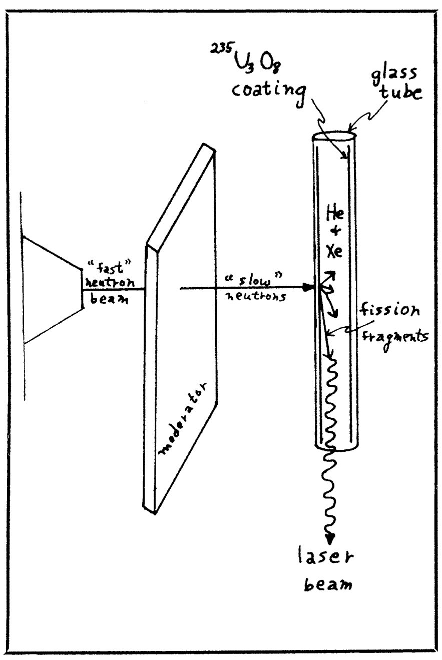
proportions in these compounds—the exact proportions of the record-breaker are one part lead, 5.1 parts molybdenum and 6 parts sulfur. In the testing of the many possible combinations, critical fields are higher than 600,000 gauss are expected to turn up. If they do, testing will be a problem. FBNML's best pulsed magnets can produce no more than 500,000 gauss.

In these cases there is always the metallurgical question whether the material can be made into wire and wound into coils, and whether the coils will behave the way the laboratory samples do. Foner is optimistic that both answers are affirmative. At these high fields a magnet must be carefully engineered with the strongest materials because the forces are so strong that it runs a danger of tearing itself apart. Nevertheless Foner believes that high-field magnets will be made of the compound some day. □

Reactor-powered laser developed

A long-standing barrier to more efficient use of nuclear reactors has been the difficulty of converting energy from a reactor's dense flux of neutrons directly into a more useful form. In conventional atomic power plants, conversion proceeds very inefficiently through several stages, ending with a steam-driven electric generator. In an important step toward liberating nuclear energy from the steam age, NASA scientists have succeeded in using a beam of neutrons from a pulsed reactor to power an infrared gas laser.

Working with the Godiva reactor at the Atomic Energy Commission's Los Alamos laboratory, T. F. Wimett, H. H. Helmick and R. T. Schneider took advantage of the reactor's exceptionally high flux of 10^{18} neutrons per square centimeter per second to cause fission of uranium atoms in the interior coating of a meter-long glass tube. Inside the 1.5-centimeter-diameter tube, at a pressure of about half an atmosphere, a gas mixture of 95 percent helium and 5 percent xenon was thus bombarded by nuclei resulting from fission in the coating. The resulting one-joule laser pulse, with 100 microsecond duration and a wavelength of 3.5 microns, shot out the end of the tube.



Reaction-powered laser: Fast neutrons from reactor are slowed in moderator and cause fission in uranium coating of glass tube. Fission fragments hit helium or xenon atoms causing them to emit a pulse of infrared laser light.

The development holds important implications for the feasibility of new laser applications and radical reactor designs. The project, the director of NASA's Research Division, Francis C. Schwenk, told SCIENCE NEWS, is part of a larger effort to develop an energy-efficient, fuel-conserving "gaseous reactor," in which fission occurs in a plasma of uranium atoms at very high temperature and pressure. Originally proposed as a propulsion system for interplanetary travel, the novel reactor now looks theoretically promising as an environmentally desirable, low-cost alternative to conventional and breeder reactors. But, unlike these other reactors, new ways of converting fission energy to more convenient forms must be developed before plasma reactors—still experimental—can become useful.

Direct conversion to coherent laser light now appears to be an attractive method of manipulating the hard-to-handle plasma energy. (MHD may eventually offer another method.) As coherent light, the energy could be transmitted over long distances—say, from an orbiting power station to other satellites or to the earth. Also, a laser beam of the proper wavelength can stimulate chemical reactions. Water, for example, could be dissociated into oxygen and hydrogen, and the latter used as part of a "hydrogen economy" (SN: 9/1/73, p. 135).

In a uranium plasma reactor, creation of laser light would not require the complex set of steps used in the Los Alamos experiment—the lasing gas would be mixed directly with the plasma and produce coherent light more or less automatically. Working with radio-frequency radiation under simulated reactor conditions, NASA scientists have been able to generate, from a tube containing argon, a flux of energy in the range needed for terrestrial power generation. □

Early protein lack: Malevolent effects

Many studies have suggested that malnutrition, specifically protein deprivation, can seriously harm the fetus and newborn. Total caloric restriction or protein restriction during pregnancy, for example, results in a smaller-than-average baby with a smaller-than-average brain. This brain will have fewer cells than normal, and with less DNA content than normal. Damage will be worse in certain parts of the brain than in others. Prenatal and postnatal malnutrition alters nerve transmitters and the enzymes that make them. It disturbs nerve cell connections. It can also lead to hyperactivity, emotional changes, decreased exploratory behavior and possibly learning problems.

Now a team of investigators at the Worcester Foundation for Experimental Biology, headed by Peter J. Morgane, Warren Stern and Oscar Resnick, has used neurophysiological, neurobehavioral, neurochemical and anatomical techniques to confirm and further underscore the malevolent effects of early protein malnutrition. Their work is in press with four journals: EEG CLINICAL NEUROPHYSIOLOGY, BIOLOGICAL PSYCHIATRY, DEVELOPMENTAL PSYCHOBIOLOGY and BRAIN RESEARCH.

The research group fed female rats a diet containing half their normal protein needs. The rats were mated and continued on this protein-deprived diet during pregnancy. Following weaning, their offspring were also maintained on a diet that contained half their protein needs. The investigators then studied the offspring before and after weaning for various brain and behavioral changes, comparing them with a group of rat pups that had not been deprived of protein during pregnancy and early life.

One of the things they found was that protein deprivation delays normal brain responses to visual stimuli. When they flashed a light in the eyes of the rat pups, electrical impulses were slow to register in the animals' brains. Prior studies have shown only that neonatal malnutrition, not protein deprivation specifically, produces such an effect. Although the Worcester team found that the delayed responses to visual stimuli returned to normal as the pups matured, they still believe that early delayed responses can hamper newborns' vision and normal development.

The Worcester investigators also found that prenatal and postnatal protein deprivation slowed central nervous system responses in the reticular formation, a core that runs up the brain stem to the thalamus and controls sleeping and waking. The responses became