

along with another former Genentech employee, Sharon Carlock. By the time Armos went under, Sheehan had invested \$1.5 million in the venture. The only other source of capital was Fred Adler Associates, a New York venture capital firm, which put up about \$1 million.

The company's research efforts got under way in earnest in mid-1981, and it had about a dozen Ph.D. scientists on the payroll. Its research projects involved the use of recombinant DNA techniques to produce porcine growth hormone and to develop vaccines against a variety of animal diseases.

By April, cash was running perilously low, and Sheehan was searching for additional sources of support. But most of the employees were unaware of the gravity of the situation until 30 June, when they were informed that the company was out of money and could not afford to pay them for the month they had just worked.

At that point, negotiations were still going on with Eli Lilly and SmithKline for possible partnership arrangements that would provide an injection of capital, and most of Armos' employees continued to work for the company in the hope that an 11th-hour rescue would be made. However, says one scientist, "we were all sending out résumés and scurrying around looking for jobs."

The final end came on Friday, 13 August, when Armos filed under chapter 11 of the bankruptcy laws. No corporate fairy godmother has so far been found, but Sheehan says he is still hoping to reorganize the company and attract some investment to support a less ambitious agenda.

—Colin Norman

## Laser Battle Stations: Back to the Drawing Board

Gung-ho advocates of laser battle stations suffered a setback last month. House-Senate conferees agreed to broaden the scope of basic research, to slow the pace of laser development, to raise the question of survivability, and to ignore a call for a demonstration laser in space.

What prompted the move on basic research was a congressional debate during the spring and summer over

the utility of long-wavelength lasers, which to date have consumed more than \$2 billion. The House, citing the laws of physics in a rare display of scientific reasoning, said the money was wasted and that only short-wavelength lasers would suffice for the fighting of war in space (*Science*, 4 June, p. 1082). The Senate disagreed and warned that the United States might lose the race for the domination of space to the Soviets; it called for laser battle stations based on technology already at hand.

The conferees came up with a compromise. Long-wavelength programs have not died on the vine, but conferees in their markup of the 1983 Defense Authorization Act put in \$20 million for the study of short-wavelength lasers, shy of the House's \$50-million request but enough to get the program rolling.

More important for those in the House who urged a slow approach to the development of the best systems, the conferees killed a \$40-million program that would have given the Air Force the go-ahead to start a laser empire of its own. The program, which would have run 3 years, soaked up more than \$120 million, and been centered at the Air Force's Space Command in California, would have clearly taken lasers out of the developmental stage and into the field.

The conferees in effect put lasers back on the drawing board. Most existing programs are now conducted by the Defense Advanced Research Projects Agency.

In addition, the conferees added \$20 million for the study of laser "vulnerability and lethality," which will determine whether lasers can be effective in space and whether they can withstand various attacks. This was a heartening development for critics who feared major problems were being overlooked. One question is whether space lasers can withstand the million-volt surge of electricity caused by distant nuclear blasts (*Science*, 12 March, p. 1372). Another is whether they can withstand a zap from other lasers.

In a gesture that affected no specific program but was a clear signal of congressional intent, the conferees also deleted Senate language that called for an orbiting demonstration of a laser battle station by the end of the decade.—William J. Broad

## OPEC Gives a Boost to U.S. Firewood Use

Although it has been widely recognized that OPEC has done the U.S. firewood industry an immense favor by raising oil prices during the past decade, the extent of the favor has until now been largely a matter of speculation. Now, however, the Department of Energy has produced two studies documenting in detail a sharp rise in the use of wood fuel for both residential and industrial heating in the past few years.\*

Between 1978 and 1980 alone, the number of households relying on wood as their chief source of fuel for space heating more than doubled. Some 4.5 million households now burn wood as their primary source of heat, and another 10 million use wood as a secondary heat source. Between them, they burned about 48 million tons of wood in 1980, twice the amount used for residential purposes in 1970.

But even these sharp increases in residential firewood consumption have not been enough to wipe out the declines of the 1950's and 1960's. For all the attention paid to the resurgence of firewood as an energy source, American households burn about one-fifth less wood now than they did in 1950.

Industry, in comparison, has tripled its consumption of wood fuel over the past three decades, with especially sharp increases in the mid-1970's. Two industrial sectors—pulp and paper manufacturing, and the wood products industry—account for virtually all the 80 million tons of wood fuel burned each year by industry, according to the surveys.

As for the utilities, few seem ready to turn to wood to generate electricity. And even in the residential and industrial sectors, the consumption of wood fuel may start to level off, predicts one study. Many houses and factories likely to convert to fire wood have already done so, it suggests, and technological changes in the pulp and paper industry may depress total fuel requirements.—Colin Norman

\*Energy Information Administration, *Estimates of U.S. Wood Energy Consumption from 1949 to 1981*, and *Residential Energy Consumption Survey: Housing Characteristics, 1980*.