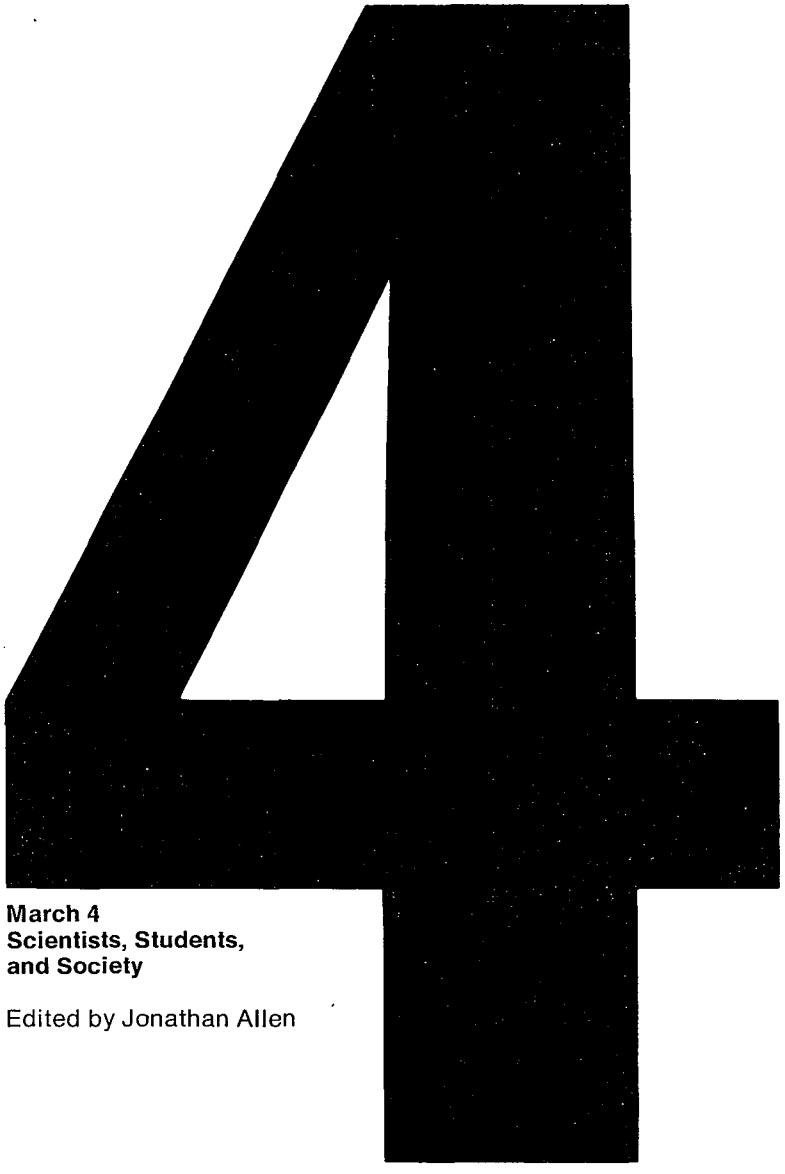

March 4
Scientists, Students, and Society

Edited by Jonathan Allen

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Preface

This book is the historical record of a series of talks and panel discussions that were sponsored by the Union of Concerned Scientists at MIT and held on March 3 and 4, 1969. The issues under consideration, relating science to government and society, had been steadily mounting in importance to the scientific community. Many scientists had begun to share the strong conviction that they should speak out on the national policies whose furtherance they served in one way or another. The meetings aroused considerable attention, even on the national level, before a word had been spoken.

As the dates for the talks drew near, plans for fairly complete press coverage became apparent, and the group of speakers grew to include many prominent men. It was decided to tape-record all of the talks, and some thought was given to the possibility of printing the transcriptions. After the meetings were over, their publication in book form was arranged in order to reach a wider audience.

To capture as much of the feeling of the occasion as possible, a minimum of editing has been done, and the printed versions are very close to the original transcriptions. The reader will not find here a collection of tightly phrased position papers but may, instead, find himself involved in grappling with the issues. Frustration, anger, and attempts to find methods to change the direction of national policy are evident throughout the book.

Many people helped to bring the March 4 discussions into being. Those involved in developing the original idea are mentioned in the historical introduction by Murray Eden. The arrangements for recording the original talks were made by Morris Halle, and he has been of invaluable assistance at all stages of the book's production. Elliot Lieb assisted with the early planning of the book. Deborah McPhail and Katrina Streif performed the difficult and lengthy job of transcribing the tapes. Astute editorial suggestions were furnished by Patricia Eden, and Ann Allen helped with all of the typing, editing, and proofreading. The speakers have all been most helpful and cooperative in preserving the style and delivery of their talks, a task that hasn't always been easy. Finally, Francis Low, Chairman of the Union of Concerned Scientists during the meetings, has been a great help at many points in the overall production.

Jonathan Allen, March 1970

system is dangerous. After all, it saves lives, doesn't it? After all, it is a defensive weapon. That is the superficial view that anybody will have of such a weapon if there are no people who are inside, who study what such a weapon means and know the technological background of both the offense and the defense. It is the responsibility of a scientist and an engineer not to be satisfied by something that appears on the surface as saving lives, but to penetrate below the surface, to *know*. Our great need is to know and, at the same time, not to forget that what we really are after is the preservation of mankind.

M. S. Meselson

Controlling Biological and Chemical Weapons

Chemical and biological weapons, like nuclear ones, are capable of killing very large numbers of people, especially civilians. Nerve gases are comparable with the uranium bomb, in the sense that a single large bomber dispensing one of the more toxic ones under meteorological conditions favorable to the attacker could kill most unprotected individuals within an area the size of the high casualty zone at Hiroshima or Nagasaki. You may recall the accident last year at Skull Valley, Utah, where gas from a test escaped and led to the death of 6,400 sheep over an area of some 200 square miles. Biological weapons, employing anthrax spores, or other potential biological agents, are even more powerful than nerve gas because less is required to kill a human being, and therefore less is required to attack a given area. For example, a standard United States field manual, "The Employment of Chemical and Biological Weapons," states that a single fighter plane can spray enough biological agent to cause 50 percent mortality in an area of 300 square miles.

Fortunately, chemical and biological weapons have never been used in this fashion. Nor does any nation in the world today prominently threaten the use of chemical and biological weapons as they do nuclear weapons. The United States and the other major nuclear powers do not need chemical and biological weapons to deter strategic attacks against themselves. These weapons are not needed to maintain the so-called balance of terror. Nuclear weapons do that. Chemical and biological weapons would simply get in the way by complicating the calculations and expectations of the respective sides in any strategic crisis.

These weapons offer no ability to limit damage from enemy strategic nuclear forces, since the latter can be easily protected. The proliferation of chemical and especially biological weapons would greatly increase the threat to nuclear nations by offering relatively cheap strategic destructive capabilities to the nuclear nations. In short, for a country like the United States, chemical and biological weapons are the worst imaginable strategic weapons.

There are some important properties of chemical and biological weapons that concern their capabilities for tactical use. In my opin-

ion these properties should make the United States eager to prevent chemical and biological weapons from ever being used. Chemicals are very cumbersome weapons to defend against. When chemical weapons are used in combat, soldiers must be provided with protection if the enemy is able to retaliate in kind. This means masks, protective suits, and lugging along enormous amounts of decontamination equipment. The more complicated and interdependent a fighting force is, the more will these protective measures reduce their fighting efficiency. Sophisticated forces would often be placed at a disadvantage with respect to less sophisticated ones. Mortar cartridges loaded with nerve gas have a much higher kill radius than conventional ones. And, as we know, large numbers of mortar shells can be deployed even by guerrilla forces. In other words, the violence level of tactical combat would be enormously increased if lethal chemical weapons were legitimized and came to be used—and their employment could be more advantageous to the enemy than to us.

Gas and germ weapons are difficult to confine—witness the death of the 6,400 sheep, 30 miles away from the test site. This is a case, we are told, in which the most extreme precautions were taken to be sure that no such accident would occur. Under not uncommonly stable meteorological conditions, the tactical employment of moderate quantities of nerve gas could create lethal concentrations as far as 100 kilometers or more downwind from the battlefield. Thus, although fighting forces can be well protected against gas, its tactical employment could easily kill large numbers of civilians. For example, a few days of tactical nerve gas employment in Europe could quite easily kill tens of millions of civilians.

Another feature of these weapons that should make them anathema to the United States is that they are prohibited by international law. The major existing international agreement that prohibits their use is the Geneva Protocol of 1925, which specifically prohibits the use of "asphyxiating, poisonous or other gases, and of all analogous liquids, materials or devices" and of "bacteriological methods of warfare." The Geneva Protocol was proposed by the United States.

Finally, I wish to add one more consideration that is enormously important, and that is that these weapons are particularly abhorred

by mankind. We should do nothing to erode this view because it may be the decisive safeguard against the proliferation of weapons that would gravely threaten the security of the United States as well as that of others.

In view of these circumstances, one would think that the overriding purpose of United States chemical and biological warfare policy would be to prevent the proliferation, legitimization, and use of these weapons. We are the pacesetter in military matters, or at least a coequal pacesetter with the Soviet Union. Therefore, our actions, our statements, our policies, will influence the nature of warfare in the future. Unfortunately, unwisely, it is not the case that the overriding purpose of U.S. chemical and biological warfare policy is to prevent the spread, legitimization, and use of chemical and biological weapons. This is not to say that the United States is at present using lethal chemical and biological weapons or that the United States is pressing hard to abolish the worldwide agreements and restraints against the use of these weapons. Rather, our policy is ambiguous, internally inconsistent, and looks menacing and provocative to the rest of the world. There's only one country whose policy I consider to be worse than our own. This is the country that has used poison gas against unprotected villagers in the Yemen—apparently Egypt, although she denies it.

Now when I say that the policy of the United States is unwise, confused, provocative, and dangerous, I don't primarily mean our research and development policy, although I would include some aspects of that. And I don't mean our work on defensive measures, although some of that I think is unwise, and it is done in unnecessary secrecy. And I don't mean our efforts in intelligence to find out what other countries may be doing in this area, although it is improperly used and badly exaggerated to stimulate higher appropriations for CBW. I don't mean any of those things if they serve the purpose (which I think should be overriding) of preventing the legitimization, proliferation, and use of chemical and biological weapons. What I do refer to are two things. First, our use of "nonlethal" chemical weapons in Vietnam, specifically the agent called CS or super-tear gas and chemicals used to attack food crops. And secondly, I refer to our international policy. I'd like to say something briefly about these policies and actions.

First, regarding the use of nonlethal gas in Vietnam, it is true that the agent we use in great quantity, CS, is not lethal in the open when used for police purposes. It can kill when used in confined spaces. It is less lethal to a variety of experimental animals than the kind of tear gas usually used by police. But we really aren't sure that this comparison holds for man. CS is a very reactive chemical and, as used by the military, it penetrates to the deep recesses of the lungs. Almost nothing is known about its possible long-term aftereffects.

However, regardless of the toxicity of CS when used by itself, the idea that war can be made more humane by the use of such chemicals is a myth. Nonlethal gases introduced into the field of combat will come to be used in any way they possibly can to increase the effectiveness of bullets, bombs, and other lethal weapons. We have used nearly 14,000,000 pounds of CS in Vietnam since 1965. Most of it is used for purposes that cannot be considered nonlethal. It is supplied to our forces in Vietnam in grenades, mortar shells, rockets, 105 mm and 155 mm howitzer projectiles, with ranges up to 15 km, and in bulk disseminating devices and aircraft cluster combs up to 1,000-pound size. The distinction between lethal and nonlethal gases might be made in the laboratory under conditions of controlled use. But that distinction loses its meaning when nonlethal gases are massively used in order to kill, in close coordination with conventional lethal weapons.

The myth of humane chemical war could be a reality, but not in today's world. If all lethal weapons were put away and if men still fought wars (that's hard to imagine), then nonlethal gases could be used in war without much killing. But that's not the situation. In proposing the use of nonlethal weapons, the military have never proposed that the lethal ones be put away.

I think that nonlethal gas warfare is worse than a myth; if it were just a myth you'd say, well, it's not going to do anything except disappoint those who thought that it would save lives. It won't be much worse than regular conventional weapons. The use of nonlethal gas in war is highly dangerous. Its use sets the stage for the use of other gases—for the use of lethal chemical weapons. Although that hasn't yet happened in Vietnam, it did happen in World War I. The first gases used were tear gases. The French and Germans used

them in regular military operations. In one artillery barrage alone, at Neuve-Chapelle, 3,000 tear gas artillery shells were fired. This was all before the famous German use of chlorine gas at Ypres in 1915.

Nonlethal gas sets the stage for escalation because it makes men wear masks. It teaches officers and men the rather special techniques of gas warfare. It teaches them to look for favorable situations in which to use gas. It causes the military to ask for gases that are more effective. It causes military establishments in all countries to review their previous policies and to consider procurement of their own gas weapons. It erodes the general expectation that gas will not be used in war.

Finally, a strong case can be made that the use of nonlethal gas violates the 1925 Geneva Protocol, even though the United States claims it does not. This treaty, ratified by over 60 nations, prohibits the use in war of poisonous, asphyxiating, and other gases, and of all analogous liquids, materials, and devices. In 1930, the United Kingdom, France, Rumania, Spain, the Soviet Union, China, Italy, Canada, Turkey, Czechoslovakia, Yugoslavia, and Japan declared that they viewed the use of tear gas in war as prohibited by the Geneva Protocol. The United States, which has not yet ratified the Protocol, was the only nation that disagreed with this view. However, two years later, at Geneva, even we agreed that the use of tear gas should be prohibited in war.

I'd like to turn to the second aspect of what I consider to be foolish and dangerous U.S. policy for chemical and biological weapons. This concerns our international policy. I'd like briefly to trace the development, or I should say the fluctuations in that policy, since World War I. I've described how World War I gas usage began with tear gas, then went to chlorine, mustard, phosgene, and other poison gases. Following that war, language was introduced into the Treaty of Versailles affirming a general prohibition against the use of asphyxiating, poisonous, and other gases (the same language that is in the Geneva Protocol) and specifically prohibiting their possession by the defeated powers. Subsequently, in 1922 at the Washington Disarmament Conference, a prohibition against the use of asphyxiating, poisonous, and other gases, and all analogous materials, liquids, and devices was agreed upon by the nations rep-

resented there, including the United States, which introduced it. The Senate recommended ratification of that treaty without a single dissenting voice, and the United States ratified it in 1925. Unfortunately, the Washington Treaty never came into effect because it contained an article on an unrelated matter dealing with submarine warfare to which the French objected. A clause in the treaty required French ratification.

In 1925, there was a meeting in Geneva to discuss the worldwide sale of arms. The United States was represented at that meeting and asked the delegates if they would place on the agenda the question of gas warfare. It was the policy of the United States at that time to press for prohibition of gas warfare. The other nations supported our initiative, and the Geneva Protocol was born. It was signed by the United States and 37 other nations present. However, the Senate failed to approve the Geneva Protocol. It was debated but never came to a vote. The Senate debate on the Geneva Protocol was partly in secret and partly in public. The public part began with the reading of a letter from General Pershing, who wrote,

> I cannot think it possible that our country should fail to ratify the Protocol which includes this or a similar provision. Scientific research may discover gas so deadly that it will produce instant death. To sanction the use of gas in any form would be to open the way for the use of the most deadly gases and the possible poisoning of whole populations of non-combatant men, women and children. The contemplation of such a result is shocking to the senses. It is unthinkable that civilization should deliberately decide upon such a course.

General Pershing's letter was the only strong statement in favor of the Protocol. An effective lobby was organized at the time by the American Chemical Society, the Army Chemical Corps, the American Legion, and parts of the chemical industry. They opposed ratification of the Protocol, and it was referred back to the Foreign Relations Committee and never came out again. The supporters of the Protocol had been caught by surprise. Thinking it would pass through the Senate as easily as the Washington treaty four years earlier, they failed to do their homework and to organize public support. Subsequently, at the Geneva disarmament conferences in the 1930s, the matter came up again, and representatives of the United States and other nations agreed to a treaty covering a large

variety of weapons that prohibited the use of gas in war, specifically stating that tear gas was subject to the same prohibition as all other gases. The United States agreed to that stipulation in 1932. This treaty never came into force because the approach of World War II disrupted the meetings.

At the start of World War II, the French and British exchanged assurances with the Germans and Italians that gas would not be used and that the Geneva Protocol would be obeyed. And so it was. In all of the combat in World War II on land and on the sea, neither gas nor biological weapons were used at all in Europe. Gas is thought to have been used on several occasions by Japan against China before we entered the war. In essence, however, biological and chemical weapons were not used in that global conflict. Incidently, both the United States and Germany produced large quantities of tear gas weapons, but not even these were used.

In the middle 1950s, the United States budget for chemical and biological warfare research and development ran around ten million dollars a year, and our efforts were mainly directed at defense. In the late fifties a large increase began, an increase which in the course of the next five years multiplied the budget more than tenfold. The earlier emphasis on defense shifted to a new emphasis on employment of CB weapons. At the time of the changes, in 1959, Congressman Kastenmeir of Wisconsin introduced a joint House-Senate resolution stating that its sponsors did not oppose research and development, did not oppose expansion of the program, did not oppose readiness, but did feel that the United States should reaffirm her long-standing World War II policy of never using chemical or biological weapons, except in retaliation.

Unfortunately, I think foolishly, the Defense and State Departments at the time opposed the Kastenmeir resolution and in separate letters to Congress explained their reasons. The State Department letter of 1959 stated, "Similar declarations might apply with equal pertinency across the entire weapons spectrum, and no reason is conceived why biological and chemical weapons should be singled out for this distinction." The State Department was not perceiving the Geneva Protocol. At the time of the increase in the budget in the late 50s and early 60s, Army manuals added language to say that the United States was not a party to any treaty that

would prevent us from initiating the use of chemical and biological weapons, and new field manuals were issued emphasizing the offensive employment of gas and germ weapons. And then, as you know, nonlethal gas was used in Vietnam. When nonlethal gas was first used there, it caused a storm of questioning and criticism. At that time Secretary Rusk said that the expectation was that such gases would be used "only in riot-control-like situations," and "not in ordinary military operations." Indeed he may have expected that, but it's not what happened. As you have seen, gas is now used on a very large scale and is used in close support of ordinary, conventional lethal operations.

In 1966, the Hungarians introduced a resolution in the United Nations General Assembly calling upon all nations to observe the Geneva Protocol. The resolution was cast in rather harsh language. The United States at first opposed the resolution, but then the Hungarians indicated that they were willing to soften the language, and it became apparent that essentially all other members of the United Nations were in favor of the resolution. The United States ultimately voted for and even cosponsored the revised resolution. I'm glad to say that we did so.

In the course of the debate, however, our delegate Mr. Nabrit said (departing from the actual text of the Protocol),

> The Geneva Protocol of 1925 prohibits the use in war of asphyxiating and poisonous gas and other similar gases and liquids with equally deadly effects. It was framed to meet the horrors of poison gas warfare in the first World War and was intended to reduce suffering by prohibiting the use of poisonous gases such as mustard gas and phosgene, but it does not apply to all gases. It would be unreasonable to contend that any rule of international law prohibits the use in combat against an enemy for humanitarian purposes of agents that governments around the world commonly use to control riots by their own people.

I leave it to you to evaluate the accuracy and the wisdom of this statement.

Our policy at present is riddled with internal inconsistencies, and I might mention just a few. The first is, do we or do we not feel that the prohibition against gas and biological weapons of the Geneva Protocol is binding upon ourselves? The field manuals still say that we are not bound by any such treaty. The State Department, on December 22, 1967, on the contrary, stated, "We consider that the basic rule set forth in this document has been so widely accepted over a long period of time that it is now considered to form a part of customary international law." But Deputy Secretary of Defense, Cyrus Vance, on February 7, 1967, said to the Foreign Relations Committee, "We have consistently continued our *de facto* limitations on the use of chemical and biological weapons." This statement sounds as though it is merely a matter of present policy subject to change.

The question is, do we or do we not consider ourselves bound by the Geneva Protocol, which prohibits first use but does not prevent research, development, or retaliation? Another question that might be asked of the United States is, do we believe that the use of nonlethal gases in order to kill is covered by the Geneva Protocol? As I mentioned, Secretary Rusk said that the anticipation was that these weapons would be used only in riot-control situations. The facts are very different. Another question: The Defense Department stated before the Senate in 1967 that "it is clearly our policy not to initiate the use of lethal chemicals or lethal biologicals." I question why the Defense Department specifies *lethal* biologicals. Does this mean that it is not against our policy to initiate the use of so-called incapacitating germ weapons?

These are hard questions. The United States, of all nations, should be the first to wish that chemical and biological weapons not be legitimized and not come into general possession and use. These questions had better be answered soon. There's a possibility that better and more consistent answers will be forthcoming because a number of things are taking place on the international scene today with regard to chemical and biological weapons. Unfortunately, none of these has occurred at the initiative of the United States. It's a pity; all of these things could have been done by the United States. The General Assembly has asked Secretary General U Thant to prepare a study on chemical and biological weapons for the use of the Eighteen Nation Disarmament Committee at Geneva, and that study is now going on. The United States has a representative on the study, but the proposal did not come from us. The United Kingdom has proposed at the Eighteen Nation Disarmament Committee in Geneva a total ban on biological weap-

ons, including a prohibition against their use even in retaliation, and also a prohibition on their production.

What should the United States be doing in this area? It seems to me that we should be pressing for universal ratification of the Geneva Protocol; it should be resubmitted to the Senate for advice and consent as to its ratification. I think that the United States should clearly state that we do not intend to separate gases according to their types and kinds and that we are willing to refrain from using tear gas and anticrop chemicals in war. We should welcome the British proposal, and we should review our multimillion-dollar-a-year investment in chemical and biological warfare research, development, and procurement to make sure that whatever is done, is done in consonance with what should be the overriding objective, namely, to prevent the legitimization, proliferation, and use of these weapons.

What can scientists like ourselves do about this matter? Possibly a great deal. These are not the weapons upon which the deterrence of war rests. Reasoned argument in this area can have effects. I believe that even a relatively small amount of attention given to these matters by a few citizens can lead thoughtful officials and legislators to look into the matter. I believe that there's a good deal of room for careful study and papers. There is no careful study, of which I'm aware, on the history and legal status of nonlethal chemical and biological weapons in war. There's no careful paper of which I'm aware on the reasons why nonlethal gas warfare is a myth. The subject is interesting to the general public. Newspapers, radio, and television are generally receptive to anybody who wants to present responsible views on this subject. This is an area where scientists can be effective by learning facts and by expressing their views to officials, legislators, and to the public.

G. Alperovitz

The History of Atomic Diplomacy

I'm flattered to be here among scientists because I'm a historian, and historians always feel that somehow scientists have a closer regard for something we call truth than some of my historian friends have. But I'm not sure that's true. Nonetheless, it's good to be here.

I want to talk, though, as a historian, about the work of scientists, and therefore I feel free to comment on their search for truth and their attempt to discover what was really happening. I want to talk about it in perhaps the most dramatic setting of twentieth-century science—the production of the atomic bomb and the use of the atomic bomb. Now as a historian, I'd like to isolate only one aspect of that which is relevant to the discussions we are having tonight; a very narrow question, but I think a very deep one. It's this: if one regards what we take as the evidence of what men did at that time, on the one hand we have brilliant scientific work. Men were dedicated with extreme care to finding out the facts in their laboratories, to developing those facts, to testing out hypotheses, to making choices, to building upon choices, to doing the hard work to achieve the result; and finally, through that very difficult process that some call the scientific method (but we historians call simply the application of intelligence), there was in fact a discovery and a production of nuclear weapons.

What is an interesting fact for the historian is not this scientific event. Rather—and now I want to talk about the great majority of scientists (and I exclude particularly men like Neils Bohr, Leo Szilard, James Frank, Eugene Rabinowitch, and many others) involved in that day-to-day application of intelligence, who at the very same time were not involved in a careful estimation of precisely what the facts were in relation to the application of what they had done. These same men who diligently worked in their laboratories to find out precisely how to make the bomb had no diligence, the great majority of them, in finding out precisely what its use was to be; whether, in fact, it was as necessary as other secretaries of war and defense at that time said it was. These men were not careful when they listened to what were called statements, but in fact were hy-