

Food and Population: Thinking the Unthinkable

In one of the starkest assessments of the world food situation yet delivered, five scientists told the House Subcommittee on Fisheries and Wildlife Conservation and the Environment this week that the recently concluded World Food Conference had failed to come to grips with underlying causes of the present crisis, and that the United States has already begun a policy of triage—deciding which people shall live and which shall starve on the basis of political considerations. They suggested that foremost among these considerations should be whether the recipient country had an effective program of birth control in operation.

University of Wisconsin ecologist Grant Cottam, an official observer at the Rome conference, said delegates had failed to face the possibility that the world's "carrying capacity" (the total number of people that can be fed using available resources) may have already been exceeded and that any attempts to increase food production will only aggravate the decline of life quality unless population expansion is brought under control. "The carrying capacity of the world is probably less than the number of people already in existence," he said. In recent years "we managed to survive without serious famine only because of the presence of a large [food] reserve. . . . With no reserves left, there is no way that we can avoid massive famines. The earth simply cannot continue to support an exponential population growth." The food shortfall this year will be equivalent to the needs of roughly 130 million people, he estimates (see diagram).

Georg Borgstrom, a food scientist at Michigan State University, agrees that the natural limits to the carrying capacity of the biosphere have not been properly gauged. By calculating the amount of land needed to produce enough protein to feed people now alive, one finds that three-quarters of the production goes to livestock. Thus, if one billion more people are added to the population over the next decade, as expected, the actual drain on biological resources will be several times greater than that calculated simply on direct protein needs, because of the extra livestock that will also be added. The only way

this could be accommodated (unless world dietary habits change drastically) would be for much of the world's remaining forests to be cut down to yield cultivated land, which will increase the already present danger of ecological disaster, he said.

But other resources are also running out, and these directly affect food production, University of Wisconsin geophysicist John S. Steinhart told the committee. For example, 10 calories of fuel are now required to produce one calorie of food in the United States; so when the price of oil skyrocketed, "working-class Americans whose food budget had required 15 to 20 percent of their income two years ago now must spend 30 percent or more of their income on food and prices which are still rising," he says. And the consumption of such limited natural resources *must* level off or decline: "Only madmen and some economists think otherwise."

If the additional population is not to be subjected to ever increasing misery, money as well as food must be provided, and need for capital grows some three times faster than the population, says University of California human ecologist Garrett Hardin. Thus, if population continues to rise at two percent a year, capital must grow at six percent a year or living conditions in poor countries will merely get worse. Without these additional infusions of money and fuel, the poor "will break limbs off the few trees that still line their public roads. . . . Next year the grain harvest will be still poorer. This is what is meant by the 'vicious cycle of poverty.'" Population growth has become a cancer, and "You can't cure a cancer by feeding it."

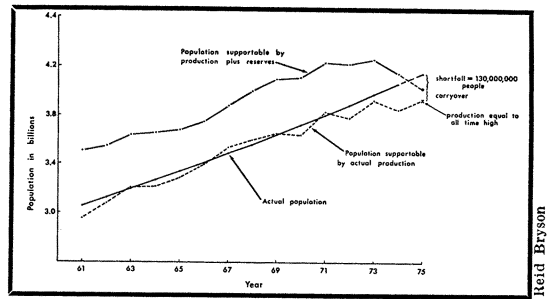
This grim conclusion is shared by other members of the panel. "It is time we recognize the absurdity of today's world and stop pouring rat hole money into a hopeless population sink," agrees Wayne H. Davis, a zoology professor at the University of Kentucky. "You cannot solve a hunger problem by feeding hungry people."

The process of cutting off food has already begun, adds Steinhart: "We already practice triage, whether or not we so name it. When President Ford declined Secretary Butz's and Sen. Hum-

phrey's (D-Minn.) request for one million tons of grain for India and announced a week later that grain would be supplied to Syria, it is triage in action even if the reasons for the choice are diplomatic. He decided that some in India will die and some in Syria will live."

The right to have children implies the responsibility to feed them, says Hardin. If Western countries keep pouring in aid, "the extra food will be converted into more babies." The only way to avoid this is to use food aid as "bait" to encourage rigorous family planning.

Statements such as these are sure to bring a flurry of protest, but they indicate that the nation has begun to think what was once "unthinkable." Subcommittee chairman, John D. Dingell (D-Mich.), probably reflected the sentiment of a growing number of Congressmen when he said that if all to come out of the Rome conference was criticism of the United States for not giving more aid, "It would seem that the delegates might just as well have stayed at home." □

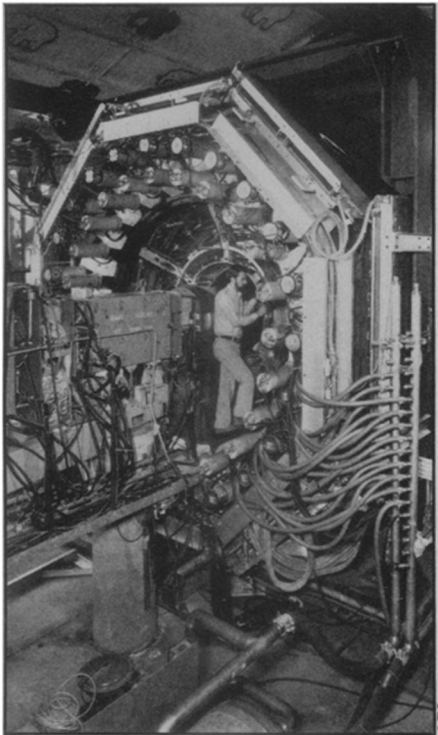


"With no reserves left, there is no way that we can avoid massive famines."

One little, two little, x little particles

And then there were two. Mysterious new elementary particles, that is. Twelve days after the discovery of the psi or J, a very odd, heavy new particle (SN: 11/23/74, p. 324), comes its partner, a very odd, heavier new particle. At 4:30 a.m., Pacific standard time, a group of physicists from the Stanford Linear Accelerator Center and the Lawrence Berkeley Laboratory found it in an experiment at SLAC's SPEAR storage ring. Details will appear in the Dec. 9 PHYSICAL REVIEW LETTERS.

The new particle is designated psi(3700), 3,700 being its mass in millions of electron-volts. Its earlier, lighter predecessor is now called psi(3105). Psi(3700) is, like its partner, electrically neutral. Also like psi(3105), psi(3700) has an anomalously long lifetime for a particle so heavy, possibly the same as the 10^{-18} second estimated for psi(3105). The lifetime hints that some unusual new structure is present in the make-up of these oddball particles.



Deep in the heart of this giant detector electrons meet positrons and make psi particles. The psi's decay products are recorded and measured by several layers of different kinds of counters.

Theorists are going frantic trying to assess the significance of the discovery. One suggestion is that the new particles may be the intermediate vector bosons, the particles that embody the weak subatomic force, and that they may support recent theoretical efforts to unify that force and electromagnetism. Another suggestion is that

they may be quarks, not the usual old-fashioned kind of quark that has been in particle theory for a decade, but a newer, fourth quark that some theorists find necessary, possessed of a special new quality called "charm."

Quot homines, tot sententiae. Every theorist has his pet idea, says Rudolf Larsen of SLAC, but one has to see a pattern before the significance is clear. Having just two of the particles, he says, is like having only two lines of the spectrum of the hydrogen atom. One wouldn't learn much about the structure of the hydrogen atom from so little.

There are two more weeks of the current experimental run, and the group at SPEAR will go on looking, gradually raising the energy as they go. "It seems we can't scan far without finding one," Larsen says. The SPEAR experiment collides beams of electrons with positrons. Since the total electric charge in that combination is zero, it can produce only neutral particles. If there are charged analogues, SPEAR is likely to find them only if a neutral member of the group decays into a slightly lighter charged version. A complementary experiment at Brookhaven National Laboratory, which participated in the discovery of the psi(3105)—called J by the experimenters at Brookhaven—is more capable of making charged versions and is looking especially for them.

One feels rather like the old-time radio announcer: "Tune in again next week, folks." Never in recent memory has particle physics zipped along with such speed. "It's a real credit to the storage ring," says Larsen. □

NAS launches study on fluorocarbons

Fluorocarbon aerosol propellants and refrigerants are a serious enough threat to the earth's ozone layer that a National Academy of Sciences committee should be convened to do a thorough study of the problem. These are the conclusions of an *ad hoc* NAS panel of atmospheric scientists headed by Donald Hunten of the Kitt Peak National Observatory in Tucson. Hunten told SCIENCE NEWS that it "seems appropriate to give public exposure to the problem for a few months" before expecting any recommendations by the academy, but that he hopes they will take action within a year to recommend a Government ban on the use of fluorocarbon propellants if that is their conclusion based on a growing body of evidence.

Following the group's recommendation, NAS is now organizing a special interdisciplinary panel. Members are being chosen and a report will be issued within a year, a spokesman says.

The *ad hoc* panel included Frank S. Rowland of the University of California at Irvine and Michael B. McElroy of Harvard, both of whom recently published theoretical mechanisms and timetable projections for fluorocarbon breakdown and ozone destruction in the upper atmosphere (SN: 9/21/74, p. 181; 10/5/74, p. 212). The group met in late October and made their recommendation to the academy's governing board Nov. 16.

The Rowland and McElroy teams and others theorize that when inert chlorine-containing fluorocarbons float up past the troposphere (the lower seven miles of atmosphere) into the stratosphere, they are dissociated by ultraviolet light energy and release reactive chlorine atoms. These interact with ozone (O_3) in a chain reaction that changes thousands of ozone molecules into molecular oxygen (O_2). Using computer calculations based on production growth rates, chemical reaction

rates and climatic factors, McElroy predicts percentages of ozone depletion ranging from about 3 percent to 30 percent by the year 2000, depending on the growth of the industry and the onset of Government regulation. If growth continues at the 1960-72 rate of 22 percent, and production is not halted for 10 years, 10 percent of the earth's ozone layer could be destroyed, McElroy predicts. Several thousand cases of skin cancer per year could result from the subsequent increased exposure to ultraviolet light.

A subcommittee of the standing NAS Climatic Impact Committee will study the environmental, public health and economic impacts of the continuation or removal of fluorocarbons from the market. Although some direct evidence of ozone depletion does exist now, the subcommittee will pay close attention to upcoming measurements of ozone depletion taken in the stratosphere. The Manufacturing Chemists Association is funding James E. Lovelock, an atmospheric scientist at the University of Reading in England, who plans next year to measure ozone and fluorocarbon breakdown products. The Atomic Energy Commission and the National Oceanic and Atmospheric Administration also are involved in direct measurement. Rockets and balloons carrying laser devices will probably be used.

Although the NAS plans to issue a report within one year, and many would like to see a ban clamped on production of the products now, a long, controversial study seems likely. Rowland and McElroy have both advocated speedy consideration of the problem and the National Resources Defense Council (an environmental public interest law firm) has petitioned the Consumer Product Safety Commission to ban the use of spray cans that use the suspected propellants. But Ray McCarthy, technical products manager of DuPont's Freon products division thinks "two to three years would be a more reasonable estimate" of the time needed to gather sufficient scientific evidence. "We are 100 percent in favor of having the National Academy of Sciences make this study, but we don't want to see the products found guilty without a trial."

McCarthy emphasizes that the ozone depletion models are theoretical and that no one has yet proven environmental damage conclusively. Rowland responded to this statement in a phone interview. "Industry says it is just a hypothesis. But their position is just hypothetical, too. They have the hypothesis that it is safe to release fluorocarbons, but no data to back up their position. We have a hypothesis that it is unsafe, but we do have some scientific data, and are coming up with more." □