pulse relative to another. A slight frequency shift goes along with this phase shift.

The effect of all this is to raise frequencies in the trailing half of the pulse and lower them in the leading half, producing what is called a "chirp," after the acoustical phenomenon of the same name. Negative dispersion, working on this chirped pulse, tends to narrow it, because the trailing part keeps trying to over-run the leading part. In the experiment, negative dispersion narrowed input pulses produced by a mode-locked color center laser operating at 1.5 micrometers wavelength from about 20 picoseconds wide to 2 picoseconds wide and it made solitons out of them. The shape and behavior of the pulses conforms to the mathematical expectations. They rise and fall as they should, and when they fall, they give back the shape and frequency spectrum that came in. "That's the mystical part," says Mollenauer. One doesn't expect such exactness when dealing with actual matter.

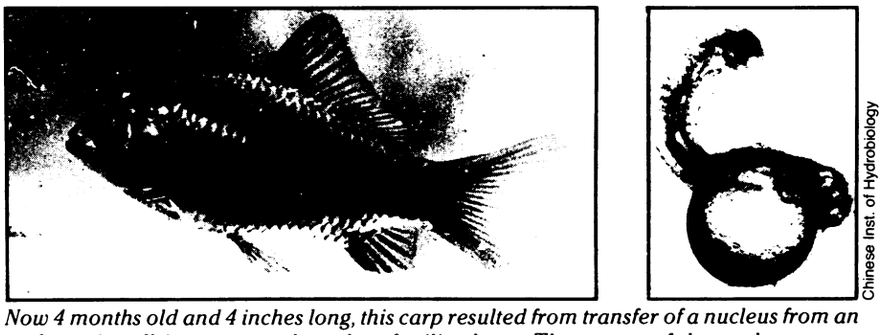
Mollenauer expects that solitons may be useful in communications someday, but not until the fibers are loaded with traffic at 1.3 micrometers. That is the wavelength at which dispersion is zero for quartz, and highly compressed, though not soliton, pulses can be made there. Later, perhaps, solitons at 1.5 micrometers could be added on the same fibers.

The work may also be of interest to those who are studying solitons in other branches of physics. Such studies have been mainly theoretical. These experiments have "opened our eyes, and we hope will open the eyes of other people," says Mollenauer. The experiments "have brought it down to the real world." □

Gene-splicer quits UCSD

The scientist who was charged with cloning the wrong virus (SN: 8/16/80, p. 101) has resigned from the University of California at San Diego. Samuel Ian Kennedy claimed that irreconcilable difficulties with the university's biosafety committee made it unlikely he could work there effectively in the future. The committee concluded its report on the incident with a statement that Kennedy had either cloned the Semliki Forest virus deliberately or made a mistake due to poor record keeping or a lapse of memory. Kennedy says he believes the virus was cloned due to accidental contamination of virus stock when vials were broken in transport from England. Kennedy and the committee differ on the chronology of events leading to the incident, and Kennedy charges the committee did not give him sufficient opportunity to explain the situation. It is widely agreed that no health hazard resulted from the error; cloning of Semliki Forest virus is now permissible under the National Institutes of Health guidelines. □

Chinese carp clone & cross-species embryo



Chinese Inst. of Hydrobiology

Now 4 months old and 4 inches long, this carp resulted from transfer of a nucleus from an embryonic cell into an enucleated, unfertilized egg. The source of the nucleus was a blastula, not an adult fish as had been reported earlier (SN: 8/2/80, p. 72). Among 189 attempted transplants, only two fish developed to the fry stage, say scientists at the Chinese Institute of Hydrobiology. More recently, scientists at that institute combined nuclei from one family of freshwater fish, grass carp, with cytoplasm from another, loach. The resultant embryo reached the "heart-beat" stage (right), but it died later of abnormal development. Chen Hongxi of the institute's laboratory of fish genetics and breeding suggests that techniques of somatic cell culture, genetics and nuclear transplantation soon may produce a new method of fish breeding.

Congress pledges a big spur to fusion

With a commitment reminiscent of President John F. Kennedy's May 1961 pledge to put a man on the moon, Congress last week cleared a bill calling for development of an operational fusion power plant by the year 2000, roughly 20 years earlier than is currently scheduled. Sent recently to President Jimmy Carter for his signature, the proposed Magnetic Fusion Energy Engineering Act of 1980 outlines a series of research and engineering objectives estimated to total around $20 billion.

The goal of magnetic-confinement fusion research is to enclose a hot, fully ionized gas of light nuclei, such as deuterium and tritium, within a "magnetic bottle" until the nuclei collide and fuse, liberating energy.

The magnetic-confinement fusion-power program aimed at developing commercial electric power plants is already 28 years old. Research developments, especially over the past two years, have boosted enthusiasm that conditions needed to achieve sustained and controlled fusion are "achievable... in devices now under construction," according to the bill's drafters, headed by Mike McCormack (D-Wash.).

For fiscal years 1978 through 1980, however, the magnetic fusion budget has declined 16 percent (after accounting for inflation). Stating that "progress in magnetic fusion energy systems is currently limited by the funds made available rather than technical barriers," the bill's sponsors claim their goals will require at least a doubling in seven years (after accounting for inflation) of the present annual magnetic-fusion funding, with a 25 percent funding increase necessary in each of the 1982 and 1983 fiscal years.

"[T]he present 2010 schedule for demonstration of practical fusion power is unnecessarily and undesirably long," said Robert Hirsch in testimony before the House subcommittee on Energy Research and Production last December. It is expected that schedule would lead to operation of a fusion power reactor by the year 2023. Added Hirsch, chairman of the subcommittee's independent fusion advisory panel, "After looking at details of the [Department of Energy's] planning... and considering past experience in other high-technology programs, we believe the engineering feasibility of fusion can be demonstrated before 1990 and that commercial fusion power can be demonstrated in the period 1995 to the year 2000." What's more, DOE agrees that operating a fusion demonstration plant as early as 1995 "is, indeed, credible," Hirsch testified.

DOE also estimates that the direct cost of the more rapid development schedule called for in the current bill would actually cut the program's total cost by about $2 billion (in 1981 dollars) over the $14.3 billion price tag associated with the present research timetable. Considering both price tags too optimistic, however, Congress proposes budgeting the accelerated program at $20 billion.

In addition to speeding the reactor-development schedule, the legislation calls for:

- creating a national magnetic-fusion engineering center to coordinate work at major fusion-engineering facilities,
- developing a detailed five-year plan that earmarks intended milestones and costs,
- receiving from DOE a comprehensive program-management plan — to be delivered to Congress no later than January 1982, and

• assessing within a year of the act's enactment the personnel requirements of the accelerated program and what will be needed to overcome any foreseen shortfall in available qualified engineers.

The act also requires creation of a technical magnetic-fusion advisory board to review the national program and to report its findings to DOE at least three times a year. Including representatives of industry, universities, government laboratories and technical organizations, its job will include recommending changes to strengthen such areas as research development and cooperation between researchers. □

New Caesarean recommendations

Approximately a half-million women in the United States now deliver babies by Caesarean section, triple the rate of a decade ago. These births comprise 18 percent of all deliveries. Consequently, a number of obstetricians believe that too many Caesareans are now being performed, and a panel of them convened at the National Institutes of Health last week, under the leadership of Mortimer G. Rosen of Case Western Reserve University, to set guidelines that they hope will lower the rate of Caesareans. Here are some of their recommendations:

• Ninety-eight percent of women in the United States who have had one Caesarean now undergo another for subsequent deliveries because of the possibility that a scarred uterus may rupture during labor. Many obstetricians, however, now make a low, horizontal incision in the uterus that heals easily and rarely ruptures, and it is as safe, or safer, for a woman who has had this kind of Caesarean to deliver vaginally in subsequent pregnancies. Thus women who have had one Caesarean should be given the option of a vaginal delivery whenever possible during subsequent deliveries.

• Much of the increase in Caesareans has been for women whose labor does not progress normally, which can occur, for instance, when the labor contractions are not strengthened. But abnormal labor can often be improved by allowing a woman to move around, to sleep for brief periods, or by giving her drugs. Thus, obstetricians should try these measures before they resort to a Caesarean, unless they have reason to think the baby is in trouble.

• In 1970, only 11.6 percent of breech babies (those ready to come out of the womb feet first rather than head first) were delivered by Caesarean; in 1978, 60 percent were. But vaginal delivery is safe for breech babies in certain positions, if the baby weighs less than eight pounds, if the mother's pelvis is normal, or if the obstetrician is experienced with such deliveries. □

The attack on academic asbestos

The U.S. Environmental Protection Agency is trying to kick the asbestos problem out of school. The agency recently proposed a rule that would require all public and private elementary and secondary schools in the United States to identify friable, or easily pulverized, asbestos-containing materials in school buildings.

Asbestos — a naturally occurring mineral that readily separates into fibers — has been widely used for fireproofing, thermal and acoustical insulation and decoration. Release of fibers from asbestos that can be easily crumbled is a well-documented health hazard; in fact, the link between occupational exposure to asbestos and lung disease was first reported in 1927. Since then, investigators have gathered epidemiologic and experimental data showing that exposure to asbestos via inhalation increases the risk of numerous diseases, including asbestosis — a noncancerous lung disease—and cancers of the lung and other organs (SN: 7/15/78, p. 41).

To reduce the risks of exposure to asbestos-containing materials in school buildings, the EPA-proposed rule, which may be finalized in February 1981, would require school officials to inspect buildings for friable materials and to analyze suspect samples with Polarized Light Microscopy — a technique that identifies substances on the basis of their shape and optical properties. Larry Longanecker of EPA's Office of Pesticides and Toxic Substances predicts that friable asbestos will be discovered in about 10,000 schools affected by the proposed ruling.

EPA

Encapsulation of a ceiling surface.

This asbestos, says Longanecker, could be removed, enclosed with a barrier such as a suspended ceiling or encapsulated. Encapsulation involves use of either a penetrant — a chemical that soaks in and locks individual asbestos fibers in place — or a bridging sealant — an agent that covers the asbestos surface with a protective coating. EPA recently stamped its seal of approval on 19 encapsulators developed by various chemical firms. □

Targeting cancer drugs with antibodies

Monoclonal antibodies (mass-produced antibodies against specific cell antigens), which have become realities during the past several years, promise to revolutionize cancer treatment. At the 1980 International Symposium on Cancer, held recently in New York City, Emil Frei III of the Sidney Farber Cancer Institute in Boston reported that scientists are beginning to couple monoclonal antibodies against human cancer cell antigens to cancer drugs. Researchers hope that the antibody-drug packets will hone in on cancer cells more selectively than do the drugs alone and thus kill cancer cells while sparing normal ones. And in the August PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, investigators report what appears to be the first success toward achieving this aim. The investigators are D. Gary Gilliland and R. John Collier of the University of California at Los Angeles and Xenon Steplewski, Kenneth F. Mitchell, Tong H. Chang and Hilary Koprowski of the Wistar Institute of Anatomy and Biology in Philadelphia.

The Los Angeles and Philadelphia researchers first fused mouse melanoma cells with spleen cells from mice immunized with human colon-rectal cancer cells. The resulting hybridomas (hybrid cell lines) in turn secreted antibodies that bound specifically to human colon-rectal cancer cells. The investigators then showed that the antibodies did not bind to other normal and malignant human cells. They attached the antibodies to diphtheria toxin or ricin toxin (potent poisons) and placed the toxin-antibody packets, as well as diphtheria toxin, ricin toxin and hybridoma antibodies, in the presence of colon-rectal cancer cells. As they hoped, the toxin-antibody packets were at least 100 times more lethal against the cancer cells than were the toxins or antibodies alone. The researchers then exposed the toxin-antibody packets to lung cancer cells, melanoma cells, human embryo cells and normal lung cells. Although the packets killed virtually 100 percent of the human colon-rectal cancer cells, they did not affect the other varieties of cells. The scientists conclude that toxins combined with monoclonal antibodies might provide a valuable treatment for cancer patients — by killing cancer cells but not normal ones.

Before such a treatment can be tested on cancer patients, however, it has to be shown effective in animals. And as Steplewski explained to SCIENCE NEWS, "We are trying to treat nude mice that have implanted human colon-rectal tumors and do *in vivo* experiments on them." □