radiates in all directions throughout the cell. The egg's nucleus, waiting off to one side, rushes down one of the corridors created by the aster and, within one minute, merges with the sperm nucleus. Almost immediately, the first steps toward creation of an embryo get underway.

Fertilization, the Schattens say, is "the riskiest of all biological processes." Small wonder then, that the egg has developed such aggressive mechanisms to ensure its success. No longer will it be possible to view fertilization as a solo act.

RESOURCES & ENVIRONMENT

What OSHA Is Up To

"Auchter's Record at OSHA Leaves Labor Outraged, Business Satisfied" by Michael Wines, in *National Journal* (Oct. 1, 1983), 1730 M St. N.W., Washington, D.C. 20036.

The Reagan administration's attempt to "deregulate" industry helped get the U.S. Environmental Protection Agency (EPA) into hot water. Meanwhile, hardly anybody is paying any attention to EPA's twin, the Occupational Safety and Health Administration (OSHA).

OSHA director Thorne G. Auchter has not only avoided public controversy, he has even acquired a mild taste for regulation, writes Wines, a *National Journal* correspondent. For example, Auchter's OSHA was expected to abandon longstanding agency attempts to limit workers' on-the-job exposure to carcinogens. But last April, OSHA suddenly announced plans to issue emergency regulations on exposure to asbestos. OSHA also sidestepped chemical industry and White House opposition to regulations requiring labels with tips on handling and safety for all hazardous chemicals used in American factories. The initial cost to industry will be almost $600 million, plus $228 million per year thereafter.

Auchter's critics, chiefly labor union officials, believe, as one put it, that Auchter was "dragged kicking and screaming into regulation." He took action on asbestos, they say, only after a congressional committee grilled him in March. And the new regulations will probably just codify standards already accepted voluntarily by industry. Critics also charge that OSHA's enforcement of existing regulations is lax. In 1982, for example, the agency levied only $5.8 million in fines against violators; in 1980, Jimmy Carter's OSHA collected $18.5 million.

Auchter replies that his brand of "cooperative regulation" allows business to put its money into workplace safety and health rather than legal battles with OSHA. The agency's own resources have also been redirected. A controversial new "targeting" policy exempts from federal inspection factories in industries with low health-related absenteeism. (An existing program exempts all industries in the 21 states that have their own safety regulations.) OSHA officials claim that the cutback allows them to scrutinize the most dangerous workplaces, particularly

construction sites. The agency made 64,000 inspections in 1982, down by about 1,000 from 1980. Construction site inspections, however, were up from 28,000 to 31,000.

President Reagan's OSHA may not have broken much ground, Wines notes, but it probably hasn't lost much. Since the agency was created in 1970, job-related deaths have declined slowly, but workdays lost due to injury or illness have increased. That trend has not changed.

Fusion Energy: False Promise?

"The Trouble with Fusion" by Lawrence M. Lidsky, in *Technology Review* (Oct. 1983), Room 10-140, Massachusetts Institute of Technology, Cambridge, Mass. 02139.

For several decades, scientists have touted fusion as the great energy hope of the 21st century. And generating electricity through fusion is scientifically feasible, writes Lidsky, an MIT nuclear engineer. But utility companies won't want to buy fusion reactors.

Experimental reactors are now under construction in the United States (at Princeton), Japan, Western Europe, and the Soviet Union. Physicists are concentrating on the fusion of deuterium and tritium ("D-T fusion"), two forms of hydrogen that are abundant in seawater. It promises cheap, safe, virtually unlimited power—one cubic meter of seawater would yield as much energy as 2,000 barrels of oil.

In a fusion reactor, the hydrogen atoms would be heated to 150,000,000 degrees Celsius, held in a vacuum "bottle" created by super-magnets cooled nearly to "absolute zero" (-273 degrees Celsius). The fusion of the atoms' nuclei would release neutrons, which would bombard and heat containment walls within the reactor. The heat would be used to create steam to drive electricity-generating turbines.

Such a reactor, Lidsky suggests, would be a "large, complex, expensive, unreliable source of power." Within its walls would be some of the highest temperatures attainable on Earth and some of the lowest; the relatively heavy high-energy neutrons used in bombardment would quickly erode the reactor's core. Although a fusion reactor would be much safer than today's fission models—a "meltdown" would be impossible—its complex machinery would be subject to frequent minor but debilitating breakdowns.

Scientists have ignored these practical problems. Engineers and utility executives cannot, says Lidsky. By the 21st century, improved fission reactors will almost certainly be more attractive than the fusion alternative. Not that Lidsky favors abandoning fusion research. He argues that in the race to get quick results (and win government research grants), his colleagues have slighted a promising alternative. Fusion using lithium or boron might be simpler than D-T fusion, and it would produce heat without the need for troublesome neutrons.

That kind of research is a "high-risk, high-gain" proposition with a far-distant payoff. But if it works, Lidsky believes, it will deliver what D-T research once promised: inexpensive, plentiful energy supplies.