Myth and reality in chemical warfare

A convincing case is set forth that the Soviets actually made use of trichothecene biotoxins in Laos and Cambodia

"Yellow Rain: A Journey Through the Terror of Chemical Warfare" by Sterling Seagrave, M. Evans & Co., New York City, 1981, 316 pages, **$11.95**

Reviewed by John M. Deutch, professor of chemistry at Massachusetts Institute of Technology and former undersecretary of the Department of Energy (1979–80). A member since 1975 of the Defense Science Board, Deutch chaired its panel in 1980 that examined all U.S. chemical warfare programs.

Chemical warfare (CW) and biological warfare (BW) are horrors that inflict monstrous wounds and death on both military personnel and innocent civilians. It is therefore not surprising that some observers of national security matters are tempted to believe propositions about CW/BW that permit one to avoid CW issues, reject proposals for improving CW capability of the U.S. and its allies and turn to nuclear weapons issues that inexplicably seem more tractable.

Some of these propositions that prove upon examination to be highly suspect or just plain wrong are the following:

- The Soviets will not develop, deploy, and use in the field lethal CW agents or BW toxins if the U.S. and its allies abandon CW and BW.
- The lesson of World War I is that chemicals are not effective in combat and, in any case, training and protective equipment easily can negate the advantage of chemical use.
- The existing CW weapons capability of the U.S. and its allies (combined with an improved defensive CW posture) and/or reliance on the nuclear umbrella is sufficient to provide deterrence from Soviet CW use.
- Verifiable arms control agreements are a promising avenue to solution of the CW/BW problem.

The blockbuster book "Yellow Rain" by Sterling Seagrave, appropriately subtitled "A Journey through the Terror of Chemical Warfare," presents an excellent opportunity for reviewing myth, reality, and just plain old-fashioned hope with respect to CW/BW. The book contains three main themes. The first is a journalistic history of CW/BW from World War I to today by an investigative reporter of no mean resolve or brains. The second is an account, rather unrewarding for the reader, of the author's internal conversion on CW/BW issues, which seems to be an indulgence that many investigative reporters permit themselves today. And the third is an interesting but somewhat flawed and contradictory discussion of some major issues concerning CW and BW, most prominently the issue of deployment by the U.S. of a binary nerve agent chemical munition. On balance, for those who wish a readable introduction to the subject of CW/BW and who can preserve some skepticism, this book is recommended reading.

By far the strongest part of the book is the historical account of the use of CW/BW from its origins prior to World War I. Indeed, the book is best known for giving the first comprehensive account of the use of biotoxins in Laos and Cambodia. The biotoxins in question are sesquiterpenoid compounds such as anguidine, deoxynivalenol, nivalenol, and T-2 toxin from the trichothecenes family produced by the various fungal species *Fusarium* (see C&EN, Nov. 30, 1981, page 29, for the chemical structures).

"Yellow Rain" has been catapulted into prominence by the statements by Secretary of State Alexander Haig (C&EN, Oct. 26, 1981, page 15) and Assistant Secretary of State Richard Burt that the U.S. has physical evidence from environmental samples of the use of these BW agents in Southeast Asia, and that this use implicates the Soviet Union (C&EN, Nov. 16, 1981, page 10). The use of such agents by the Soviets or their surrogates would appear to be a categorical violation of two treaties signed by the U.S.S.R.—the 1925 Geneva Protocol banning use of lethal chemical weapons, and the (unverifiable) 1972 biological warfare convention banning production and use of BW agents.

Once one absorbs the surprise of use of these BW agents instead of the more familiar CW agents (phosgene, mustard, blood agents, nonlethal incapacitants, or even organophosphorus nerve agents), it is natural to seek a more comprehensive account, with supporting evidence, of Soviet activity in the CW/BW area. Here "Yellow Rain" is invaluable.

Seagrave presents an enormous amount of material concerning the first use or supply of proscribed chemical agents by the Soviets. For example, in addition to the Southeast Asian experience, he cites provision of chemical agents to Egypt (then a Soviet ally) for use in Yemen during the early and mid-1960s, use of chemicals in Afghanistan by Soviet military units, and use of chemical agents by the Soviets in covert operations and in their own homeland.

Seagrave makes an impressive case that these Soviet activities happened. And he does not conceal his contempt at the frailty of international organizations (such as the United Nations and the Red Cross), as well as the U.S. and other countries, in confronting these alleged events.

The author also reviews the questionable past policies and programs of the U.S. in the CW area. And he discusses the unfortunate conduct of the U.S. during the Vietnam war in using tear gas and vast amounts of agent orange defoliants. I also regret the U.S. use of the hallucinogen BZ in Vietnam. But I question Seagrave's contention that the U.S. employed the arsenic-based vomiting agent adamsite. In any case, there is no room for reasonable doubt that Soviet misconduct in this area has vastly exceeded that of the U.S. or any other nation.

Some readers of this review and of the book understandably will doubt the awesome accounts of Soviet CW/BW use. They will question the character, certainty, and scientific

basis of the evidence that supports "Yellow Rain," or the intelligence estimates that led to official statements such as those of the State Department (C&EN, Dec. 14, 1981, page 21).

It is important to appreciate that the character of the evidence is not amenable to scientific verification. There will always be uncertainty in these matters. The evidence comes largely from refugee reports and the reports of western experts or observers who have visited the scene late or have spoken at second hand to alleged victims. The information presented in "Yellow Rain" is of this character. Although it may not be scientifically provable, it is impressive in its quantity and diversity. As Seagrave points out, credulity is stretched further by the alternative propositions that the information is a plant or is the result of mass hysteria.

In addition to this type of information, the U.S. government has some information such as physical samples from Laos, that is euphemistically termed "technical intelligence." Although not free of uncertainty either, when this information is combined with the reporting mentioned above, a rather convincing picture emerges.

However, we should not be surprised that some will judge the evidence as compelling whereas others will view it as circumstantial. The reader may be interested to know that I believe "Yellow Rain's" account of CW use in Southeast Asia to be largely accurate and consistent with available data.

Seagrave is less interesting when he turns to what policy action should be taken by the U.S. and its allies in response to this Soviet action. The issue that presents him the most difficulties is the proposal for the U.S. to deploy binary chemical munitions to modernize CW retaliatory capability. The binary CW weapon consists of substances of relatively lower toxicity that are mixed in artillery shells or bombs prior to use to form the lethal nerve agents that currently compose our unitary munitions (C&EN, Dec. 15, 1980, page 22). The binary weapon is safer and hence more deployable; to some this means it is more usable.

At one point Seagrave states, "In summary, the majority of arguments in favor of binaries are vastly outweighed by the arguments against them." Part of Seagrave's concern seems to be that the "third generation" Soviet toxins are more effective than binary nerve agents—which he calls "old-fashioned chemical agents"—and that the U.S. might adopt "yet another expensive detour."

Yet further on, he writes, "A decisive response is definitely needed to the abuse of Soviet chemical weapons and their use on relatively defenseless resistance forces ... I have found myself grudgingly and bitterly conceding the need for a compact binary strike force." While Seagrave's final position may be correct, neither the logic nor the consistency of his arguments is particularly impressive.

In fact, most experts agree that trichothecene toxins are unlikely to prove as effective chemical agents as organophosphorus nerve agents. If this is so, then why are the Soviets mounting this macabre activity? Moreover, are the Soviets not concerned with the morality of such acts, or at least concerned about being discovered?

My answer to the first question is "I don't know," and to the second question "No." However, it is not surprising to find the Soviets engaged in a not especially intelligent field research and development program that frantic Soviet diplomats are required to obfuscate in western capitals. In the CW/BW area, the Soviets seem to have the same dull, single-minded objective of improving their military capability that one finds in such diverse areas as space launches, nuclear weapons tests, antisubmarine warfare efforts, and antiballistic missile research and development.

I believe that Soviet CW capability and NATO (North Atlantic Treaty Organization) vulnerability no longer can be ignored. NATO vulnerability is an invitation to Soviet CW use. CW's threat lies in the vastly reduced mobility and force effectiveness experienced by troops even if they are well trained and equipped with the best defensive protection gear available (which NATO troops are not).

Therefore, deterrence cannot be achieved by defensive measures alone. The present NATO offensive capability based on unitary munitions is essentially nonexistent, and reliance for deterrence on nuclear weapons is neither believeable nor wise. There is no alternative to deploying a credible CW retaliatory capability that will cause the Soviets to think twice before introducing chemical weapons into a NATO conflict.

This is the real issue. Once resolved, it is a simpler matter to decide issues such as unitary vs. binary, or nerve agent vs. toxin. Arms control negotiations to put CW/BW beyond the pale flounder on the issue of adequate verification and the Soviet misconduct so impressively recounted in "Yellow Rain."

In the remote possibility that the reader who has read this far has preserved any hope in these matters, it should be emphasized that CW is by no means only a superpower matter. There is a further concern: Nations that perceive a serious security predicament in their possibly unstable regional circumstances may turn to CW/BW weapons to strengthen their position. Use by terrorists of CW/BW weapons is another possibility. What policy measures do we have to deal with these eventualities? □

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