likely to be applied to domestic animals. Markert and Peter Hoppe of the Jackson Laboratory in Bar Harbor, Maine, described recent experiments in which they changed the genetic material in fertilized mouse eggs. Using microsurgical techniques, they removed one pronucleus (the sac containing one set of chromosomes, either from the male or female parent) from an egg six hours after fertilization. The remaining pronucleus then duplicated, and the two pronuclei merged, giving an egg with two identical sets of chromosomes. The embryos were implanted in female mice and seven offspring of such manipulation have been born; five with all genes derived from the mother, two with all genes derived from the father. Being completely homozygous, all the successful embryos have two X chromosomes and thus are female. That procedure is different from what is generally thought of as cloning. Although all the genes come from a single adult mouse, they consist of two copies of half the donor mouse's genetic material, rather than a single copy of each donor gene. "This is the highest state of the art now," Markert says. "No one has done any more."

However, it is possible to produce a clone of mice by simply extending that technique. If the procedure is repeated on eggs from any of the completely homozygous mice, offspring with maternal genes will be exact genetic copies of their mothers. Markert expects experiments on such cloning of valuable domestic animals to begin in a few months. His laboratory is currently working on rats, and he expects no barrier to success in rabbits and cows.

Clones of domestic animals, he says, are very much on the contemporary agenda of research. However, neither Markert nor Hoppe foresee human applications of cloning. Hoppe says, "It is a fascinating tool for research purposes, but I would never condone it in humans." Markert says the cloning techniques have "no important potential for human beings." He points out that the success rate in manipulating mouse eggs was exceedingly low. It took hundreds of eggs to produce seven offspring. Such vast amounts of human material are not available. To the claims in Rorvik's book, Markert reacts: "Someone in Lippincott is a publicity genius." □

We have to stay in our own universe



Birrell and Davies/Nature

Going from our universe to another by way of a space bridge provided by black holes. This is a mathematician's conformal diagram, in which time flows vertically and space is represented horizontally.

Black holes are one of the most fascinating features of contemporary physics. At present they are mostly theoretical curiosities, although some astronomers believe there is evidence for actual ones in the sky. Astrophysically a black hole is a star that has finished its nuclear burning and collapsed to a fantastically dense state. Mathematically it is a place where space and time seem to stop.

Black holes are called black because they form, in a sense, horizons to the observable universe. Things that fall into them don't come back. You can't see into them, because any light that might be generated inside them never gets out. A black hole's gravitational field is so strong that the light is infinitely redshifted. In the center of a black hole is a singularity, a place where the laws of physics may no longer apply, and where space and time seem to disappear.

Is a black hole, perhaps, "the drain" down which so many beloved things are said to have gone? Is it a way out of the universe, a doorway or a tunnel into some other universe, of whose existence we are otherwise unaware? The mathematics has

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. □