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whereby certain algae produce hydrogen from water, using sunlight as energy.

Defending the NIH guidelines, Cohen says that no such thing exists as "zero risk"; the public should weigh the "reasonable expectation" of major benefits from recombinant DNA research against "the vague fear of the unknown."

In *New Scientist*, Sinsheimer, a California Institute of Technology biologist, contends that the NIH guidelines neglect the long-range "potential evolutionary consequences" of gene-splicing because they were written to cope with "immediate medical hazards." (The complex NIH rules prohibit some experiments, notably those involving known high-risk pathogens such as the Lassa fever virus and Newcastle disease virus, which affects chickens, but some "moderate-risk" organisms, such as *Salmonella typhi*, are eligible for recombination. Release into the air of any recombinant DNA molecule is prohibited.)

Sinsheimer urges that all such research, by industry or universities, be done under maximum security conditions, using organisms which, in contrast to the commonly used *Escherichia coli*, are not apt to survive if they escape the laboratory.

Are We a Nation of Hypochondriacs?

"On the Science and Technology of Medicine" by Lewis Thomas, in *Daedalus* (Winter 1977), 165 Allandale St., Jamaica Plain Station, Boston, Mass. 02130.

Notwithstanding congressional complaints of its "insufficiency," writes Thomas, the American health care system—doctors, clinics, hospitals, nurses—has been expanding rapidly. Estimated annual expenditures for health care have gone from \$10 billion in 1950 to \$130 billion in 1976, and the costs will rise further if a national health insurance program is enacted.

Thomas, executive director of Memorial Sloan-Kettering Cancer Center in New York, sees little justification for this spending "boom" in terms of real U.S. health needs. Average life expectancy is now 72 years; far less hospital care is required for common infectious diseases (e.g., lobar pneumonia and meningitis) since the development of antibiotics in the 1940s. Nor is the boom explicable in terms of major medical breakthroughs requiring expensive new technology. Indeed, the major killer diseases of 1950 (heart disease, cancer, kidney disease) are the same in 1977; here, U.S. medicine has employed extremely costly "halfway" techniques of diagnoses and treatment, far short of "cures" or "prevention."

Most important, the lion's share of health outlays by Americans is spent on nonfatal, as yet technologically incurable, illnesses—influenza, gastrointestinal ills, arthritis, neurosis, psychosis. Thomas argues

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that TV commercials, newspaper columns, and fund-raising propaganda by "disease agencies" (e.g., the Heart Fund) have fostered a "national obsession" with disease. In turn, "unsupportable demands" have arisen for illusory preventive medicine; seeing the doctor has become a "cultural habit." Redesigned for use only when really needed, Thomas contends, the health system would probably cost much less; new investment should be for research to move future health technology beyond the "halfway" point.

RESOURCES & ENVIRONMENT

Can We Do As Swedes Do?

"Efficient Energy Use and Well-Being: The Swedish Example" by Lee Schipper and Allan J. Lichtenberg, in *Science* (Dec. 3, 1976), 1515 Massachusetts Ave., N.W., Washington, D.C. 20005.

The per capita gross national product in Sweden was only 10 percent below that of the United States in 1971. Yet, for every dollar of GNP, Sweden required only 68 percent as much energy as this country. Schipper and Lichtenberg, both energy researchers at Berkeley, studied the Swedish economy in great detail and found that Sweden uses less energy per capita in all sectors, while enjoying a standard of living rapidly approaching that of the United States.

Swedish passenger transportation relies more heavily on subsidized rail and bus systems than on automobiles and aircraft. (In Stockholm, Gothenburg, and Malmo, where 25 percent of Sweden's population lives, mass transit, motor bikes, and pedal bikes account for 75 percent of all commuting.) Swedish building codes require homes and offices to be far better insulated than in America, and 19 percent of the country's residential heating needs are met by highly efficient district heating stations. Swedish factories generally operate with higher energy efficiency than U.S. factories, in part because of more modern equipment. For example, lumber by-products provide 60 percent of all fuel used in the paper industry (which consumes 15 percent of all energy in Sweden) as against 35 percent in the U.S. paper industry.

The most important factors shaping Sweden's energy consumption patterns, the authors note, are government policy and "the relative price of energy with respect to other resources." Heavy taxes are levied on gasoline for cars, and government loans favor conservation-minded builders. The writers suggest that similar initiatives in the United States, especially those favoring smaller cars, better structures, and more efficient use of process heat by industry, "would result in savings of 30 percent in the total energy used."