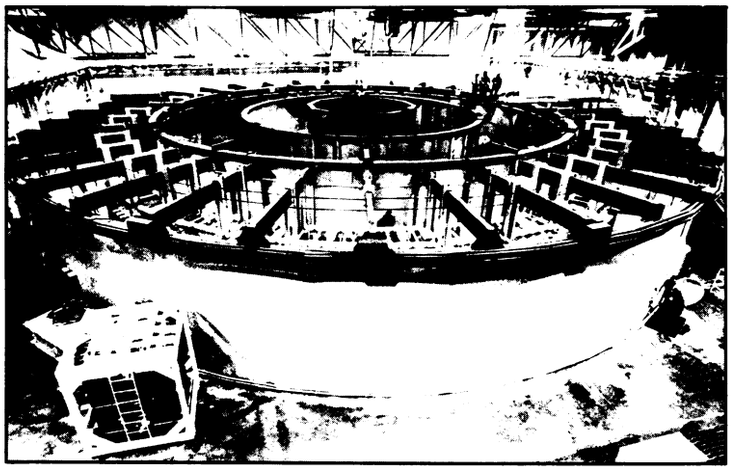
searchers such as climatologist James D. Hays of Lamont-Doherty Geological Observatory. But Hays and others fear that future may soon be snatched from their hands. The *Challenger*'s funding has nearly run out and the much larger *Glomar Explorer* is scheduled to take its place, although even that possibility is under intense debate. If the *Explorer* is funded, it will concentrate on deep ocean drilling, often sitting over one hole for as long as a year. Because the deep ocean has little sediment, the HPC would be moot. If *Challenger* funding is halted — as in the current plan — the HPC "could die with it," says Hays. He and others, backed by the DSDP's scientific advisory panel, have proposed a two-year extension of the *Challenger* to sample the world's ocean bottoms with the HPC.

But the bureaucratic machinery is already rumbling along one track and the researchers fear the momentum may be too much to switch it to another. And the current attitude toward funding "big science" makes the researchers less than optimistic. Scientifically, however, they believe the choice is clear. Says Hays: "If we lose the HPC, paleooceanography will stagnate." □

Fusion switch: Ions for electrons



Sandia Labs

PBFA *under construction. One of 36 generators for the 100-ft-diameter machine is inset.*

There is no question that thermonuclear fusion can be induced by imploding a mass of fuel. That was proved long ago at a place whose name has become a common noun for bathing suits and underpants (because almost all the substance of the garments has been blown away?). The modern question is whether this kind of thing can be made to work efficiently and economically with small pellets of fuel in a reactor to produce electricity.

The fuel pellets would be imploded by energy delivered from several sides by beams of something: laser light, electrons or ions. Lasers got the first start and continue to enjoy a heavy research effort, possibly because the technology of lasers was immediately available and also possibly because the bomb — at least according to what we have read in judicially sanctioned press reports — employs gamma rays, which are a form of light. Electrons seemed the next best bet. Ions appeared to be a long shot. Now the latter situation reverses. Sandia Laboratories of Albuquerque, the major U.S. center of such particle-beam fusion experimentation, has announced that its forthcoming major experiment, the Particle Beam Fusion Accelerator (PBFA) will use beams of light ions (elements of low mass like carbon or oxygen) rather than the electrons it was originally intended for.

The change comes about because of the success in producing and accelerating ions in another apparatus, PROTO I. This work was led by David J. Johnson of Sandia, and it was stressed last spring by Gerald Yonas in a public report on the promise of light ion fusion (SN: 3/31/79, p.197). That work, which produced ion beams with a current density of 400,000 amperes per square centimeter, is now coupled to theoretical modeling of ion beam transport (another serious problem) by J.P. Quintenz and J.W. Poukey, to form the basis of the laboratory management's decision to change PBFA to ions.

From the point of view of the target, ions have seemed a more efficient way of making the implosion happen. The difficulty of producing and transporting them, compared with light or electrons, led to their being kept on the back burner until now.

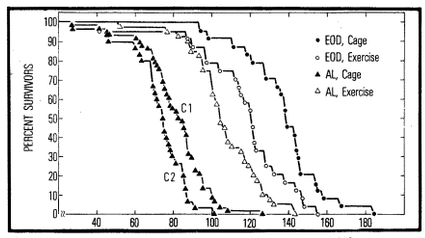
The first stage of PBFA, which is scheduled to start operating next fall, will consist of 36 units, each producing a particle beam to drive at the target, delivering a total power of 30 trillion watts in 40-nanosecond pulses. In 1983 it is planned to add another 36 modules to raise the power to 100 trillion watts. A similar machine in the Soviet Union, Angara-5, recently operated its first unit (SN: 10/27/79, p. 277) with electrons, which seem for the moment the continuing Soviet choice. □

Fasting fosters longevity in rats

The advantages of moderate eating habits extend far beyond the cosmetic; numerous animal studies have demonstrated that caloric restrictions early in life lead to an increased life span and reduce the risks of certain diseases, cancer and diabetes among them. But evidence for the health-promoting effects of periodic fasting has been less convincing. Some experiments have shown a modest increase in life span, while others have arrived at conflicting and confusing conclusions. Now, recent experimental findings suggest that periodic fasting not only promotes a longer life, but encourages more vigorous activity later in life. These findings were presented by Charles L. Goodrick of the Gerontology Research Center in Baltimore at the recent annual meeting in Washington of the Gerontological Society.

Goodrick's research focused on the effects both of fasting and of access to an exercise wheel on five groups of paired male rats, one control group and four experimental groups. One of the experimental groups was placed on an every-other-day feeding schedule and given free access to the exercise wheel; a second group was also fed every other day but denied use of the wheel. Two other groups of rats were allowed to eat at will, but only one of these "ad lib" groups had the exercise wheel available.

Goodrick found that the fasting rats lived significantly longer than the rats that were permitted to eat ad lib. He also discovered that the ad lib rats that exercised lived significantly longer than those that ate freely but did not exercise. Among the fasting rats, Goodrick found, exercise did not further increase their life span.



Goodrick

Rats fed every other day lived to 180 weeks.

The fasting rats not only lived longer, they remained more active later in life than the ad lib rats. "The amount of voluntary wheel exercise was significantly increased for the rats fed every other day when compared with the voluntary wheel exercise of controls, and these differences were especially impressive and consistent late in the life span," Goodrick said.

According to Goodrick's evidence, "Health, vigor and a long life may be maximally promoted by a reduction of daily food intake or by periodic fasting." □