

suggests. Innovation after innovation pouring out of our \$2 billion research effort and the consequent great medical advances may have been blighted by serious disorganization.

Hospitals have too long occupied a place apart from the community, he says. The medical school and the university need to join with the medical practitioner, the teaching hospital, the community hospital, the insurance prepayment plans and the Government to attempt to develop, on an ongoing basis, programs that will improve practical health services for people.

Many of the health problems can be solved only in a larger context than medicine alone.

Dr. Benton H. Goodenough, vice president in charge of labor relations, Pacific Maritime Association, says "health is bargainable." Management and labor can sit down together on the same side of the table and use all their efficiency to create a profitable system for everybody, Dr. Goodenough believes.

CRYOGENICS

Lowest Temperature Yet

A common pin dropped on a table from a height of one-eighth of an inch generates about 10 ergs of energy, obviously a miniscule amount.

That 10 ergs raises temperature, and even that tiny amount is "much too much" to be allowed in the experiment during which Dr. Arthur Spohr of the Naval Research Laboratory reached the lowest temperature yet achieved—within less than a millionth of a degree of absolute zero.

The previous low had been about 1.3 millionths of a degree above absolute zero, which is 459.7 degrees below zero F. Although three-tenths of a millionth of a degree seems like an insignificant change, it is very important to scientists studying atomic nuclei because even such a slight decrease in temperature in this range results in decided changes in some of the physical properties of matter.

One of the most important changes is that, as the temperature gets colder, the magnetic pole of each atomic nucleus becomes more aligned with all other nuclei. The drop of three-tenths of a millionth of a degree means that instead of only about one percent of the nuclei being aligned, 15 percent of them have poles pointing in the same direction.

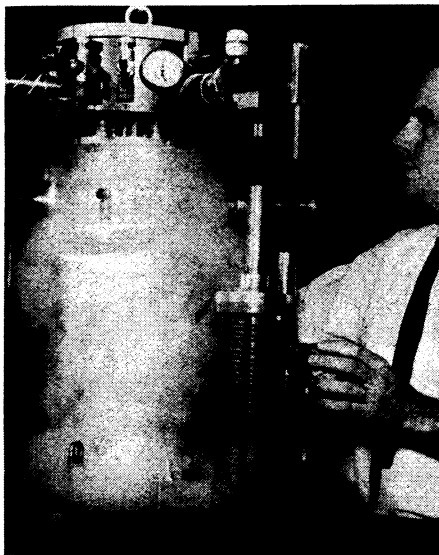
At room temperature, atomic nuclei have dancing magnetic poles that point in one direction, then another in random motions.

The experiments in which the record low temperature was produced were

preliminary to developing an apparatus for studying the interaction of forces between aligned atomic nuclei. Dr. Spohr, with assistant Edwin Althouse, used two techniques, including one known as nuclear cooling, to reach the record low temperature.

This method was first demonstrated in 1956 at Oxford University by Dr. Nicholas Kurti and Dr. Spohr, using apparatus requiring two stages.

The first stage consists of a paramagnetic salt, cerium magnesium nitrate, cooled to a temperature of about 200 thousandths of a degree above absolute zero by a magnetic cooling technique. Using this salt made it possible to reach a lower initial temperature than had been obtained elsewhere with other materials.



Navy

Dr. Spohr and lowest temperature rig.

The second stage, during which the record low temperature was obtained, is connected to the first by heat-conducting copper wires.

An intense magnetic field applied to the second stage generates heat that flows up the copper wires to the first, which is cooler at this step in the procedure. The link between stages is then broken, and the magnetic field at the site of the specimen—a bundle of copper wires for the NRL experiment—reduced to zero, causing further cooling.

A magnetic field is used to cool materials through a process known as "adiabatic demagnetization," which prevents the production of energy generated when the magnetic poles of atomic nuclei change direction.

FOREIGN RESEARCH

CIA Damage

American social scientists working overseas have always had trouble with politics. Before a sociologist or an-

thropologist could get to work, he had to convince his subjects he was not an arm of U.S. foreign policy—specifically military policy. It wasn't always easy, since the Defense Department did, in fact, support much of the research.

When Camelot, an Army-financed study of social conditions in Chile, broke into the news in 1965, social scientists found their positions more tenuous than ever. The Chilean press shouted intervention and the United States reacted by placing military studies under State Department review.

But the Camelot furor waned—in this country at any rate—and when Senators began drafting a bill setting up a National Foundation for the Social Sciences (SN: 2/18), they apparently did not think they had to shut out military funds.

The new foundation would greatly expand and support research in all the social sciences, and in addition would provide a civilian umbrella for foreign studies. Besides, the foundation would need some of the money the Defense Department spends annually on such research—roughly \$10 million—so a section allowing any Government agency to contract for research in the new foundation was drawn into the bill. The contracts could make up 25 percent of the foundation's yearly budget. That was last year.

Then, in February, Central Intelligence Agency links with students and universities, through supposedly independent foundations, came to light. The effect on foreign research has been predictably disastrous. Scientists are meeting with reluctance, subtle forms of resistance and sometimes outright cancellation of their projects. The heat is particularly strong in Latin America.

"We must be aware," said sociologist Myron Glazer last week in testimony before the subcommittee which is considering the bill, "that we face a crisis of credibility overseas."

A professor at Smith College, Dr. Glazer had done his own analysis of student political attitudes in Chile and almost failed at the task. Even before Camelot and the CIA disclosures, Dr. Glazer and his co-workers had been accused of representing U.S. intelligence. They very nearly lost all cooperation because of the false rumors.

Since February, the entire U.S. academic world has come under suspicion. A joint Brazilian-Cornell University project was dropped by the Brazilians though they did not suspect their American colleagues of CIA connections, reports the June 23 issue of SCIENCE, in an analysis of the CIA aftermath. In another case, an American scientist was encouraged by his associates in Peru and Chile to drop

research plans in those countries.

It will take a long time to clear U.S. researchers in the eyes of foreign nationals, says Dr. Glazer. The new foundation could make an important contribution, "but it is essential that the foundation credentials be the mark of an independent researcher."

Dr. Glazer urged the subcommittee to change the section allowing agency contracts. This time the subcommittee took note.

"I have come increasingly to the view that the section has to be eliminated altogether or very strictly circumscribed in some manner" said Senator Fred R. Harris (D-Okla.), author of the legislation.

The original intent, he said, was to use contract money to provide temporary funding—a "halfway house"—for the foundation. Besides the Defense and State Departments, the Department of Health, Education and Welfare, for instance, supports a good chunk of social science research domestically.

"But I am beginning to think we can't afford a halfway house," said Harris. "Direct Congressional appropriations would be far better."

DRAFT

Students Still Deferred

Congressional debate over draft legislation has been long and heated. For a time it seemed that undergraduate and graduate students, as well as persons in "critical" occupations, would lose their exemptions.

Last March President Johnson spoke in favor of the position of his National Advisory Commission on Selective Service: the urgent need in draft reform is for a "fair and equitable system," meaning no deferments.

Secretary of Labor W. Willard Wirtz, whose department kept track of deferrable job categories, says there really is no such thing as a critical occupation in this country as far as the draft is concerned.

But Congress had different ideas. Each House passed draft legislation much less radical than the President's Commission envisioned. And, when a compromise bill emerged from a Senate-House conference, the new version was less radical still.

The new law requires the deferment of any student in college or trade school who is doing well enough not to be thrown out.

The bill says categorically that if you've had one deferment, you can't have another. But then it quickly modifies itself, saying no second deferments "except for graduate study, oc-

cupation or employment necessary to the national health, safety or interest."

This qualification covers a lot of territory, according to dissenting Representative William F. Ryan (D-N.Y.) who predicts scientists and science students will continue to be virtually draft-safe. It's his guess that physics or biology will be safer fields than history or literature.

However, supporters of the compromise legislation say questions of graduate and occupational deferments are meant to be "narrowly constructed and strictly applied" by all draft boards under guidelines set forth by the President.

Signs are that for all the cries for reform, the draft situation will be similar to today's and scientists who have been worrying about graduate students being yanked out of university labs can relax.

An Executive Order on the subject of deferments—an order that has been in the works for well over a month—is being reviewed in light of the new legislation. It is possible specific action on this question will be delayed until the middle of July.

At present, although most graduate students in science do win draft deferments, decisions as to who goes and who stays are solely in the hands of local boards. When the new regulations emerge from the White House, they will be uniform guidelines for all boards.

HIGH ENERGY

300 Bev: Compromise, Progress, Competition

In a competition reminiscent of the recent fight among U.S. cities for location of the proposed 200-billion-electron-volt particle accelerator, now planned for Weston, Ill., nine European nations are lined up as site candidates for the next jump in accelerator design: the 300 Bev being planned by CERN, the European Organization for Nuclear Research.

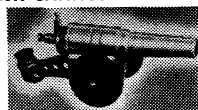
Proposals for the 300 Bev have been under consideration in Europe since 1964; U.S. physicists are already thinking beyond it, to a possible 600 to 1,000 Bev machine sometime in the next decade.

The Russians expect to have their new 70 Bev Serpukhov machine operational in November. CERN, made up of 28 nations, has welcomed an offered opportunity to cooperate with the Russians, and is about to sign an agreement. The Russians apparently do not plan any giant and may well count on using CERN's 300 Bev.

UNUSUAL SCIENCE BARGAINS

BIG BOOM & FLASH CANNON

Perfectly safe giant noisemaker for sports, games, the 4th and 7th graders. Fun, produces brilliant flash and loud bang. Completely harmless—no gun powder, matches or recoil. Easily operated. Beautiful reproduction of regular Army 60 MM cannon in hefty cast iron. "Ammo" is pulverized Bangsite combined with water in cannon producing harmless gas. Cannot be ignited by hottest flame or heaviest concussion. Incl. ammo for 200 shots. Instr. Wt. 2 1/4 lbs. Stock No. 70,898Q-----\$5.75 Ppd. EXTRA AMMO (About 400 Shots)-----\$1.00 Ppd. Stock No. P41,005Q-----



Games of Logic For Thinkers!

WFF'N PROOF

Exciting as poker, complex as chess. Gives practice in abstract thinking and math logic. Developed by contemporary Yale professor. If you think learning should be fun, try WFF'N PROOF brain-to-brain combat! 21 games of progressive difficulty. Starts with simple games mastered by some 6-year-olds. Ends with subtle logic to challenge professional logicians. 3 1/2" x 3 1/2" case contains logic cubes, playing mats, timer and 224 page Inst. book. Stock No. 60,525Q-----\$6.00 Ppd. WFF'N PROOF EQUATIONS, 5 games for grades 1-12 Stock No. 60,526Q-----\$3.00 Ppd.

CRYSTAL-GROWING KIT

Do a crystallography project illustrated with large beautiful crystals you grow yourself. Kit includes the book "Crystals and Crystal Growing" and a generous supply of the chemicals you need to grow large display crystals of potassium aluminum sulfate (clear), potassium chromium sulfate (purple), potassium sodium tartrate (clear), nickel sulfate hexahydrate (blue-green) or heptahydrate (green), potassium ferricyanide (red), and copper acetate (blue-green). Stock No. 70,336Q-----\$9.50 Ppd.



GIANT WEATHER BALLOONS

Create a neighborhood sensation. Great backyard fun. Exciting beach attraction. Blow up with vacuum cleaner or auto air hose. Sturdy enough for hard play; all other uses. Filled with helium (available locally) use balloons high in the sky to attract crowds, advertise store sales, announce fair openings, etc. Amateur meteorologists use balloons to measure cloud height, wind speed, temperature, pressure, humidity at various heights. Photographers can utilize for low-cost aerial photos. Heavy duty neoprene. Stock No. 60,568Q-----8" Diam.-----\$2.00 Ppd. Stock No. 60,632Q-----16" Diam.-----\$7.00 Ppd.



WOODEN SOLID PUZZLES

12 Different puzzles that will stimulate your ability to think and reason. Here is a fascinating assortment of wood puzzles that will provide hours of pleasure. Twelve different puzzles, animals, and geometric forms to take apart and reassemble, give a chance for all the family, young and old, to test skill, patience and, best of all, to stimulate ability to think and reason. Stock No. 70,205Q-----\$3.00 Ppd.



NEW WORKING MODEL DIGITAL COMPUTER

Actual Miniature Version of Giant Electronic Brains

Fascinating new see-through model computer actually solves problems, teaches computer fundamentals. Adds, subtracts, multiplies, shifts, complements, carries, memorizes, counts, compares, sequences. Attractively colored rigid plastic parts easily assembled. 12" x 3 1/2" x 4 1/4". Incl. step-by-step assembly diagrams, 32-page instruction book covering operation, computer language (binary system) programming, problems and 15 experiments. Stock No. 70,683Q-----\$5.98 Ppd. Detailed Programming Booklet For Experiments Stock No. 9080Q-----50 Pages-----\$1.00 Ppd.



'FISH' WITH A WAR SURPLUS MAGNET

Go Treasure Hunting on the Bottom

Great idea! Fascinating fun and sometimes tremendously profitable! Tie a line to our 5-lb. Magnet—drop it overboard in bay, lake, river or ocean. Troll it along the bottom—your "treasure" haul can be outboard motors, anchors, fishing tackle, all kinds of metal valuables. 5-lb. Magnet is war surplus—Alnico V Type. Gort. cost \$50. Lifts over 150 lbs. on land—much greater weights under water. Stock No. 70,571Q—5lb. Magnet-----\$12.50 Ppd. Stock No. 70,570Q—3 1/2-lb. size-----\$ 8.75 Ppd.



Order by Stock No.—Send Check or M.O. Shipment same day received—Satisfaction or money back.

TEACHERS: Write for Educational Catalog Q-2 Edmund Scientific Co., Barrington, N.J.

MAIL COUPON for FREE CATALOG "Q"



EDMUND SCIENTIFIC CO., Barrington, New Jersey 08007. Completely new 1967 Edition, 148 pages. Nearly 4500 BARGAINS. Please Rush Free Catalog "Q"

Name.....
Address.....
City.....State.....Zip.....