food agency's position that there was "no evidence" that rats injected with nitrates develop tumors. "The ombudsman said no . . . they said they have a lot of complaints from citizens and don't have time to take up all of them." But, said Gillberg, "With one television program, we got nitrates banned in Norway!" He said that his group was gathering documentation on appeals made to the ombudsman, who has a staff of about ten persons to investigate complaints in a country of 8 million people. "This kind of documentation is needed for new laws," he said. Recently, a second official ombudsman, specializing in consumer affairs, was named.

The best route to getting certain unsafe products off the market or undesirable policies changed in Sweden, Gillberg believes, is through public education, and thence, the parliament. Indeed, the environmentalists' greatest success has been a parliamentary one. Last May, the 350-member legislature passed a sweeping law calling for a moratorium on all nuclear power plant development until after a comprehensive review of the safety issues could be made. Although the law will allow completion of some nuclear power plants, observers of Swedish politics say the vote was significant, not the least because it was pushed through by a coalition of the Center and Communist parties against the ruling Social Democrats.

Given Sweden's long record of leadership in world organizations, one might expect a Swedish Ralph Nader to look to such organizations for help. However, Gillberg seems to have little faith in international groups at present. When the U.N. Conference on the Human Environment was hosted by the government in Stockholm last year, Gillberg says that he stayed in Uppsala and boycotted it, because the government's involvement in it was a "Chaplin farce." On the one hand, he says, a pollution-conscious Swedish public helped create a sympathetic setting for the meeting. But on the other hand, he scoffed, the Social Democrats hosted the conference "to appease people. They were also profiting from it themselves because they were getting a bad name," on pollution questions. It syphoned energy from his movement, he said.

Whether scoffing at government regulation of paper mills, or recalling how a cabinet minister once blurted out on television that he didn't care what was in the soap so long as he had a nice white shirt to wear, Gillberg portrays a Sweden very different from its usual image. Spokesmen for the Swedish government have indicated, however, that the government's environmental record is excellent. From this side of the Atlantic, of course, it is impossible to judge the merits of Gillberg's and the government's conflicting assessments. But the fact that Gillberg has the apparently respectful attention of a wide Swedish audience shows that Naderism is, to some extent, exportable.

—DEBORAH SHAPLEY

Sorghum: "Miracle" Grain for the World Protein Shortage?

The development of hardy strains of so-called "miracle" wheat, rice, and corn by plant scientists has made possible a dramatic rise in the production of cereals in less developed countries. Now, researchers at Purdue University have come up with a discovery which they believe could transform the lowly sorghum plant into an important source of protein for millions of the people who need it most.

The Purdue scientists have identified two strains of sorghum with a much higher lysine content than most other sorghum plants, and are working to develop seed stocks for wide use. An estimated 300 million people in the world now depend on sorghum for their "principal" food, according to the Agency for International Development (AID).

Sorghum is the cereal crop on which the very poorest people in the developing countries of Africa, East Asia, and India depend. It grows in arid and stony soil where wheat and corn cannot. It is a staple in the African region of Sahel, which this summer experienced a wide-scale drought and famine. Sorghum seeds are pounded into flour, which is then mixed with water to make mush or baked into crude bread; the stalks are used as thatch or for fuel. The sorghum usually grown in the United States is not a human food crop; it is used as feed for animals. The stalks of certain strains yield a kind of molasses. Even as fodder, its poor protein value requires that it be supplemented.

Sorghum's nutritional defects stem from the small amounts of lysine found in most of the 16,000 strains grown throughout the world. Lysine is one of the amino acids necessary to protein manufacture in the body. Thus the lack of lysine in sorghum limits the overall protein value of the grain. While screening some 10,000 varieties of sorghum from all over the world, the Purdue researchers found two Ethiopian strains with a single gene which remedies the lysine deficiency. Hence the plants have triple the protein value of normal sorghum. The researchers, including John D. Axtell, Dallas L. Oswalt, and Rameshwar Singh, performed the work on a $1.7 million contract with AID. They will publish the results in the forthcoming issue of *Crop Science*.

Axtell stated at an AID-sponsored press conference on 28 September that, by cross-breeding techniques, this gene could be added to strains of sorghum already used by farmers. And, since the people who depend on sorghum are also susceptible to kwashiorkor and other malnutrition-related diseases, the increased nutritive value of their sorghum diet could lessen the incidence of those diseases. At the press conference, John A. Hannah, the outgoing AID administrator, went a step farther and called the Purdue discovery one "of life-giving importance" to the 300 million people who depend on sorghum.

Moreover, the sorghum discovery will aid the very poorest people in less developed countries, those who have allegedly been bypassed by the green revolution. In developing countries, only the richer farmers grow wheat and corn. Critics of the green revolution have maintained that the so-called "miracle" crops require substantial

capital investments—special fertilizer and the like—and thus have benefited only farmers who were well off to begin with. Sorghum, by contrast, is grown by farmers too poor to grow these more expensive crops.

At the press conference, Hannah likened the breakthrough to the discovery, also made by Purdue scientists, of high-lysine corn about 10 years ago. Oliver E. Nelson of the University of Wisconsin, a crop geneticist who worked on high-lysine corn, also told *Science* he thought the two discoveries are comparable. Nelson said, "Axtell's data looks very good to me." For people "who . . . draw the major part of their protein from sorghum it would be tremendously important."

However, these rosy predictions were dimmed somewhat by the scientists themselves during the press conference and at briefing sessions, where they admitted that many obstacles and unknowns lie in the path of delivering the high-lysine sorghum to farmers world wide. Axtell stated that, in the next 3 to 5 years, the scientists will probably be able to have farmers grow the genetically improved strains in the "most promising" areas, such as Ethiopia, where they believe these plants already grow. But the process of breeding the gene into the many other sorghum varieties used by farmers could be lengthy. Actual introduction of improved sorghum could take "7 to 10 years for the most difficult situations," Axtell admitted. "The tendency will be to overstate how quickly this will get into production."

For one thing, a plant that is healthy in the nursery might not fare so well in the field. The Purdue scientists so far have only preliminary results on how well the protein-rich sorghum really grows. "We don't have any data on the yield characteristics" of the strains, says Axtell, but from preliminary growing of them in a tropical environment, in Puerto Rico, "we have no reason to expect there will be any major problems." Another risk incurred by genetically altering plants is that other features—their appearance, taste, texture of grain, or resistance to disease—can be inadvertently altered. "The problem is not that they [the genes] can not be transferred to other varieties," explains Nelson. "The question is whether the gene will interact well with the genetic background into which it is put. . . . They may go to one variety with a favorable interaction, but in the other varieties," the result might be unfavorable. AID will continue to sponsor the work of cross-breeding, as will a number of international organizations.

Another set of unknowns involves the distribution of improved seeds to the farmers. Here, however, Axtell pointed out the advantages of marketing a genetically improved plant, instead of trying to get people to use food additives or of enriching their own food through processing. "Once you get the seeds to the farmer there is no further technical infrastructure needed to ensure that it will enhance his diet."

The work was part of AID's $9 million per year research program aimed at addressing problems in less developed countries. Erven Long, a senior AID technical officer, indicated recently that the sorghum breakthrough is but one of a series of "firsts" likely to emerge from this program. Other key results could come from research at the University of Illinois on a biodegradable DDT, and at the University to emerge from this program. Other vaccine. Other work might result in protein-enriched wheat and alternatives to herbicides as a method of weed control.—DEBORAH SHAPLEY

Briefing

Congress Views Détente with a Fishy Eye

The ambiguousness of the current U.S.–Soviet détente was pointed up by two votes in Congress on 26 September, one to authorize accelerated construction of the Trident missile submarine, the other to require a free Soviet emigration policy as the price for removing discriminatory tariffs on Soviet goods.

By a vote of 49 to 47, the Senate authorized a $1.5-billion appropriation for beginning work over the next 4 years on all ten of the Trident submarines presently proposed—a schedule opposed by Senator Thomas J. McIntyre's research and development subcommittee but not by the parent Armed Services Committee (*Science*, 20 April and 24 August). The House Ways and Means Committee voted, with no dissent, to deny "most-favored-nation" (MFN) treatment to the Soviet Union in levying tariffs unless Russian Jews and other Soviet citizens are permitted to emigrate if they choose. The Nixon Administration had lobbied against imposing this conditional MFN policy, contending that it might imperil détente. Ironically, however, on the other side of the Capitol, Administration spokesmen were emphasizing the gravity of the Soviet military threat in appealing to senators to support Trident. The Administration has given contradictory explanations of why it wants to rush ahead with Trident, but one reason is that it feels Trident will be a useful bargaining chip in strategic arms talks.

The Trident authorization is now in the bag, for both the House and Senate have approved it. The conditional MFN policy has not yet been approved by either the House or Senate, but a majority in each body has endorsed it. Since the recent harrassment of Soviet physicist Andrei D. Sakharov (*Science*, 28 September) and novelist Aleksandr Solzhenitsyn, a broad-based coalition of liberals and conservatives has been pressing hard for Congress to stand up for Soviet dissenters.—L.J.C.

Dominick Leaves EPA; Successor Not Yet Named

The Environmental Protection Agency's assistant administrator for hazardous materials, David D. Dominick, is leaving office 15 October to return to private life. Dominick, an attorney from Wyoming, was commissioner of the Department of the Interior's Federal Water Quality Administration until 1970 when that agency was absorbed as a part of the newly created EPA. At EPA, Dominick has been identified especially with efforts to eliminate or restrict the use of predator control poisons and the use of DDT and other persistent pesticides. Charles Wurster, chairman of the scientific advisory committee at the Environmental Defense Fund (the environmental law group that has led efforts to ban persistent pesticides), gives Dominick high marks for job performance and expresses the prayerful hope that his as yet unnamed successor will be equally competent and vigilant.—L.J.C.