

Earlier animal research has shown that the brain becomes hypersensitive to CRH; in fact, rats repeatedly injected with CRH eventually respond with seizures. That sensitization is also reflected in the natural history of depression, according to researcher Philip Gold at NIMH.

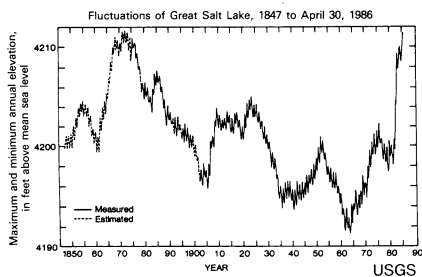
"The first episodes generally require emotional stress," says Gold, "but they progressively require less and less. CRH might be relevant there. . . . It represents a link between biological and psychological models of depression."

Next, the researchers plan to look for agents that suppress or block CRH, and to test them in animals. — *L. Davis*

Lake at record high

People in the six counties surrounding the Great Salt Lake in Utah collectively prayed on May 4 in hopes of stemming the lake's rising levels. But the lake has continued to swell, and on May 12 it topped, by 0.6 inches, its June 1873 historic record of 4,211.6 feet above sea level.

The U.S. Geological Survey (USGS) reports that the lake is 17 feet higher than its peak value last year and has risen 3.3 feet — two times the average seasonal rise — since its seasonal low on Oct. 16, 1985. USGS also notes that during the past four years the lake has risen 11.6 feet; it rose a similar amount before the 1873 high, but that increase took 12 years to occur.



Scientists expect that the lake will continue to swell for at least another month because most of the spring snowpack in the Wasatch Mountains has yet to melt, and northern Utah's rivers are already rushing with much more water than normal; the USGS predicts the waters will rise to 4,212.5 feet next month. According to the USGS the lake has already flooded about 770 square miles of shoreland, causing more than \$200 million in damage.

On May 14 the Utah legislature approved a \$71.7 million plan for pumping the flooding waters into the desert. However, it will be several months before pumping, which could drain the lake by as much as 16 inches in the first year, can begin. — *S. Weisburd*

Efficient WIMPs would rescue the sun

The sun emits only about a third of the neutrinos it ought to emit, according to theorists' "standard model" of the thermonuclear processes that go on in its center. However, adjustments to account for the neutrino observations tend not to predict properly the acoustic vibrations of the sun. Now, calculations by two groups show that putting WIMPs (weakly interacting massive particles) in the center of the sun would satisfy both criteria. It is the only theory that does so, John Faulkner of the Lick Observatory in Santa Cruz, Calif., told SCIENCE NEWS.

WIMPs (SN: 7/13/85, p. 23) would move energy out of the center of the sun, lowering the temperature, affecting both the thermonuclear processes and the acoustic properties, particularly the speed of sound. WIMPs and the speed of sound came to Faulkner's mind as he heard a description of the theory of the sun's p-wave vibrations by Douglas O. Gough of the Institute of Astronomy in Cambridge, England. To calculate theoretically the sequence of these waves and the differences in frequency from one wave to the next is extremely complicated, but Gough presented a simplification for cases where the differences fall a certain way. Cancellations in the mathematics then result in a very simple equation — "a simple integral," as Faulkner describes it

— on which the differences in these waves depend.

One of the things on which this integral depends is the sun's central temperature, so Gough's simplification yields a way of testing the effects of WIMPs on the acoustic pulsations. Faulkner, Gough and an Indian student, M.N. Vahia, did the calculation in a few days, using hand calculators, and found that the WIMP model predicted the observed differences between the vibration frequencies to within two significant figures.

Meanwhile another group had been at work. Ronald L. Gilliland of the High Altitude Observatory (HAO) in Boulder, Colo., W. Däppen of HAO and J. Christensen-Dalsgaard of Aarhus University in Denmark had been calculating descriptions of the p-waves according to the full theory using a high-speed computer — about the only practical way to do it from this full-dress approach. They had reached the same conclusion about the fitness of the WIMP theory. The two groups decided their approaches were complementary and agreed on simultaneous publication in the May 15 NATURE.

The results do not prove the existence of WIMPs, says Faulkner, but if WIMPs don't exist, something else in the sun has to be efficiently transferring energy out of the center. — *D. E. Thomsen*

Continuing the hunt for funds

Another university has joined the growing list of institutions seeking research and construction funds by going directly to Congress. Last week, the Senate appropriations committee voted to include \$25 million for a new science and engineering technology center at Arizona State University (ASU) in Tempe. According to an amendment to the "urgent supplemental appropriations" bill, the funds are to come out "of the amounts available to the Department of Defense" (DOD) for this fiscal year.

"A lot of universities are going this other way," says Brent Brown, ASU vice-president for university relations. The proposed building is part of a major effort to upgrade the university's engineering program, he says. "We're trying to make sure the effort we've started here is continued."

In the same bill, another amendment authorizes funding for nine more universities. Late last year, Congress passed legislation that granted \$55.6 million to these universities from DOD research and development funds (SN: 3/29/86, p. 196). However, DOD complained that granting these "set-asides" would violate other laws and regulations that require DOD to ensure that universities compete for research contracts. The Senate com-

mittee's action circumvents that problem.

Just two weeks before this vote, Defense Secretary Caspar W. Weinberger rejected a bid by seven senators to get DOD to release funds for the universities. In a letter to the senators, Weinberger stated, "Support of merit-based research is an important principle which we feel we must uphold." He added, "The . . . earmarking of research funds for specific universities, without merit competition, establishes a precedent that could jeopardize" the preeminence of U.S. universities.

"The Secretary of Defense took an enormous risk," says Robert M. Rosenzweig, president of the Association of American Universities (AAU) in Washington, D.C. "I was very pleased by his action."

The AAU and the National Association of State Universities and Land-Grant Colleges also tried to persuade the Senate committee to reject funding for specific universities. In a letter, the presidents of the two organizations, which represent many but not all of the nation's universities and colleges, stated, "If any of these . . . projects, or others that may be proposed, is funded, pressures on other institutions to seek direct funding for re-

search and research facilities projects will grow."

"The problem is the longer it goes on and the more instances of it there are, the harder it is for institutions to hold out," says Rosenzweig. "Nobody wants to be the last in line." The real issue, he says, is documented in a White House panel report released last week, which looks at the health of university research (see p. 328). "Until that problem is addressed," he says, "these kinds of pressures are going to pop up all over the place, and in responding to them, serious damage can be done to the whole enterprise."

The Senate committee proposals have yet to be acted upon by the entire Senate. The House version of the appropriations

bill includes funds only for projects at Northeastern University in Boston and at the Rochester (N.Y.) Institute of Technology. Even if the House and Senate agree to fund all the university projects, DOD can still return the money to Congress unspent. But the strength of congressional support so far in favor of this funding may make that unlikely.

In an earlier debate, Sen. Ted Stevens (R-Alaska), who chairs the defense appropriations subcommittee, said there is nothing new about Congress earmarking funds for certain colleges and universities. He and others argue that it's an acceptable way to help universities wanting to improve their research programs.

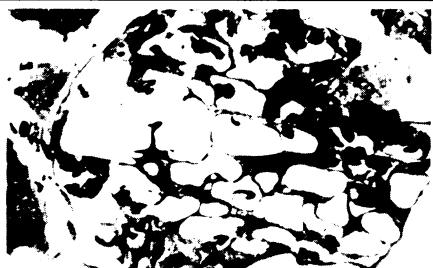
— I. Peterson

Putting human tissue under glass

Human organs cannot survive long-term freezing—the ice crystals that inevitably form fatally impair their function. But Gregory M. Fahy, a researcher at the American Red Cross's Transplantation Laboratory in Bethesda, Md., thinks he has an alternative. Instead of turning the water within organs into ice, he super-cools it into glass. He and a former co-worker have already "vitrified" mouse embryos; at the Red Cross's recent Annual Scientific Symposium in Washington, D.C., Fahy described modifications to the procedure that may allow it to be used on entire organs.

With cooling, kidneys can be banked for two to three days, and hearts and livers for six to eight hours. Transplantation experts estimate that as many as 20 percent of the organs donated and available for transplantation have to be discarded because a matched recipient can't be found before the organs spoil.

Fahy and William F. Rall, now at Rio Vista Laboratories in San Antonio, Tex., have succeeded in vitrifying mouse embryos, a process they initially described in the Feb. 14, 1985 NATURE. Since then, Rall has reimplanted the embryos, which then continued their development and grew into normal mice. Their offspring were normal as well, Rall says.



Capillaries within the kidney show the disruption of freezing: Walls between the vessels in the upper left quadrant have broken down. Vitrification, Fahy says, will prevent this.

The vitrification process relies on the addition of several chemicals that prevent the crystallization of water within and outside the cells. With cooling, the molecules essentially are fixed in place, becoming what Fahy calls "a solid liquid." This is unlike conventional freezing, in which the water molecules crystallize into an orderly structure.

Organs present what Rall terms "huge technical problems." Among them are determining a way to use high enough levels of chemicals to induce vitrification without poisoning the cells, and getting the tissue to warm properly. Fahy reported at the symposium that doing the procedure at 1,000 atmospheres of pressure limits the concentration of chemicals needed.

The largest organ he has so far been able to vitrify has been a rabbit kidney. The result, which is stored at -125°C , looks something like a gruesome paperweight. The vitrified tissue itself appears normal from the outside, with no visible traces of ice. Fahy has not yet done microscopic studies of the tissue, but he says that because vitrified cell preparations retain their normal architecture and viability, and because the process of vitrification doesn't involve any sudden changes as does freezing, he expects that further investigation will show that the organ tissue is preserved.

More details on Chernobyl

As cleanup crews at the Chernobyl nuclear power station continue efforts to encase its devastated reactor in concrete, Soviet leaders have begun offering the most detailed account thus far of what they think caused the April 26 accident. In a televised statement last week that was later translated and distributed by the Soviet press agency Tass, Communist Party Chief Mikhail Gorbachev said the reactor's "capacity suddenly increased" during a scheduled shutdown of the #4 reactor.

The Soviet reactor design incorporates what is called a "positive void coefficient," explains Frank Graham, vice-president of the Atomic Industrial Forum, Inc., in Bethesda, Md., a nuclear-industry association. That means any loss of water or overheating of water in the pressure tubes through which fuel-cooling water passes could prompt "a surge in the fission action," causing a rapid increase in reactor power, he says. This is in contrast to most commercial U.S. reactors, Graham says, which begin losing power when their fuel's coolant overheats. Theoretically, Graham told SCIENCE NEWS, the power surge that Gorbachev seemed to be referring to could, if unchecked, have caused "the fuel to come apart"—and, in a reactor of the Chernobyl type, started a graphite fire.

Conceding this scenario is only an "educated guess," Graham says it might explain the origin of the graphite fire and hydrogen explosion that the Soviets now believe blew the roof off the plant. As the heat generated in a graphite fire melted the pressure tubes—liberating water, steam and oxygen—the zirconium that clad the fuel would have begun oxidizing, producing copious amounts of heat and hydrogen.

Meanwhile, bone marrow transplant specialist Robert Gale, of the University of California at Los Angeles, has returned from Moscow after assisting in a reported 19 transplants. As many as 100,000 Soviets may eventually suffer radiation-induced health problems, he estimates.

— J. Raloff

Self-promoting AIDS gene

While the AIDS virus's genetic sequence was reported last year, the book has remained open on the number and functions of the proteins it produces. Now, William Haseltine of Harvard University and his co-workers report in the May 22 NATURE the discovery of a protein that promotes viral production of other AIDS proteins. The gene that makes the protein is the second such self-stimulating AIDS gene to be identified; the first was also found by the Harvard group. □

While he can vitrify organs, the key is going to be in reversing the process. Thawing, Fahy says, is "the last barrier." The problem is balancing the speed of heating, making it fast enough to prevent ice crystals from forming as the specimen "warms" from -125°C , but slow enough to avoid stress fractures of the sort that can crack a glass into which boiling water has been poured.

"We have a new direction, new possibilities and a lot of data," says Fahy. "But we don't have proof it's going to work in [an intact] organ."

— J. Silberner