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.

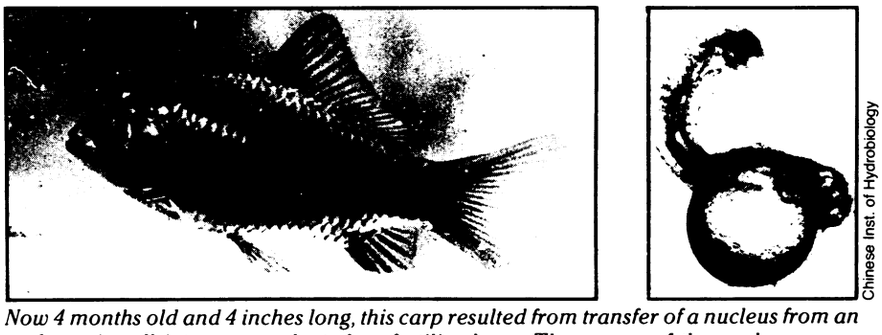
Mollenauer expects that solitons may be useful in communications someday, but not until the fibers are loaded with traffic at 1.3 micrometers. That is the wavelength at which dispersion is zero for quartz, and highly compressed, though not soliton, pulses can be made there. Later, perhaps, solitons at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