

Signs of superconductivity at a 'warm' 60 degrees K.

The search for high-temperature superconductivity continues despite repeated failure and the pessimistic attitude of certain experts in the field. Superconductivity is the total loss of electrical resistance that occurs in some metals and alloys at very low temperatures. Flow of electricity without resistance would be (and in some cases already is) technologically useful, but the phenomenon has not yet been observed in any substance at temperatures above 21 degrees K.

Now there is a glimmer of a hope for temperatures substantially above that. It appears in the work of a group at the University of Pennsylvania, Alan J. Heeger, Anthony F. Garito and associates, and was reported at last week's meeting of the American Physical Society in San Diego.

The Pennsylvania group has found superconducting fluctuations, changes in conductivity that are usually precursors of a stable superconducting state in an organic salt with the jawbreaking name dimethyltetrathiofulvalene-tetracyanoquinodimethan or (ATTF)(TCNQ). Fluctuations tend to occur in known superconductors at temperatures

slightly above the point at which superconductivity sets in. In (ATTF)(TCNQ) the fluctuations appear at 60 degrees K.

So far, however, the experimenters have not been able to induce a stable superconducting state. At the temperature where one would expect the onset of stable superconductivity, 50 degrees K., (ATTF)(TCNQ) undergoes a crystalline phase change that renders it an insulator.

This does not mean the loss of all hope. The Pennsylvania group hopes to achieve stable superconductivity by "fine tuning" the structure of the material, a process that Heeger calls "creative organic chemistry." This consists of altering the structure by replacing certain atoms or groups of atoms with other atoms or groups.

If it works, it could open a new field for the interplay of solid-state physics and organic chemistry. It could enable scientists to build into synthetic organic molecules the features required for stable superconductivity, just as the features necessary for certain desirable properties are now built into synthetic fibers such as nylon.

If it works at 50 degrees or in that neighborhood, it could open up new superconducting technology since the engineering requirements for refrigeration are far easier in that range than they are below 20 degrees. □

Government scientists venture a quake prediction

On March 22, Earl Holt, the mayor of tiny (8,500 pop.) Hollister, Calif., issued a unique warning to his constituents, advising "those that have a good bourbon to put it in a safe place." Despite his composure, the mayor was reacting to a historic announcement—the first official Government earthquake prediction. Scientists of the U.S. Geological Survey had predicted that a "moderate" quake of magnitude 4.5 (Richter) would hit the region, a hundred miles southeast of San Francisco, within the next several months.

Hollister lies near a particularly active region of the San Andreas Fault, where four moderate quakes, ranging from 4.0 to 5.0 on the Richter scale, have occurred within the last 15 months, so that citizens of the primarily agricultural region were hardly surprised at the prospect of another quake soon. Still, the USGS announcement represents an important further step in understanding the fundamental processes that lead to quakes.

In making the announcement, while preparing for formal presentation of their data before the April meeting of the American Geophysical Union, geologists Robert Wesson and William Ellsworth cite a swarm of "microquakes" now occurring near Hollister as the tip-off for the predicted quake. Microquakes are imperceptible tremors, with magnitudes as small as 0.5, that may occur by the thousands just before a moderate quake. Wesson and Ellsworth also found that the four preceding quakes had released tension at both ends of a 12-mile section of the fault, leaving the center portion still under some strain, which led them to predict this as the site of the next quake.

The announcement also represents something of a "trial balloon," Wesson told *SCIENCE NEWS*. Since previous predictions have usually come from a variety of "seers," Wesson says the USGS hopes to establish a rapport with the media and the public concerning scientific earthquake predictions. If their openness on work in progress can help establish credibility, Wesson says, "the public may be more receptive to more important predictions in the future."

Robert Stevens, regional director of the Office of Emergency Preparedness (OEP), agrees. "We will be very interested to see what the public's reaction is," he says. OEP was given an advance copy of Wesson and Ellsworth's papers in order to decide what action should be taken. Because of the relatively low intensity of the predicted quake, the remoteness of Hollister and developing state of the art, Stevens said, OEP decided to take no overt action, but to study the effects of the prediction and the quake on people involved.

The California Governor's Earthquake Council has also discussed the prediction.

Understanding the mechanism by which different segments of a fault release energy and the reactions of people to earthquake predictions is vitally important in preparing for great quakes that are sure to come. Donald Tocher, director of the Earthquake Mechanism Laboratory of the National Oceanic and Atmospheric Administration, has noted that a period of moderate quakes on the San Andreas Fault appears to precede a great quake and, he says, "It is clear to me that we're well into a period of this moderate activity." Moderate quakes south of San Francisco, such as the one predicted at Hollister, he says, probably build up strain in the "locked" portions of the fault farther north. Such locked segments are the origin of major quakes like that of 1906.

A surprising ban for St. George's seals

About 300 miles southwest of the Alaskan mainland are the Pribilof Islands, controlled by the United States since 1867 and noted for their thriving rookeries of valuable fur seals. Japan has long maintained—and still does—that the seals are a major detriment to its commercial fishing grounds, reducing the catches by eating the fish and damaging the nets. In 1911, a treaty was signed by the United States, Japan, Canada and the Soviet Union abolishing sealing from the open ocean above 30 degrees north latitude and reaffirming U.S. control of sealing on the Pribilofs, but providing Japan and Canada with 15 percent each of the islands' harvests. (The same percentages go to Japan and Canada from Russia's Komandorskiye Islands.)

In 1941, with the coming of World War II, Japan effectively dissolved the treaty by withdrawing from it, citing the effects on fishing as the reason, and the pact was not reformed until the four nations signed an interim agreement in 1957. Japan, however, has continued to be a reluctant member.

For this reason, U.S. officials were less than optimistic early this month when they set out for two weeks of negotiations in Japan about a proposal



U.S. Fish and Wildlife Service

Pribilof seal: A surprising reprieve.

for the National Oceanic and Atmospheric Administration to study the factors governing the seal population—a proposal which would ban the commercial taking of seals from St. George Island. St. George accounts for only about 15 percent of the seals taken from the Pribilofs, but the issue was still a touchy one. So it was a somewhat pleasantly surprised U.S. delegation that returned from the International North Pacific Fur Seal Commission meeting last Friday with an agreement settled and signed.

The study, with its ban, could last as long as 15 years, since the female fur seal is not fully productive until she is about eight years old. An influential argument at the commission meeting was that the study would give insight into the seals' real diet makeup, and show just how much of a threat they are to commercial fishing. Conservationists are also happy about the agreement, however, because of the commercial threat to the seals as a species, and grateful about any reduction in the clubbings and other violent methods sometimes used in taking the animals.

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Conservationists also were cheered last week at the withdrawal of an application to the National Marine Fisheries Service for an exemption to the Marine Mammal Protection Act that would have allowed the Bergner International Corp. of New York to import 10,000 dressed seal hides from Canada. Six exemptions have been sought for seals since the act was signed last October, of which one, also with pelts in mind, was rejected. Besides the recent withdrawal—just before a possibly embarrassing public hearing—four other requests are awaiting hearings or being processed. At stake: up to 3,000 live seals for sale to zoos and other institutions and 2,100 more for their hides. □

A call for a change of attitudes toward drugs

President Nixon advocates mandatory imprisonment for heroin pushers. New York Gov. Nelson A. Rockefeller wants life sentences for dope dealers. Connecticut Gov. Thomas J. Meskill wants to reinstate the death penalty for twice-convicted pushers, including marijuana and LSD dealers.

"This would return the drug-use prevention effort to relying on fierce words in statute books instead of constructive action," concluded the National Commission on Marijuana and Drug Abuse last week. Such a hard line on drug use, said the commission in its second and final report to the White House, is irrational and overreactive. It solves nothing and might even be counterproductive because juries are sometimes reluctant to impose harsh mandatory sentences. Instead, the commission calls for a massive change of attitude toward drug use.

Last year the marijuana section of the commission's report recommended decriminalization of that drug (SN: 3/25/72, p. 197). Now, turning to other forms of drug use, the commission reports that alcohol is the most abused and destructive drug and that barbiturates (used by housewives, for instance) are "America's hidden drug problem." But the commission says the Government should not interfere with a person's decision to use drugs as long

as they do not lead to antisocial acts. Heroin, for instance, should remain restricted, but users should be given treatment or counseling as alternatives to prison. The commission suggests that refusal to accept treatment be punished by a \$500 fine and up to one year in jail.

The commission calls existing drug education material inaccurate and ineffective and says it should no longer be used. Methaqualone, the commission feels, should be more tightly controlled as should advertising and prescription of other mind-altering drugs. Finally, the commission calls for the establishment of a Controlled Substances Administration. It would be an independent agency coordinating enforcement of drug laws, treatment of users and all government programs of education and research. Such an agency, the commission says, would put an end to the drug-abuse industrial complex that has a "vested interest in perpetuation of the problem." President Nixon this week proposed a reorganization that would take all drug control programs (but not rehabilitation and education) out of the Treasury Department and White House and put them in the Justice Department. Unless Congress vetoes the plan, it, not that of the commission, will go into effect in 60 days. □

U.S. and Soviets plan 25 research projects

The new U.S.-U.S.S.R. Joint Commission on Scientific and Technical Cooperation (SN: 7/8/72, p. 19) held its first meeting in Washington last week and announced approval of 25 programs of cooperative research in six general areas.

The commission selected programs from among proposals submitted by joint working groups of Soviet and American scientists that have been meeting for the past several months. The six general areas of cooperation include energy, computer applications to management, agricultural research, microbiological synthesis, chemical catalysis and water resources. Within each area, certain projects were given first priority while others will begin after work is effectively under way.

Cooperation will include exchange of scientists and specialists; exchange of scientific and technical information; joint research, testing and development; organization of joint courses, and special arrangements between U.S. companies and Soviet agencies.

Despite the agreement, several questions remain to be answered, including what provisions will be made to expedite projects involving embargoed

goods, whether the U.S.S.R. will make travel permits easier for its scientists to obtain, and how much information will be held back in areas of keen competition.

One such area is the crucial energy research field of magnetohydrodynamics, including investigations into the nature of plasmas that may one day provide useful sources of fusion energy. SCIENCE NEWS talked with Richard Balzhiser, head of the American energy negotiating team, and A. I. Maksimov, Soviet deputy minister of energy, who said there would be a free exchange of data and experts and use of one country's equipment to test that of the other. (Fusion projects, per se, will be handled by separate agreement through the Atomic Energy Commission.)

The chairman for this meeting of the joint commission was National Science Foundation Director H. Guyford Stever who said the discussions were held in a "true spirit of cooperation." His words were echoed by the head of the Russian delegation, V. A. Trapeznikov, who said the joint projects would "benefit not only these two countries, but all mankind." □