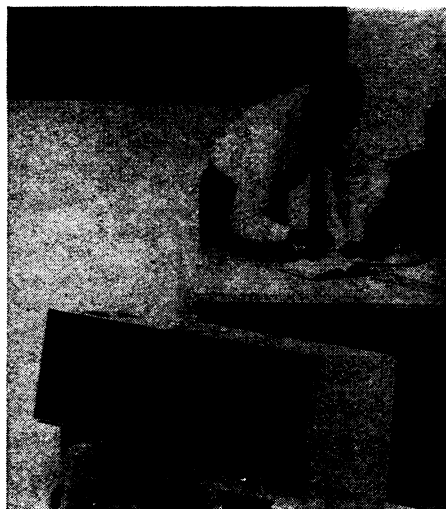


from Government's computer support programs now, which are more research oriented.

**Cost of installing** and operating computer facilities available to everyone on the campus would be about \$60 per student per year, according to PSAC estimates. This is less than many schools now spend for college libraries and only a small part of the overall



Leigh Wiener

They must understand computers.

educational cost for each student every year.

Since colleges and universities are strapped for money, however, PSAC believes the Government should step in, because "it is in the national interest to have adequate computing for educational use in all our institutions of higher education by 1971-72."

The Committee also recommends that colleges be encouraged to share the cost of such services. The panel called for a faculty training program so all professors, whatever their disciplines, will know how to use the computer themselves as well as how to help their students.

"No matter what his specialty, the student must be given the opportunity of using computers in learning and doing," the committee concluded, noting that computers are used in the social sciences and in music and art, as well as in the more familiar "hard" sciences.

Some \$13 million is being requested to start the program in the 1968 budget, now under Congressional scrutiny. The money was requested even before the PSAC report was finished, to enable the National Science Foundation to lay groundwork for its somewhat changed role.

**NSF has for several years been**

funding a "modest" program in support of computer services in colleges and universities, ranging from the largest to relatively small institutions. However, most of these grants went to schools where computers were already available, and most, if not all, of the time on the machines was research oriented.

These grants went each year to only some 30 of the 400 institutions having computers.

Other Government agencies have also supported university computer programs, notably the Department of Defense and the National Institutes of Health. The DOD grants have traditionally been mission oriented. Those from NIH, however, have not been as closely oriented to health research in the past as they will be in the future.

New NSF grants during the next few years will be aimed at developing not only improvements in the computers and their necessary accessory equipment but also in methods of providing students easy and mistake-proof access to the computer.

## Tight Lid on U-235 Production Method

The gas centrifuge method of producing enriched uranium emerged from its blanket of security briefly last week, but only to bury itself more deeply. The Atomic Energy Commission announced that even classified private research on the process would be halted, and further work would be under Government contract only.

The **gas centrifuge** received much publicity in 1960 when a West German inventor announced that he had solved the problems involved in making the device practical. If true, it was possible that high-grade fissionable uranium would be within the reach of any country that felt like investing in the machine and the doors to the nuclear club were wide open.

Following the publicity, then-AEC Chairman John A. McCone announced that the U. S. was also working on the centrifuge principle. But he said that the problems which had led this country to abandon that process during World War II, in favor of the gaseous diffusion system, had not yet been solved, and probably would take as long as eight years to overcome. A less technically advanced country would need even longer, he said.

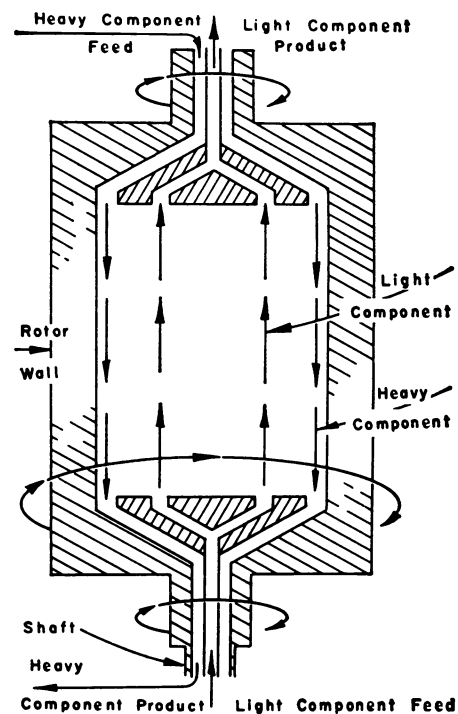
Last week's AEC announcement did not indicate that the centrifuge had come of age yet. It will still be 10 years or more, said the AEC, before the centrifuge could compete economically with the gaseous diffusion

method. But the long range potential for other nations is good enough so that the AEC doesn't want to contribute to the body of open knowledge. "The centrifuge," says an AEC spokesman, "has always been connected with the proliferation problem."

In principle, the centrifuge system is basically simple. Natural uranium contains less than one percent of U-235, which is the kind of uranium needed for fission. The rest is U-238, which is very slightly heavier but otherwise chemically and physically similar to its fissionable isotope.

The centrifuge whirls uranium hexafluoride gas at a rate of speed sufficient to throw the heavier isotope to the outside and leave the lighter gas in the center. The separated gases are drawn off in different directions, and the gas containing more U-235 can either be used as is or sent through another stage of separation.

The trouble is that the centrifuge has to move at enormous rates of



Centrifuge for uranium separation.

speed to separate the two isotopes. Laboratory models have been made to work, but large size machines that can handle commercial loads apparently put too much strain on bearings and other materials to hold up for any length of time.

The gaseous diffusion method also depends on the weight difference of the two isotopes. Molecules in a gas mixture at a given temperature have the same average energy, which depends

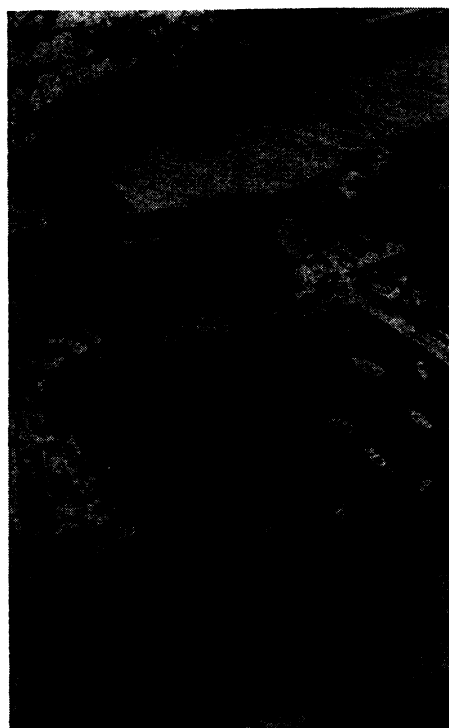
on the mass of a molecule and its velocity. This means that the lighter U-235 molecules move faster than the heavier U-238 isotope. Under a slight pressure, they will be more likely to move through a membrane so they can be drawn off. As in the centrifuge, the process is repeated until the needed concentration of U-235 is obtained.

The centrifuge's advantage as a clandestine source of fission material is offset by the fact that bomb uranium has to be highly enriched—about 90 percent U-235. It is this high refinement that gives the centrifuge system the most trouble; the size this requirement imposes on them strains existing materials technology. On the other hand, nuclear power stations can use uranium in which the U-235 content is only a few percent. In this range the centrifuge system might become valuable.

## Oil, Oil Everywhere

The water pollution problem posed by the breakup of the oil tanker Torrey Canyon on a rock near Lands End, England, is apparently unprecedented.

Although some floating oil washed up onto beaches during World War II from torpedoed ships, it was never anything like the 118,000 tons of raw petroleum that poured squarely onto



UPI

Oil blackens Porthleven harbor.

English beaches from the sinking tanker.

**Had it happened on a United States beach, we would probably be as ill-prepared as the British, according to a**

spokesman for the U.S. Army Corps of Engineers Coastal Engineering Research Center.

Eventually, the oil will probably either evaporate or disappear naturally, he noted, but there seems to be no way to calculate how long this will take. The problem has apparently never been foreseen. "I don't know of any report in print," he said.

In the meantime, attempts to firebomb the floating oil and burn it up were proving as unsuccessful as local efforts to dissolve it with detergents.

While oil released from the tanker's holds caught fire when the hulk was bombed by the Royal Air Force, it went out after consuming the oil's lighter components, leaving the blackest, stickiest, messiest part of the oil to float up onto the resort beaches in the area.

## Nurture, not Nature In Schizophrenia

A Norwegian scientist is placing schizophrenia squarely back in the hands of psychologists. But there is no indication it will stick.

In one of the largest twin studies ever undertaken on this mental disease and its origins, Dr. Einar Kringlen of the University of Oslo has found environment more to blame than heredity.

**If his interpretation** is correct, says Dr. Kringlen, then the "so-called solution of the schizophrenia riddle will not come from any biochemical breakthrough," and expensive research "will most likely be worthless."

Dr. Kringlen's results, reported to an international conference on schizophrenia at Rochester University in New York last week, challenge those scientists searching for an inherited biochemical defect in schizophrenics. There are many, and at this point, the contest looks like an equal match.

Schizophrenia occurs in every population at a rate of about one percent. It "remains the central core of what we consider madness or unreason," according to Dr. John Romano, chairman of psychiatry at Rochester, and "constitutes modern psychiatry's greatest challenge."

The term schizophrenia covers a wide variety of diseases. No one knows for sure whether its many forms are even related. Some may be environmentally induced, by a bad home for instance; others may be genetic in origin.

Most recently, Tulane University researchers produced evidence that acute schizophrenia is an autoimmune disease, in which the brain manufactures

antibodies against its own cells (SN: 2/11).

Still other recent work has attributed the disease not to genes, not to a bad home, but to poor conditions in the womb.

Dr. Kringlen does not rule out heredity as a cause, since his study of identical twins—who share the same genes—clearly indicates a genetic factor. But the factor was weaker than previous reports have claimed, he says.

**If schizophrenia** were entirely determined by heredity, then identical twins would have to show 100 percent concordance—that is, one twin could not be schizophrenic and the other normal. Instead, Dr. Kringlen found the twins to be concordant in only 25 to 39 percent of the cases.

The rate was higher than that found with fraternal twins—whose genes are not the same. They were both psychotic in 10 percent of the cases. Nevertheless, the difference is not great enough to make a strong case for heredity, Dr. Kringlen believes. That leaves environment as the more potent cause of madness, in his opinion.

His second major finding poses problems no matter which theory the scientist favors. "A normal twin," says Dr. Kringlen, "may be paired with any type of schizophrenia." Reason would dictate that whether a bad home or genes cause the illness, twins would fall somewhere in the same ballpark, a borderline psychotic with a neurotic, for instance. But that was not the case.

Moreover, birth order, birth weight, difficult birth, physical strength in early childhood and psychomotor development were, on the whole, of "practically no significance for later schizophrenic development," he concludes.

There was, however, a link between childhood personality and psychosis. In both identical and fraternal twins, the schizophrenic twin had been most often the lonely, reserved, submissive, dependent and obsessive one. What made him that way? Probably environment, says Dr. Kringlen.

## Cryogenic Detector

As has been known for some 50 years, superconducting materials show no apparent resistance to the flow of an electrical current when cooled to temperatures near absolute zero—459.7 degrees below zero F.

Another, more fundamental property of superconductivity, discovered several years ago, is that each piece of superconductor behaves as if it were a single giant atom. This recently recognized property is related to the behavior of the electrons in the superconductor. These electrons all move in a precisely ordered way relative to one