BIOTECHNOLOGY

OPEN QUESTIONS IN MILITARY BIOTECH

Some debates are perpetual: If information is scarce or ambiguous, then the debaters argue interminably from first principles and present their surmises as proven fact. Or they confuse what is true with what is right, and impassioned partisanship replaces understanding.

Public discussions of military biotechnology are too often just installments in this sort of perpetual debate. Hard information is scarce. (We could probably gather together all of the people who know what's going on in military biotechnology on both sides of the East-West rift and still not have a quorum for a rubber of bridge—or an opponent for a game of chess.) And what little information we have may support several contrary views. What is left is a political Rorschach test, in which we see nothing but the shape of our own expectations.

Yet the questions raised by even the possibility of military use of biotechnology are urgent.

What Is the U.S. Doing? The U.S. Department of Defense (DoD) itself declares that it is investigating applications of biotechnology to a grab-bag of problems. In a widely reported presentation to the annual meeting of the American Association for the Advancement of Science, the DoD's Thomas R. Dashiell summarized his agency's "11 current in-house projects (and)...32 projects using recombinant DNA technology funded by DoD under contract primarily to universities." The in-house researchers, he said, are seeking vaccines against diseases like malaria, dengue, anthrax, and other likely agents of biological warfare. The external researches center on projects of interest to any industrial bureaucracy: high-performance lubricants, fuels, adhesives, surfactants, and structural materials. Anything to keep machines running better, longer. Researchers on other, more military projects are looking for biological sensors (to warn of biological attack), and antidotes to chemical and biological toxins.

The DoD's catalogue pointedly omits any mention of offensive biological weapons. And we are told that the government has classified no defense recombinant DNA projects, and that all are matters of public record. Some observers are skeptical, despite what the Defense Intelligence Agency's John Birkner called an established "policy of open disclosure." Indeed, this seemingly sudden assertion of candor bemuses, even in the context of a strong Administration initiative condemning biological warfare. We have lost the habit of associating even politic virtue with advanced defense planning.

The suspicious fear that the current air of frankness is in fact a smokescreen meant to hide secret research into lethal agents. The military, for its part, is left to prove a negative proposition—that it is *not* hiding anything.

Other critics of military policy on biotechnology worry that research into biological countermeasures will itself endanger the peace. They fear that the nation that completely protects itself against biological weapons will then begin to consider using those weapons in combat.

What Is the U.S.S.R. Doing? No one really knows, so people tend to assume that the Soviets are doing what their prejudices lead them to expect. Raymond Zilinskas (whose two-part analysis of Soviet biotechnology concludes in this issue) spent months researching the Rus-

sians' biotechnological research. At the end of his investigation—which concentrated mainly on non-military biotech—he was still left with the nagging certainty Soviet scientists were pursuing lines of civilian research that he could not document.

Among those who share a kindred certainty regarding Soviet military researches are Pentagon strategists and *The Wall Street Journal's* William Kucewicz. The latter's articles helped bring to the general public the debate of biotechnology and the military. Kucewicz proceeded from the assumption that military applications of biotechnology were a high priority in the U.S.S.R.: He described attempts to clone the gene for cobra venom into influenza viruses. He reported widespread deaths from anthrax around the Soviet biotechnology institute at Sverdlovsk (an area to which anthrax is native, we are told, though we should also remember that the Soviets appear more accident prone in their military and high-tech installations than the West is). And he took as given that "yellow rain" is a Soviet mycotoxin (an assertion somewhat undermined by *Nature's* publication of convincing evidence that the substance really is bee feces and pollen after all).

In the end, the reader could dismiss most of Kucewicz's evidence as rumor and innuendo. Or the reader could discern the ominous outline of a well-developed and well-hidden program of aggressive research.

Where Does That Leave Us? What is true conflicts here with what is right. It is certainly wrong to manufacture infectious agents with intent to kill. But is it right to leave oneself defenseless to weapons easily within the reach of current technology, even if it is true that building biological defenses can shake the balance of terror? Is it right to refuse to enlist biotechnology to defend ourselves against conventional biological agents?

And even if, as domestic critics fear and the Soviet Military Encyclopedia says, defensive and industrial biotechnology can easily be turned to hostile ends, would we rather manufacture our vaccines from weakened or killed microbes (which are themselves weapons as well as the source of defense) or clone the genes for antigenic compounds into less noxious organisms?

Are we to control the export of biotechnological equipment and information that might serve a non-Western war effort—including production capacity bioreactors, decontaminants, separators, extraction apparatus, microencapsulants, and 10 micron spray nozzles?

In view of all this, the U.S. should continue to shun the offensive use of biological agents, whether produced by biotechnology or by conventional means. And, until we can be sure that biological attack is vanishingly unlikely, we must use the technologies at hand to secure whatever protection is available.

We would like to see a verifiable ban on the development of all offensive military biological agents, but that seems unlikely. Nuclear munitions leave a wide track: massive manufacturing plants on the ground, radioactivity in the air, and seismic tremors betray testing. Biological agents can be produced in small laboratories. If you detect them in the air, it's already too late. Tests are marked by small convulsions in small animals. The seismometers do not note their passing.

—Douglas McCormick