

THE EFFECTS OF AMERICAN SCIENTIFIC COMMUNITIES AND INDUSTRY ON US  
CHEMICAL & BIOLOGICAL WEAPONS POLICY

by

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF  
THE REQUIREMENTS FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY

in

THE FACULTY OF GRADUATE STUDIES

(Political Science)

THE UNIVERSITY OF BRITISH COLUMBIA

May 2007

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## ABSTRACT

This thesis examines the effects that scientific communities and domestic industry have had on US chemical and biological weapons policy over the last forty years, and in particular their influence in the successful ratification of the Chemical Weapons Convention (CWC) in 1997, and the US rejection of the proposed verification protocol for the Biological Weapons Convention (BWC) in 2001. To explore the interaction of scientific communities, industry and government, scientific and industrial publications from 1965 to 2006 were systematically researched, and interviews were conducted with individuals from academia, industry and government who were directly involved with the formulation of US chemical and biological weapons policy.

This thesis concludes that scientists have at times exerted considerable influence over US chemical weapons policy. Furthermore, concerted efforts in support of chemical disarmament on the part of the US chemical industry made a tremendous contribution towards the success of the CWC. It also concludes that even though the microbiology community had a significant impact on US biological weapons policy in the 1960s, the biotech revolution split the microbiology community into two competing factions, and decreased the influence of scientists who continued to lobby for arms control. Furthermore, this study finds that although the pharmaceutical and biotech industry is frequently blamed for the failure of the BWC verification protocol, in reality it played a minor role in this decision.

Several of this study's findings have implications for International Relations theories that examine how and why arms control regimes emerge, in particular the epistemic communities and Military-Industrial Complex literatures. Consistent with Matthew Evangelista's analysis of the effects of international epistemic communities on Soviet nuclear policy, this study demonstrates that scientists are most influential when they develop personal relationships with high-ranking policymakers, particularly the head of state. Perhaps this study's most original theoretical finding is that although corporations involved with defence are invariably assumed to be motivated solely by their own financial interests, even by non-rationalist theories, these industries can pursue more enlightened ends. Thus, this study opens a door for International Relations scholars to think of defence industry interests as politically interesting.

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## ACKNOWLEDGMENTS

Thanks to the University of British Columbia Faculty of Graduate Studies, Sir Quo-Wei Lee, Emergency Preparedness Canada, and the Simons Centre for Peace and Disarmament Studies for research funding; Smith College Provost Charles Staelin for travel funds; Mlada Bukovansky, Pat Coby, Miki Fabry, and Greg White at Smith College for support and encouragement; Raul Pacheco and Phil Orchard for comments on earlier drafts; university examiners Peter Dauvergne and John Beatty for thoughtful commentary and helpful suggestions for future research; external examiners Trevor Findlay and Douglas Ross for challenging questions and insightful assessments of my work; examination chair Diana Lary for a smooth and congenial defense; supervisory committee members Brian Job and Michael Wallace for moral support and helpful comments on several drafts; Dean pro tem, Graduate Education Ann Rose for repeated intervention on my behalf; research supervisor Richard Price for tolerance and unwavering support of all kinds; and Dennis Winzoski, Judy Winzoski, Amy Taylor, Lissi Inman, Kerry Inman, Colin Green and Bonnie Hsieh for everything.

## DEDICATION

– To E.M. Levin, who would have done something similar, given the opportunity.

## **Chapter 1 - INTRODUCTION**

### **The problem & the research project**

This study begins with an apparent anomaly: that in 1997 an international treaty containing verification procedures to eliminate the threat of chemical weapons use came into force, but in 2001 multilateral efforts to establish a similar verification protocol for the 1972 Biological Weapons Convention (BWC) failed. Why should this have occurred? Biological weapons possess less military utility and yet are more reviled and feared than chemical weapons. It therefore stands to reason that states would be more eager to accept a treaty with an effective verification regime for biological weapons than chemical weapons. Yet, this is not what occurred. This research project will be directed towards resolving this anomaly.

In what direction should we begin for an answer to this puzzle? The success or failure of a major international initiative like a multilateral arms control treaty obviously depends upon a myriad of factors and actors, and a detailed comparative analysis of these to explain variation in these two cases is beyond the scope of this thesis. No one would plausibly contend, however, that the role of the U.S. was not of paramount importance in each case, as it is immediately apparent that the United States played a major role in both the success of the Chemical Weapons Convention (CWC) and the failure of the Biological Weapons Convention's verification protocol. Thus this thesis' more limited but indispensable contribution to understanding the puzzle is to understand the opposite role played by the U.S. in these two major arms control treaties, and specifically to understand the role of actors widely assumed to have played a determinative role in the failure of the BWTC. That the U.S. should play such a pivotal role should come as no surprise: as the most powerful state in the international system, the United States should figure prominently in both sets of negotiations. As a hegemon, the US should be expected to assume some sort of leadership role in international relations, and much of the

responsibility for enforcing both treaties would likely fall on the US. In addition, both the United States and the Soviet Union -- its chief rival for much of the latter half of the 20<sup>th</sup> century -- once had extensive chemical and biological weapons programs, and therefore both would probably have strong opinions on the format of proposed arms control regimes in any negotiations over this matter. In addition, the US has large and profitable chemical and biotech/ pharmaceutical industries that might be affected by the implementation of a verification regime; therefore the US government might be expected to take an active role in the negotiation of these two regimes, so as to protect the interests of domestic industry.

As it turned out, the United States was an ardent supporter of the Chemical Weapons Convention, and adopted a leadership role in many negotiations. But, the same cannot be said for its reaction to the BWC. In the autumn of 2001 the United States withdrew from negotiations to strengthen the Biological Weapons Convention through the addition of a verification protocol.

In statements indicating the American positions on the two treaties, representatives of government agencies provided some justification for its actions. In January of 1997, President Clinton issued this statement:

Early CWC ratification by the United States is extraordinarily important. The security of our soldiers and citizens is at stake, as is the economic well-being of our chemical industry. I urge the Senate to act promptly to ensure that the United States remains at the forefront of international efforts to combat the spread of weapons of mass destruction and the U.S. chemical industry maintains its international competitiveness. I look forward to working with the Senate leadership to get the job done.<sup>1</sup>

Contrast the above quotation with this one from Ambassador Donald Mahley, the State Department's chief negotiator for the BWC. In July of 2001, Ambassador Mahley, indicated the United States' reasons for rejecting the BWC verification protocol:

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<sup>1</sup> "Chemical Weapons Convention Statements by President Clinton," <http://dosfan.lib.uic.edu/acda/factshee/wmd/cw/presiden.htm>, downloaded 25 February 2006.

The draft Protocol will not improve our ability to verify BWC compliance. It will not enhance our confidence in compliance and will do little to deter those countries seeking to develop biological weapons. In our assessment, the draft Protocol would put national security and confidential business information at risk.<sup>2</sup>

It is apparent from both of these statements that concerns about domestic business or industry – and in particular industry concerns for the protection of proprietary information – figured prominently in the United States’ reactions to both the BWC verification protocol and the CWC. The US chemical and pharmaceutical/biotechnology industries certainly had different reactions to the CWC and BWC verification protocol, respectively. The chemical industry’s trade lobby group, the Chemical Manufacturers Association (CMA) stated that it “accepted that such costs [resulting from the loss of secret information] are unavoidable, and ... worked diligently toward a [chemical weapons] treaty since 1978. By doing so [the chemical industry] has proved that it is a responsible global citizen willing to spend vast resources to help solve a major world problem.”<sup>3</sup>

Contrast this reaction with that of the pharmaceutical industry, which in 2001 indicated that it believed that the proposed protocol would put its vaccine research at risk and would “[culminate] in requirements that not only compromise our industry’s ability to research and manufacture but [would] also [establish] mechanisms to expose confidential business information.”<sup>4</sup> Gillian Woollett, a Pharmaceutical Researchers and Manufacturers Association (PhRMA) representative, argued that “to compromise our ability to develop medicines or undermine patients’ confidence in those medicines, without a definable level of confidence in the

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<sup>2</sup> Ambassador Donald Mahley, “Biological Weapons Convention,” (Statement by the United States to the Ad Hoc Group of Biological Weapons Convention States Parties, Geneva, Switzerland, 25 July, 2001).

<sup>3</sup> Will Carpenter, “The Perspective of the Western Chemical Industry,” in Shadows and Substance: The Chemical Weapons Convention, ed. Benoit Morel and Kyle Olsen (Boulder, Colorado: Westview Press, 1993), 115.

<sup>4</sup> Gillian Woollett, “Statement,” (Testimony before the Committee on Government Reform, Subcommittee on National Security, Veterans’ Affairs and International Relation, US House of Representatives, Washington, DC, 5 June 2001).

proposed protocol, would be a tragedy for public health – both in this country and elsewhere amongst the signatory nations.”<sup>5</sup>

The US government certainly assigns much of the credit for the failure of the BWC to industry. On 28 July 2001, Deputy Secretary of Defense Paul Wolfowitz remarked “What is at issue is a 210-page document which I doubt any other head of state has even bothered reading which in the name of making the treaty more enforceable would actually allow Libyan and Iraqi inspectors to start poking around American pharmaceutical companies. It's ill conceived, and that's the problem.”<sup>6</sup> However, does this assignation of blame reflect the Bush Administration's true reasons for rejecting the protocol, or were there other reasons?

This dissertation will explore the role played by US industry in both the negotiations over the CWC and the BWC. It will seek to discern why the chemical industry apparently supported the CWC, while the pharmaceutical/biotech industry did not support the BWC. It will examine how these industries sought to exert influence over the format and establishment of these regimes, and whether or not their influence was a major determinant of US chemical and biological weapons (CBW) policy.

This study will also seek to examine how scientific communities have affected US CBW decisions. Both the chemical and biotech/pharmaceutical industries are affiliated with large communities of scientists: the chemical industry is associated with the chemical sciences, and the biotech/pharmaceutical with microbiologists. It seems plausible that these sciences have had some influence on the role played by industry or the policy decisions made by the US. Previous authors certainly share this assessment. Susan Wright and David Wallace argue that the increasingly close financial relationship between the biotech/pharmaceutical industry and the

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<sup>5</sup> *Ibid.*

<sup>6</sup> Quoted in Graham S. Pearson, “The US rejection of the Protocol at the Eleventh Hour Damages International Security Against Biological Weapons,” *The CBW Conventions Bulletin*, 53 (September 2001): 6.

microbiology field have led this science to be preoccupied with the protection of trade secrets. They suggest that this close relationship may have had a significant effect on US CBW policy.<sup>7</sup>

Therefore this study will also examine the effects that scientific communities have had on US CBW policy. It will attempt to determine how scientific communities regarded the CWC and BWC verification protocol, as well as CBW issues preceding these treaties. As with industry, it will seek to ascertain why these scientific communities supported or opposed these measures, and examine what techniques these communities used to exert their influence. This study will also examine whether differences in the relationships of scientific communities and industry between microbiology and the pharmaceutical and biotechnology industry versus the chemistry and the chemical industry may explain the different outcomes of the two cases. It will also seek to determine whether scientific communities made a significant contribution to the formation of US CBW policy, and under what conditions. The null hypotheses this study will seek to disprove therefore are a) that there is no relationship between the actions of the US chemical and biotech/pharmaceutical industry and US chemical and biological weapons policy – in particular the success of the CWC and the failure of the BWC verification protocol – and b) that there is no relationship between the actions of American scientists and US chemical and biological weapons policy, again in particular the success of the CWC and failure of the BWC verification protocol.

To answer these research questions, this study will perform two case studies: the first being the relationship between science, industry, and US chemical weapons policy; the second being the relationship between science, industry and US biological weapons policy. This study will not limit its examinations to negotiations immediately preceding the signing and ratification of the CWC or the Ad Hoc Group's negotiations over adding a verification protocol to the BWC. These decisions themselves are greatly affected by prior US CBW policy and issues. Without

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<sup>7</sup> Susan Wright and David Wallace, "Varieties of Secrets and Secret Varieties: The Case of Biotechnology," Politics and the Life Sciences, 19, no. 1, (March 2000), 45, 54.

understanding how the Biological Weapons Convention arose, it will be impossible to understand why it failed to have a verification protocol, nor why this would be a major concern. Likewise, it would be difficult to understand US support for a multilateral treaty to prohibit the use of chemical arms without understanding the circumstances surrounding its decision to pursue this goal in the late 1960s. Therefore, instead of limiting the examination of the effects of science and industry on US CBW policy to the periods immediately prior to the success of the CWC and the failure of the BWC verification protocol, this study will begin its examination several decades earlier. In 1969, the Nixon Administration made several important changes to US chemical and biological weapons policy, which set the stage for later negotiations over the CWC and BWC. In order to capture the reasons for these changes – and the role played by science and industry in regards to these decisions -- this dissertation will begin its analysis a few years beforehand: in 1965. In the case of the CWC, this study will end its analysis in 1997, when the treaty was ratified by the US Senate.<sup>8</sup> In the case of the BWC, this study will end its examination at the present day, as discussions of how best to strengthen the biological weapons regime are still ongoing.

It is readily apparent that factors other than the actions of science and industry also had a significant impact on US CBW policy. Political culture, government structures, the international security environment, and who the president was when the treaty was being negotiated all mattered a great deal as to how much impact both industry and scientists have on policy. For example, Bill Clinton and Richard Nixon were quite open to advice from scientists, while Ronald Reagan and George W. Bush seem more sympathetic to the interests of industry. Indeed, having a sympathetic and receptive president is a necessary precondition for either science or industry to have an effect on CBW policy. This study will not engage in a formal comparative

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<sup>8</sup> Though it should be noted that discussions between states regarding holdout states and implementation issues continue

analysis of the relative importance of these variables. But since both of these cases occur within the same state, many of the domestic variables such as political culture or institutions do not change between cases and thus can be held constant. Rather than seeking to formally establish the relative causal weight of all variables relevant to explaining the outcomes – a daunting task to say the least - this dissertation seeks to establish that scientists or industry can have an impact, at times a profoundly important one. This premise will be established empirically and by illuminating in Chapter 2 the contributions and shortcomings of alternative theoretical explanations that point to these and other variables in explaining U.S. policy. The chief purpose of the analysis that follows, then, is simply to explore and highlight the role played by scientists and industry. That is, having shown that scientific communities and industry can matter in helping explain U.S. arms control policy – with no small implications for global arms control – this study principally seeks to further our understanding of just how these actors matter (or not) and what effects they do have. A complete explanation of US CBW policy must acknowledge the role played by these other factors – and indeed it will emerge from this analysis that these other variables have played an extraordinarily important role – but a complete explanation cannot ignore the role played by science and industry either. As will become evident in the case studies, to understand how US CBW policy has developed it is necessary to include the influence of both industry and scientific communities, though these variables are not sufficient to explain CBW policy on their own. To preview the argument that, a complete explanation of these events should not ignore the role played by scientists and industry, the US Senate's obstruction of the ratification of the CWC was ended when the chemical industry argued effectively against Senator Helms' justifications for the delay. And, as will be demonstrated, Nixon's position on the BWC was shaped by the advice given to Henry Kissinger by Harvard microbiologist Mathew Meselson.

## **Significance of the research project**

This study is significant for a number of reasons. First, the project represents the first attempt to explore the interactions between scientific communities, industry and CBW arms control policy over the entire time period examined here. The principal method of collecting data on the activities of scientific communities and industry – which is to extract it from their own publications, thereby using scientific and industrial publications as a source of primary data – represents a novel approach to conducting research in arms control.<sup>9</sup>

Second, this study reveals two instances in which prominent International Relations theories fail to account for the behaviour of actors, even though these cases bear all the characteristics of a situation where these theories ought to apply. For example, the concept of the Military-Industrial Complex cannot explain why the chemical industry would refuse contracts for the production of chemical arms, nor why it would choose to support the CWC. Likewise, the epistemic communities literature cannot explain why a large portion of the microbiology community would choose to lobby for policies more in line with the interests of industry over their assumed goal of international policy coordination. By demonstrating that these concepts do not work in these situations, this study provides a critique of these prominent theoretical approaches and the assumptions about actor motivations on which they rely. It also suggests means to rectify these concepts' failings, by demonstrating that they either require some reformulation or supplementation with theories from other areas of Political Science.

Third, related to the second point, this analysis makes a bridge between the study of how multilateral regimes develop and the formation of US public policy. International Relations scholars – and even those who study 2-level games – don't often fully analyze the extent of

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<sup>9</sup> Given the richness of this source of data, I would recommend it to anyone studying the interactions of government and scientific communities.

effects that negotiations over policy on the domestic level can have on international regimes. Likewise, public policy theorists typically don't analyze how the wrangling over the implementation of domestic regulations that occurs in their studies can have effects on the international stage.

### **Data Collection**

To perform the two case studies it was necessary to collect data on the activities of scientific communities and actors in the pharmaceutical and chemical industries in periods leading up to and during negotiations over major shifts in US policy towards chemical and biological warfare, and in particular negotiations leading to the creation of the CWC, and the failed negotiations over the BWC's verification protocol. Once this data was collected, it was analyzed to see whether and how these actors influenced US CBW policy, paying particular attention to the variables and processes highlighted by the MIC literature, the US public policy literature, and Haas' idea of epistemic communities. It was then discerned whether these actors made a significant difference to US policy. Actor motivations were then determined, and compared with the motivations assumed of them in the MIC and epistemic communities literature.

To gain a better understanding of pivotal moments in the development of US arms control policy, secondary sources such as books<sup>10</sup> and articles analyzing these cases appearing in *International Organization*, the *Nonproliferation Review*, *Arms Control Today*, *The Bulletin of the Atomic Scientists*, *International Security*, and publications from the Federation of American Scientists were examined. Various studies published by the Stockholm International Peace Research Institute (SIPRI) were also useful.

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<sup>10</sup> For example: Jeanne Guillemin, *Biological Weapons: From the Invention of State-Sponsored Programs to Contemporary Bioterrorism*, (New York: Columbia University Press, 2005). This book provides an excellent overview of US policy towards biological weapons.

To obtain the data necessary to trace the activities and evolving mindsets of scientific communities, American scientific publications from the years 1965 to 2005 were examined. While the majority of scientific journals are devoted solely to the publication of the results of new scientific studies, some prominent journals and scientific magazines also publish news items of possible interest to readers, who are usually scientists. Often articles in these news sections will describe new developments in government that might affect readers, or notable activities undertaken by colleagues to influence government. It is from these 'Government and Society'<sup>11</sup> sections that data was collected on the activities of scientists and of their reactions to events related to CBW. Other appropriate sections where the opinions of scientists on these matters were found include the 'Letters to the Editor' sections, and Editorial or Commentary pages.

The first journal examined was *Science*, published by the American Association for the Advancement of Science. *Science* is a weekly periodical that publishes studies from all branches of science.<sup>12</sup> Along with *Nature*, *Science* is one of the world's most respected and widely read scientific publications. *Nature* is, however, a British publication; since this study focuses on the activities of American scientists, *Science* is a much more appropriate source of data. *Science* is also ideally suited to the task at hand because it has been in continuous publication since long before 1965. This makes it possible to trace the evolution of ideas about CBW through the course of one publication. Not all of the journals to be studied have been in continuous publication since 1965; some have been discontinued, and others were started after 1965. However, enough journals were consulted for each case study that any time period was covered by at least two sources. This helped prevent a one-sided view of the issues.

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<sup>11</sup> Or equivalent. Early editions of *Chemistry* call this section 'The Walrus,' in a reference to the poem 'The Walrus and the Carpenter' appearing in Lewis Carroll's *Through the Looking-Glass and What Alice Found There* (1872). "The time has come," the Walrus said, "To talk of many things: Of shoes--and ships--and sealing-wax--Of cabbages--and kings--And why the sea is boiling hot--And whether pigs have wings."

<sup>12</sup> Including political science, very rarely.

Next, a number of science journals from the US chemical sciences specifically were examined. The three chemistry journals chosen were *Chemical & Engineering News (C&EN)*,<sup>13</sup> *Chemistry*<sup>14</sup> and *Chemtech*,<sup>15</sup> which are all published by the American Chemical Society (ACS). The ACS is a professional organization composed of 158,000 current chemistry undergraduate students and individuals with at least a Bachelor's degree in the chemical sciences. It is in fact the world's largest scientific society, and in this study it may be considered something of a proxy for the variable of the 'chemical science community.' These journals are intended to appeal to an audience composed of ACS members, so in addition to publishing accounts of the activities of scientists, they also report on matters related to their employers. In this way, these journals provide us with data on the actions of both the chemical sciences and the chemical industry. As an additional resource for viewpoints and activities of the US chemical industry, the magazine *Chemical Week*, which touts itself as 'The Worldwide News Source for Chemical Makers and Processors,' was consulted.<sup>16</sup> These sources were supplemented with information found on the websites of the CMA and ACS.

To find data on the opinions and actions of the bioscience community, the *Journal of the American Medical Association (JAMA)*, *Politics and the Life Sciences*, *Critical Reviews in Microbiology*, and *Nature Biotechnology* – which are all prominent American publications intended for an audience of life science professionals, graduates and students – were consulted. Even though it is not strictly a bioscience journal, the *Journal of the American Medical Association*<sup>17</sup> was included because medical doctors have a close affiliation with the pharmaceutical industry. This journal has published articles reviewing medical aspects of the

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<sup>13</sup> *Chemical and Engineering News* has been published weekly since 1923.

<sup>14</sup> *Chemistry* was published monthly from 1927 to 1979.

<sup>15</sup> *Chemtech* was published monthly from 1971 to 1999. It became *Chemical Innovation* in 2000 to 2001, when it was discontinued.

<sup>16</sup> "Browse the Chemical Week Archives," *Chemical Week*, <http://www.chemweek.com/inc/browse>, December 2005. *Chemical Week* has been published weekly since 1992.

<sup>17</sup> The American Medical Association has published the *Journal of the American Medical Association* weekly since 1883.

threat of biological warfare. *Critical Reviews in Microbiology* publishes critiques on a variety of topics related to microbiology, and occasionally produces special issues devoted to issues related to biological weapons.<sup>18</sup> *Nature Biotechnology* is a very prominent journal in the field of microbiology and applied biotechnology.<sup>19</sup> As its name suggests, *Politics and the Life Sciences* is an interdisciplinary journal that focuses on issues at the nexus between political science and biology, such as biological weapons and arms control.<sup>20</sup> *BioPharm* is a monthly journal for the biopharmaceutical industry.<sup>21</sup>

The American Society for Microbiology (ASM) is a professional organization composed of 37,000 scientists with a minimum of a Bachelor's degree or equivalent work experience in microbiology. Like the ACS, it may be considered a proxy for the variable 'the bioscience community' in this study.<sup>22</sup> Data pertaining to the activities of this organization were obtained from its website. As with the chemical science journals, these publications sometimes publish articles about the pharmaceutical and biotech industries. Data on industry activities will be supplemented with publications from the Pharmaceutical Research and Manufacturers of America (PhRMA) and information from its website. Interviews with individuals in the State

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<sup>18</sup> According to its website, "*Critical Reviews in Microbiology* publishes reviews in all areas of microbiology.... The reviews describe the current status of a field, placing the various contributions to that field in perspective.... The reviews permit the authors latitude to express their own views of the field, the historical development of that field, its current status, and the future directions of that field." "A Taylor & Francis Journal: *Critical Reviews in Microbiology*," *Critical Reviews in Microbiology*, <http://www.tandf.co.uk/journals/titles/1040841x.asp>, December 2005. *Critical Reviews in Microbiology* has been published monthly since 1971

<sup>19</sup> According to *Nature Biotechnology's* website, "The 2004 impact factor for *Nature Biotechnology* is 22.4, according to the ISI Journal Citation Reports. *Nature Biotechnology* therefore ranks first out of 132 journals in the category of biotechnology and applied microbiology and is among the top 20 scientific journals in the world." "About the Journal," *Nature Biotechnology*, <http://www.nature.com/nbt/about/index.html>, December 2005. *Nature Biotechnology* has been published monthly since 1996. Between 1983 and 1996, it was called *Bio/Technology*

<sup>20</sup> According to the *Politics and the Life Science's* website, this journal's "topic range is exceptionally broad. Recent issues have addressed chemical and biological terrorism, the evolution of group formation and ritualistic deception, the neuroscience of intolerance and violence, the genetics controversy in criminology, women's rights and the evolutionary sciences, [etc.].... Typical contributors include political scientists, life scientists, bioethicists, clinicians, health-policy scholars, physical anthropologists, moral and evolutionary philosophers, international security experts, jurists, and ecological economists." "Welcome to PLS," *Politics and the Life Sciences*, <http://www.politicsandthelifesciences.org/>, December 2005. *Politics and the Life Sciences* has been published semi-annually since 1982.

<sup>21</sup> *BioPharm* publishes news on the "Science & Business of BioPharmaceuticals." It has been published monthly since 1987. "Home," *BioPharm International*, < <http://www.biopharminternational.com/biopharm/>>, 3 December 2005.

<sup>22</sup> "Join ASM," *American Society for Microbiology*, <http://www.asm.org/joinrenew/index.asp>, December 2005. 12

Department, the chemical and biological sciences, chemical and biotech/pharmaceutical industry lobby groups, and arms control NGOs – all of whom were directly involved these arms control initiatives and their eventual success or failure – were used to confirm that preliminary interpretations of events were correct, and to ascertain whether policymakers made the choices they did for the reasons suggested.

### **Outline & major arguments**

This thesis is organized as follows: Chapter 2 provides a theoretical overview. It goes through the many theories, concepts, models and literatures that consider how and why arms control policy emerges, in order to determine whether any of these can offer an adequate explanation for the outcomes of these two cases or the effects of scientific communities and industry. Realism, neo-realism, neo-liberal institutionalism, Robert Putnam and Helen Milner's ideas about 2-level games, the Military-Industrial Complex literature, US public policy, sociological institutionalism, and Peter Haas' concept of the epistemic community are all reviewed. This analysis will employ Peter Katzenstein's analytical eclecticism strategy, demonstrating that each of these theories can make an important contribution to our understanding of how industry or scientific influence contributed to US CBW policies, and how these policies led to the success of the CWC and the failure of the BWC verification protocol. In particular the ideas of the Military-Industrial Complex, some concepts imported from the US public policy and epistemic community literatures seem especially appropriate for explaining the role played by industry and scientific communities.

Chapter 3 contains the first case study: that of the effects of the scientific communities and chemical industry on US chemical weapons (CW) policy between 1965 and 1997, when the CWC was ratified by the Senate. This chapter begins with an examination of the interaction of scientific communities and US CW policy. It reveals that through the late 1960s and 1970s,

scientists effected significant changes to US CW policy on a number of occasions. They continued to make influential contributions to US CW policy until the mid-1980s, when their influence appears to have declined quite suddenly over the issue of the modernization of US stockpiles with the purchase of binary chemical weapons. The data suggest a number of plausible explanations for this decline, including the possibility that it has been due to a 'hardening' of ideas about chemical weapons. Though scientists were instrumental at creating new understandings of CW issues in the 1960s, by the 1980s these ideas had been in place for so long they were very resistant to change.

Chapter 3 also examines how the chemical industry affected US CW policy. Though the US chemical industry was firmly ensconced in the Military-Industrial Complex in the 1960s – with huge contracts for the production of chemical agents for the US Army – in the 1980s this changed, again over the issue of binary modernization. Though the Reagan and later the George Bush Sr. administrations pushed hard for binary weapons, the US chemical industry adamantly refused to accept contracts for the production of precursor chemicals. In later years the US chemical industry made a substantial contribution to negotiations over the CWC as well. These actions are remarkable for any industry, but particularly for one that was once a key component of the Military-Industrial Complex. Chapter 3 seeks to understand why the American chemical industry would behave in this manner. This chapter ends by answering some of the theoretical questions posed in Chapter 2. A number of interesting preliminary conclusions are offered in this section, including the suggestion that the effectiveness of science advice is very much dependent on the personal relationships between scientists and the president or influential policymakers. This section also concludes that the scientific community observed in this case study fulfills the requirements necessary to be considered an epistemic community, albeit a national and not a transnational one that is usually the focus of the epistemic community literature in international

relations.

Chapter 4 presents the second case study, that of the effects of scientists and the biotech/pharmaceutical industry on US biological weapons (BW) policy between 1965 and the present day. This case study demonstrates that though the biosciences once made significant positive contributions to arms control policy in the 1960s and early 1970s, this appears to have changed in 1972 with the discovery of recombinant DNA technology, also known as the biotech revolution. Since that time, a major portion of the US microbiology community has pursued priorities more in line with their long-standing preference for self-regulation or the interests of their employers in industry than the goal of improved arms control.

Chapter 4 also explores how the biotech and pharmaceutical industry affected US BW policy. Though the biotech and pharmaceutical industry participated in negotiations over the formulation of draft proposals for the BWC verification protocol, their input consisted mainly of demands that the US include provisions to protect trade secrets in its proposals, many of which served to weaken the protocol, and render it less capable of catching violators of the Biological Weapons Convention. Nevertheless, the US included these demands in its proposals, and in turn the other negotiating parties allowed these demands to be included in the draft protocol, in hopes that doing so would convince the US to acquiesce to it. However, precisely the opposite actually occurred: in 2000 representatives of the State Department began expressing their personal concerns that the protocol was too weak to catch violators. In 2001, they convinced the new president to conduct a review of US BWC policy, which the protocol predictably failed, though only in part due to the influence of the biotech and pharmaceutical industry. Chapter 4 seeks to explain what motivated the biotech and pharmaceutical industry to behave this way, and why the US apparently submitted to its demands. This chapter concludes by answering more of the theoretical questions posed in Chapter 2. This section demonstrates that the divisions produced

by the biotech revolution and subsequent commercialization split the microbiology community into two epistemic communities pursuing two contradictory normative goals. This chapter also highlights the difficulties associated with creating an effective verification protocol for the BWC.

Chapter 5 offers a direct comparison of the actions of scientists and industry in both cases, and reviews the study's other major conclusions. This chapter concludes with suggestions for future research.

## Chapter 2 – THEORETICAL REVIEW

The purpose of this chapter will be to find appropriate theoretical approaches to help solve the problem put forward in the preceding chapter. This task requires the evaluation of a number of prominent theoretical approaches, models, literary traditions and concepts to see how they would attempt to explain the successful creation of the CWC and the failed efforts to establish a verification regime for the BWC. The matters to be examined will include the theories of realism,<sup>23</sup> sociological institutionalism and neo-liberal institutionalism, Robert Putnam's and Helen Milner's 2-level games models, the literary tradition of the Military-Industrial Complex (MIC), Peter Haas' concept of epistemic communities, and the US public policy literature. Many of these theories, models, literary traditions and concepts have been applied to successful or failed attempts at controlling arms, and each points to different variables and processes to explain these outcomes.

Thus rather than attempting to demonstrate the superiority of one theoretical approach over another, this study will seek to employ a variety of theories, concepts and so on in order to solve the empirical puzzle of how scientific communities and industry affected American chemical and biological weapons policy. In this way, this study will apply Peter Katzenstein's strategy of analytical eclecticism. Katzenstein argues that

Extolling, in the abstract, the virtues of a specific analytical perspective to the exclusion of others is intellectually less important than making sense of empirical anomalies and stripping notions of what is 'natural' of their intuitive plausibility. [Katzenstein] argues against the privileging of parsimony that has become the hallmark of paradigmatic debates. The complex links between power, interest, and norms defy analytical capture by any one paradigm. They are made more intelligible by drawing selectively on different paradigms – that is, by analytical eclecticism, not parsimony.<sup>24</sup>

Each theory, model, literary tradition or concept will be reviewed, and its strengths and weaknesses examined in regards to its ability to explain various aspects of the chosen cases. It

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<sup>23</sup> Both neo- and classical variants

<sup>24</sup> Peter J. Katzenstein & Nobuo Okawara, "Japan, Asian-Pacific Security, and the Case for Analytical Eclecticism," *International Security*, 26, no. 3 (2002): 154.

will emerge that each suggests intriguing questions that merit consideration in the case studies. These research questions will be rendered in bold lettering, so that they may be easily recognized. It will be demonstrated that very few concepts, models or theories in International Relations are able on their own to completely account for the different outcomes of these two closely-related examples of arms control negotiations. Thus, several of the explanations offered by the above theories may be refuted before the case studies are even begun.

Nevertheless, it will be revealed that two concepts or traditions in particular can offer insightful looks into the two cases, as they assign much importance to the role played by industry and scientific communities. These are the literary tradition of the Military-Industrial Complex, and Haas' concept of the epistemic community. It is these concepts that will offer the lion's share of the questions to be answered in succeeding chapters, and conversely, it is upon these concepts and literary traditions that this study will have the greatest impact. For although the Military Industrial Complex and the concept of the epistemic community offer illuminating explanations for these events, they do not fit perfectly with them, and must, in these cases, be augmented with ideas from outside the study of International Relations. This does not mean that the MIC and epistemic communities have no utility, but rather that these two cases demonstrate a need for these concepts to be supplemented with ideas originating in the study of US public policy. In offering such a modification, this dissertation will have an impact not only on the study of arms control, but also on our understanding of how the Military-Industrial Complex and epistemic communities operate.

### **Realism & Neorealism**

Power-based theories like classical realism or its later variant neo-realism focus on the role of human nature or the anarchical structure of the international system in determining the

behaviour of states. They tell us that states seek to maximize their own power and security relative to that possessed by other states, that power is determined by the material factors at a state's disposal, and that state actions in pursuit of power must be rationally and unilaterally determined.

Classical realism is pessimistic regarding the chances of success for arms control or disarmament. Hans Morgenthau tells us that while it is true that states usually adhere to international law, without enforcement it will occasionally fail. And when international law fails it does so in a spectacular fashion, possibly culminating in the termination of a state's independent existence.<sup>25</sup> It is entirely possible, Morgenthau implies, for states to create international treaties preventing the use of entire classes of weapons, but without enforcement, states cannot be certain that their fellows will adhere to these treaties. Thus, it would be foolish for states to place trust in such treaties by removing weapons from their arsenals. In this way, disarmament treaties are doomed to fail.

According to realist scholars, true disarmament, which is to say the reduction of numbers or elimination of a class of weapons, is achieved only under extraordinary circumstances. For example, Morgenthau argues that "a mutually satisfactory settlement of the power contest is a precondition for disarmament. Once the nations concerned have agreed upon a mutually satisfactory distribution of power among themselves, they can then afford to reduce and limit their armaments."<sup>26</sup> In other words, disarmament is only possible when all concerned states are satisfied with their current position in the international balance of power, and are confident that other states are equally content. Given realism's emphasis on the constant struggle for the maintenance of relative power, and the stress it imparts to the idea that states can never fully trust each other's intentions, the implication is that disarmament is almost never possible.

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<sup>25</sup> Hans J. Morgenthau, Politics Among Nations: The Struggle for Power and Peace, Fifth Edition (New York: Alfred S. Knopf, 1973), 397.

<sup>26</sup> Morgenthau, 401.

Disarmament treaties are especially meaningless in the event of war, when “victory is the paramount concern of ... nations. [Warring states] may observe certain rules of conduct with regard to the victims of warfare; they will not forego the use of all the weapons their technology is able to produce.”<sup>27</sup> Military expediency, not idealistic loyalty to international law, is a state’s sole consideration when deciding whether to employ even the most reprehensible weapons. Because they cannot count on their enemies to similarly constrain themselves in wartime, states would be fatally unwise to forego an entire class of weapons for any reason.

Even if possible, Morgenthau argues, disarmament will not necessarily lead to a more peaceful world. Classical realists believe the impetus for war lies in man’s flawed human nature, not in the existence of particularly dishonourable forms of weapons.

Men do not fight because they have arms. They have arms because they deem it necessary to fight. Take away their arms, and they will either fight with their bare fists or get themselves new arms with which to fight. What makes for war are the conditions in the minds of men which make war appear the lesser of two evils.... So long as men seek to dominate each other and to take away each other’s possessions, and so long as they fear and hate each other, they will try to satisfy their desires and to put their emotions to rest.... In a system of sovereign states ... the satisfaction of those desires and the release of those emotions will be sought by all the means the technology of the moment provides.... These means may be, in different periods of history, arrows and swords, guns and bombs, gas and guided missiles, bacteria and nuclear weapons.<sup>28</sup>

Realism also questions the motivation behind apparent efforts at disarmament. Referring to the example of Britain’s attempts to ban submarines at the 1932 World Disarmament Conference, Morgenthau contends that states will attempt to prohibit those weapons in which an enemy state has a particular strength, while legally retaining weapons in which they themselves possess a relative strength. Thus, according to Morgenthau,

The British proposals really amounted to an attempt to make the *status quo* secure from attack by outlawing the weapons most likely to be used for

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<sup>27</sup> Morgenthau, 400.

<sup>28</sup> Morgenthau, 398. Disarmament advocates will counter this assertion by arguing that a war fought with fists will cause infinitely less damage than one fought with guns and bombs, to say nothing of nuclear weapons.

overthrowing it... [for] the weapons Great Britain deemed to be aggressive happened to be identical with those upon which the anti-status quo nations placed their main reliance for achieving their political ends.<sup>29</sup>

The upshot of this argument is that states should be wary of disarmament and arms control proposals that emerge from other states, as they are likely to advance the other's interests at the expense of one's own.

The implication of realism's disdain for disarmament is that states should only pursue this goal when a disarmament treaty would give it an advantage over rival states. However, states shouldn't place their trust in the capacity of arms control and disarmament agreements to prevent other states from using these weapons. The implication for our cases is that arms control and disarmament negotiations are doomed to failure, and when they do states who placed their trust in them will suffer greatly.<sup>30</sup>

Neo-realism is similarly pessimistic regarding arms control's prospects in an anarchic system, wherein states are never completely secure. "[The] hope that, in the absence of an agent to manage or to manipulate conflicting parties, the use of force will always be avoided cannot be realistically entertained. Among men as among states, anarchy, or the absence of government, is associated with the occurrence of violence."<sup>31</sup> In a self-help system, such as the international system of states, all actors must therefore be willing and able to resort to the use of force when necessary to protect themselves.<sup>32</sup>

This permanent state of insecurity prevents states from cooperating to achieve common goods such as arms control or disarmament.<sup>33</sup> Neo-realism often employs game theory, and in particular the Prisoner's Dilemma or coordination game, to illustrate the difficulties of cooperation between two actors who cannot be assured of the other's intention in a system in

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<sup>29</sup> Morgenthau, 399.

<sup>30</sup> More precisely, Morgenthau implies that it is entirely possible for states to create international treaties preventing the use of entire classes of weapons, but have no motivation to adhere to these treaties if they are not enforced.

<sup>31</sup> Kenneth N. Waltz, Theory of International Politics, (New York: Random House, 1979), 102.

<sup>32</sup> Waltz, 91, 102.

<sup>33</sup> Waltz, 196.

which no mechanisms exist to enforce agreements between actors. The prisoner's dilemma game demonstrates that even though states can have significant incentives to cooperate, they will choose not to do so if cooperation can lead to relatively greater gains for other states, because other states might ultimately use this advantage to the detriment of other states. States can never be certain of each other's future intentions or actions,<sup>34</sup> therefore they must realize that any gain another state makes may be used against them in a future conflict. Thus, states must be more concerned with their power in relation to other states, than with any absolute gains in power. "When faced with the possibility of cooperating for mutual gain, states that feel insecure must ask how the gain will be divided. They are compelled to ask not 'Will both of us gain?' but 'Who will gain more?'" In regards to disarmament and arms control specifically, Waltz warns states that "[it] is not advisable to disarm in relation to one's rivals [because] the potentiality of renewed warfare always exists."<sup>35</sup> Even if all states would benefit from the creation of an effective regime to prevent the use and stockpiling of chemical or biological weapons, such a thing may not be possible in a system where each actor must be first concerned with its own survival.

Like realism, neo-realism's emphasis on the lack of trust in an anarchic system portends a sad fate for disarmament and arms control. Concerns for relative gains prevent states from entering into mutually beneficial agreements, unless they are certain they will gain more than their fellows. This would make it incredibly unlikely for states with a lot to lose, for instance those with large chemical or biological weapons capabilities, to agree to disarm completely.

On the other hand, neo-realism also tells us that the responsibility for the maintenance of order in the international system lies with the most powerful state, or hegemon, which is at the same time the state with the greatest capacity to regulate international affairs, and the greatest

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<sup>34</sup> Waltz, 105.

<sup>35</sup> Waltz, quoting William Fellner, 106.

interest in maintaining the status quo.<sup>36</sup> When Waltz wrote his book in 1979, he considered the United States to be the hegemon, based on its economic and military prowess. Since that time, with the fall of the Soviet empire, the US has only consolidated its position. It is interesting to note that even though the possession of nuclear weapons is a defining characteristic of major powers, Waltz considered slowing the proliferation of weapons of mass destruction to be the responsibility of the hegemon. Thus, even hardcore neo-realists, not known for their advocacy of moral crusades, believe that the United States has an obligation, if only in order to safeguard the status quo, to pursue non-proliferation, or at the very least managed proliferation.<sup>37</sup>

At first glance, realism and neo-realism seem to offer solid explanations for many aspects of our chosen cases. For example, arms control negotiations over these treaties have been fragile and delayed by mutual suspicions of the other's intentions and commitment to the goal of controlling chemical and biological weapons. During the Cold War, both the US and the USSR accused each other of using prohibited weapons in wars in Southeast Asia.<sup>38</sup> During negotiations over the CWC, the US argued that the Soviet Union was not committed to arms control since it refused to agree to the US' proposed 'anytime, anywhere' verification regime. In return, the USSR argued that by creating such an intrusive regime to which no state party could reasonably assent, the US was itself attempting to sabotage chemical arms control.<sup>39</sup> Indeed, realist suspicions about other states' intentions and relative capabilities figure so strongly in the minds of policymakers that much of the negotiating processes for these arms control regimes have focused on allaying these suspicions through the creation of confidence-building measures designed to limit concerns and reduce the incentive for suspicious states to continue producing their own weapons.

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<sup>36</sup> Waltz, 207.

<sup>37</sup> Waltz, 210.

<sup>38</sup> The USSR accused the US of using biological weapons during the Korean War, the US accused the USSR of using a trichothecene mycotoxin against indigenous peoples in Laos and Afghanistan.

<sup>39</sup> Of course, when Gorbachev came to power, he agreed to the proposed verification measures, by some accounts to the consternation of US negotiators.

In addition, concerns for relative gains appear to have figured prominently in periods leading up to disarmament negotiations. For example, prior to bilateral negotiations over chemical disarmament between the Soviet Union and United States in the early 1990s, the US undertook the revitalization of its chemical weapons arsenal with the development of a new type of 'binary weapon.'<sup>40</sup> The US had no plans to use these weapons, and only planned to stockpile them so as to improve their negotiating position relative to the USSR.

Further, in common with the world posited by realism, policymakers in the United States consider arms control treaties to be of limited real use in catching cheaters and preventing proliferation. Indeed, when asked what sort of verification regime would be effective enough at catching biological weapons producers for the US to support the protocol, an official at the US State Department replied, "None. I don't think it's possible to create a verification regime that's effective enough to meet our concerns."<sup>41</sup> The same official indicated that this insurmountable ineffectiveness was the major reason behind the US decision to discontinue negotiations over strengthening the BWC.

In accordance with realism's argument that hegemons bear a special responsibility for stemming proliferation, the United States has figured prominently in negotiations over both the BWC and CWC. In both the late 1960s and early 1990s, the US provided the major impetus for new conventions banning the use of biological and chemical weapons respectively. Similarly, both foreign and domestic arms control advocates concentrate their lobbying efforts in Washington, DC because US support is seen as key to the success of arms control regimes.<sup>42</sup> Indeed, since the US decided to walk out on negotiations over the addition of a verification regime to the BWC, virtually all international efforts in pursuit of this goal have been discontinued. With the hegemon's support to rally allies and provide incentives to the undecided,

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<sup>40</sup> See Chapter 3 for an in depth discussion of these events.

<sup>41</sup> Representative of US State Department, interview with author, 17 November 2005.

<sup>42</sup> Alan Pearson, interview with author, 19 October 2005.

arms control negotiations proceed rapidly; without the hegemon's support other states parties and begin to doubt whether a new regime can function without the leadership and participation of the state with the most resources to devote to the implementation of the regime and the most facilities to inspect.<sup>43</sup>

Many aspects of US behaviour regarding arms control – particularly its rejection of the BWC's verification regime – seem to follow the world described by realist and neorealist scholars like Morgenthau and Waltz. It is uncertain, however, whether this is more due to a tendency of US policymakers to view the world through a crude realist lens,<sup>44</sup> than the ability of the forces identified in realism and neorealism to determine the course of global politics. A realist would certainly seek to explain the outcomes of the two treaties by arguing that signing and ratifying the CWC was in the national interests of the US, while agreeing to the BWC verification protocol was not. However, realism is unable to offer a complete explanation for why one treaty promotes American national interests while the other does not. A realist may attempt to account for these different policies by arguing that the US perceived biological weapons to have greater future military utility than chemical weapons, and was therefore willing to join a multilateral agreement that sacrificed its CW arsenal while retaining the capacity to use biological weapons. However, it is consistently argued that chemical weapons possess much greater military utility than biological weapons,<sup>45</sup> because the effects of a biological weapons attack are unpredictable and uncontrollable. Moreover, biological weapons attacks would usually have delayed effects, which further reduces their utility on the battlefield.<sup>46</sup> Finally any realist

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<sup>43</sup> A notable exception to this rule is the International Campaign to Ban Landmines

<sup>44</sup> Emphasizing the supremacy of military force and distrust of international organizations, but ignoring realism's warnings against global crusading.

<sup>45</sup> See for example, Jeanne Guillemin, Biological Weapons: From the Invention of State-Sponsored Programs to Contemporary Bioterrorism, (New York: Columbia University Press, 2005) 7; Andrew Hamilton, "CBW: Nixon Initiative on Treaty Anticipates Congressional Critics," Science, 169 (5 December 1969): 1249-1250; Brad Roberts, "Jonathan B. Tucker, Brad Roberts & Elisa Harris, "Chemical and Biological Weapons," in Repairing the Regime: Preventing the Spread of Weapons of Mass Destruction, edited by Joseph Cirincione, (New York: Routledge, 2000), 226-227.

<sup>46</sup> Richard M. Price, The Chemical Weapons Taboo, (Ithaca: Cornell University Press, 1997).

theory worthy of the name would predict that a state would not join any treaty that could compromise its future capabilities in any meaningful way, regardless of arguments about relative utility of weapons systems.<sup>47</sup>

### **Neo-liberal Institutionalism**

Just as realism is the theoretical lens through which US policymakers tend to examine world politics, neo-liberal institutionalism is the lens through which many arms control advocates seem to view the same issues. Arms control advocates are convinced of the capacity of international institutions to mitigate the mistrust engendered by the anarchic system and thereby correct the 'market imperfections' that prevent actors from achieving mutually beneficial goals. They endeavour to create treaties that facilitate transparency, and are frustrated when states rebuff their plans for effective regimes.

Neo-liberal institutionalism shares many of neo-realism's assumptions – for example, it treats states as rational, self-interested, and unitary, and the international system as anarchic – but downplays neo-realism's emphasis on state concerns for relative gains.<sup>48</sup> While it still portrays states as interested solely in the promotion of their own well-being, neo-liberal institutionalism regards states as motivated by the pursuit of absolute gains, and not so concerned about the relative position occupied by other states. If states are amenable to situations in which everyone profits equally, cooperation for the collective good becomes possible, with the help of international institutions to alleviate concerns about cheating.

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<sup>47</sup> The relative utility of chemical weapons is said to be a major reason for Richard Nixon's decision to discontinue the US' offensive BW program in 1969 and announcing his support for a worldwide BW ban. By eliminating BW, Nixon was able to placate anti-WMD and anti-war protesters, while continuing to use chemical weapons such as napalm and tear gas in Southeast Asia. Nevertheless, why the US would later excise these weapons from their arsenal and submit former weapons facilities to an intrusive verification regime, when they would not accept a similar regime for BW, which continues to possess little military utility, is a question that realism cannot answer.

<sup>48</sup> Robert O. Keohane, *After Hegemony: Cooperation and Discord in the World Political Economy*, (Princeton: Princeton University Press, 1984,) 14.

The creation of the Chemical Weapons Convention seems to have followed a neo-liberal logic. Prior to the CWC's establishment, the international community had repeatedly condemned the use of chemical weapons as contrary to existing international law; thus, eliminating this class of weapons could be considered a collective good. Even though the community of states considered the use of chemical weapons to be reprehensible, states continued to stockpile and occasionally use them. The Chemical Weapons Convention sought to assuage member states' fears about each other's commitment to disarmament through a complex system of declarations about current chemical stockpiles, mandatory inspections of CW production facilities, dispute settlement mechanisms, and enforcement procedures. Although the process of destroying stocks of defunct chemical weapons has progressed more slowly than anticipated,<sup>49</sup> the CWC has been largely effective at alleviating fears about cheating and bringing about chemical disarmament.

Given the example set by the CWC, it is all the more surprising that states party to the BWC have not been able to create a verification regime that is equally capable of reducing fears about compliance. The world suffers from the BWC's lack of a verification regime. Without a verification regime, the BWC was not able to detect the Soviet Union's offensive Biopreparat program, which reportedly employed up to 70,000 people, and was apparently implemented out of unsubstantiated fears that the US continued its offensive BW program long after Nixon renounced offensive biological weapons programs in 1969.<sup>50</sup> Given this spectacular failure, it is not surprising that the United States has recently developed a massive biodefense program, which itself causes other states to worry about the US' commitment to disarmament. This is a situation that cries out for a protocol to assuage state fears about each other's adherence to the BWC. Neo-liberal institutionalism is at a loss to explain why such a thing hasn't yet emerged.

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<sup>49</sup> Lois R. Ember, "Destroying Weapons: Army's Problem-Plagues Program Turns Out to be More Costly Than Originally Planned," *Chemical & Engineering News*, 81, no. 35 (1 September 2003), 26.

<sup>50</sup> Of course this fear could have been lessened if the BWC had a verification regime that could have demonstrated to the USSR that the US was earnest in its desire to excise BW from its arsenal.

Neo-liberal institutionalism considers at length how and why international institutions emerge. It tends to explain the establishment of institutions in a post-hoc fashion: The more effective at producing positive results a regime would be, the more likely it is for states to cooperate in creating it.<sup>51</sup> Using effects to explain causes in this manner is problematic because it assumes that states are capable of accurately anticipating the collective effects of their individual behaviours, but the point remains that “[institutions] exist because they could have reasonably been expected to increase the welfare of their creators.”<sup>52</sup>

Perhaps therefore, neo-liberal institutionalism would account for the non-existence of a verification regime for the BWC by showing that its potential creators correctly predicted that such a thing would be ineffective at eliminating concerns about cheaters. Representatives of the US State Department certainly share this idea. Researching and producing biological weapons require equipment and processes that are identical to those found in perfectly legitimate enterprises such as breweries or vaccine production facilities. This makes it incredibly difficult for inspectors to not mistake one for the other. At the same time, miniscule amounts of weapons-grade pathogens are all that is required to use these dual-capable facilities to make tons of biological weapons in a matter of weeks. Finding these samples in a research or production facility – to say nothing of discerning them from identical samples used to test vaccines – would be like trying to find a needle in a haystack. Contrast this situation with chemical weapons production, which requires the mixing of relatively large amounts of a discreet number of easily recognizable precursor chemicals. If inspectors are able to track the movement of these chemicals, they should have no problem verifying chemical weapons use or non-use. Perhaps this is why the CWC exists, but a verification regime for the BWC does not: one is effective at finding weapons production facilities, and the other cannot be.

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<sup>51</sup> Keohane, 82.

<sup>52</sup> Keohane, 80.

As we will see in later chapters, the ineffectiveness of the BWC's verification regime is a major reason for the US decision to abandon negotiations. However, this problem is not entirely reducible to neo-liberal concerns for effectiveness. **After all, if the US was concerned about the verification regime's effectiveness, why would it discontinue the entire negotiation process instead of inviting BWC member states to come up with a more effective solution? In terms of the pursuit of biological disarmament, how 'effective' was it to discontinue the entire process of cooperating to improve a regime that is known to be flawed? And why didn't other states express similar concerns for effectiveness?** Finally, we must also consider **precisely how it came about that the proposed verification regime reached such a state of apparent ineffectiveness.** Hopefully, satisfactory answers to these questions will emerge from our case studies.

Like neorealism, neo-liberal institutionalism often relies on game theory to explain the emergence or failure of international institutions.<sup>53</sup> By demonstrating how fears that other actors will cheat can prevent individuals from cooperating to achieve mutually beneficial goals, neoliberal institutionalism uses game theory to show us how having institutions in place to facilitate trust and communication allows actors to avoid inefficient outcomes. In these games, actors, their interests, and structures defining the range of possible actions are all determined beforehand. If any of these elements are changed, different outcomes will ensue. Neo-liberal institutionalism classifies international efforts at cooperation into four major types of games: these being assurance (or Stag Hunt), coordination (Prisoner's Dilemma), collaboration, and suasion (Rambo). The latter two types of games -- in which an incentive to cheat persists even after both sides have begun to cooperate, or in which actors disagree how or even whether to cooperate -- are the most difficult to overcome. However, neoliberal institutionalism argues that

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<sup>53</sup> See for example: Nancy W. Gallagher, The Politics of Verification, (Baltimore: Johns Hopkins University Press, 1999)

with the help of an institution to facilitate communication and transparency, it is possible for states to achieve mutually beneficial goals in assurance games, in which both sides would benefit most from cooperation but fear that the other has a secret or irrational incentive to cheat.<sup>54</sup>

Coordination games, in which both sides may gain from cooperation, but individual incentives to cheat on the other remain, are second easiest, with assistance from institutions to coordinate cooperation efforts and prevent cheating.<sup>55</sup>

The issue areas on which this study focuses are akin to coordination and assurance games. The actors involved would benefit greatly from cooperation to eliminate the global threat of chemical or biological weapons through mutual disarmament. If biological weapons possess limited military utility, incentives to cheat on agreements to achieve this end by retaining a BW capability are minimal, though states retain doubts that their partners see the game in the same way. According to this pattern of incentives, negotiations over biological weapons disarmament are an assurance game, which ought to be the easiest sort of game to beat with the help of international institutions to facilitate transparency and communication. A verification regime for the BWC would seem to be an effective instrument for producing mutual transparency, which would allow negotiating parties to assure themselves that other states are not maintaining a BW capability, and thereby achieve the common good of mutual biological disarmament.

Chemical weapons are a bit different, in that they possess some military utility, and therefore states might have an incentive to cheat on a chemical weapons treaty by retaining a

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<sup>54</sup> Robert Axelrod argues that iterated games can also promote cooperation. He writes that "what makes it possible for cooperation to emerge is the fact that players might meet again. This possibility means that the choices made today not only determine the outcome of this move, but can also influence the later choices of the players. The future can therefore cast a shadow back upon the present and thereby affect the current strategic situation." Furthermore, players may often engage in a reciprocal 'tit for tat' strategy in iterated games, responding in kind to the other player's cooperative or uncooperative behaviour. If we treat negotiations over the Chemical Weapons Convention and Biological Weapons Convention as two iterations of the same game, what we should expect is that - following the successful cooperative outcome of the CWC, from which participating states parties likely benefited and to which most states have adhered -- the United States would reciprocate by again choosing to cooperate and assent to the BWC verification protocol. That it chose not to cooperate at the second iteration is an interesting puzzle. Robert Axelrod, *The Evolution of Cooperation*, (New York: Basic Books, 1984), 14-20.

<sup>55</sup> Andreas Hasenclever, Peter Mayer, and Volker Rittberger, *Theories of International Regimes*, (Cambridge: Cambridge University Press, 1997), 49-54.

CW capability.<sup>56</sup> This dual incentive to both create a chemical disarmament agreement and to cheat on it assigns negotiations over chemical disarmament to the classification of Prisoner's Dilemma or coordination game. Neo-liberal institutionalism tells us that this sort of game is almost as easy to beat as assurance games, provided an international institution, such as the CWC, exists to assure all parties that everyone is adhering to the disarmament treaty.

The implication of the above discussion on game theory is that if we agree that biological weapons possess lesser military utility than chemical weapons, and that therefore there is less incentive to cheat on a biological disarmament regime than a chemical disarmament regime, then according to game theory logic, the creation of an effective verification regime for the BWC should have been easier than the establishment of a CW regime possessing similar elements. Instead the opposite occurred, and it is difficult for neo-liberal institutionalists to explain why.

Neo-liberal institutionalism predicts that states will be able to cooperate to achieve collective goods under anarchy, provided fears about double-crossing can be mitigated. Institutions will emerge to facilitate this cooperation in situations where they would be most effective, and/or in situations in which states have a significant incentive to cooperate and some or preferably no incentive to cheat. Precisely the above seems to have occurred in the case of negotiations over the CWC.

However, neo-liberal institutionalism has trouble accounting for the failure of negotiations over the BWC's proposed verification regime. As above, such a regime could be incredibly useful in reducing fears of cheating, and as a result universal biological disarmament. If this situation may be accurately classified as an assurance or coordination game, achieving international cooperation in biological weapons disarmament should be no more difficult than

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<sup>56</sup> If one wishes to argue that biological weapons likewise possess military utility, negotiations over the BWC may also be classified as a PD game, which doesn't really affect the argument.

achieving cooperation towards chemical disarmament. For certain, there are substantial concerns about the protocol's effectiveness, but given the potential benefits that could be achieved from biological disarmament, we should at least see concerned states *trying* to reach an agreement according to the logic of neo-liberal institutionalism.<sup>57</sup> Unfortunately, no one fights for biological arms control anymore.<sup>58</sup> Neo-liberal institutionalism has trouble accounting for this apparent disinterest in a regime with potential system-wide benefits.

### **Two- Level Games: Robert Putnam**

The failure of the above theories to account for the different outcomes for the CWC and the BWC's verification protocol stems from their treatment of states as rational and unitary bodies. Conceptualizing states in this manner certainly helps to keep these theories parsimonious, but it also forces them to ignore the effects of the entire class of domestic variables. Neorealism indicates that the behaviour of states may be explained without reference to domestic actors, while old-school realists like Morgenthau caution against allowing the "simple moral and legalistic" thinking of domestic actors to cloud the minds of foreign policy makers.<sup>59</sup> Some of the domestic variables ignored by these theories include the role played by individual presidents, the structural constraints imposed by the composition of the US government, to say nothing of the effects of scientific communities and domestic industry. As we will see in later chapters, each of these variables has exerted significant influence over US CBW policy.

Robert Putnam's 2-level games model explains to us that policymakers are often caught between competing interests at the domestic and international levels. He tells us that "The

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<sup>57</sup> For example, Hasenclever, Mayer, and Rittberger tell us that under neo-liberal institutionalism, "States are more likely to create a regime if the set of potential mutually beneficial agreements... are large." Hasenclever, Mayer, & Rittberger, 37.

<sup>58</sup> Alan Pearson, Interview with author.

<sup>59</sup> Morgenthau, 135, 146-148.

unusual complexity of this 2-level game is that moves that are rational for a player at one board ... may be impolitic for that same player at the other board."<sup>60</sup> The implications of this argument are that the requirement for support from domestic groups often prevents a government from adopting policies that are otherwise ideally suited towards the achievement of its interests in the international arena, and vice versa.

Putnam's model shows us how domestic political structures can prevent the US from cooperating with other states, even when it has significant incentives to do so. If policymakers are relatively autonomous from domestic actors – be they voters, other government bodies, or lobbyists – they are more likely to consent to international agreements. If they are heavily influenced by these actors, there is a lesser likelihood of coming to an agreement.<sup>61</sup> For example, Putnam explains that

[under] the Constitution, thirty-four of the one hundred senators can block ratification of any treaty. This is an unhappy and unique feature of our democracy. Because of the effective veto power of a small group, many worthy agreements have been rejected, and many treaties are never considered for ratification.... [This] separation of powers imposes a tighter constraint on the American win-set [defined as the set of all possible Level I, or international, agreements that would gain the necessary majority among the constituents at Level II, or the domestic level] than is true in many other countries. This increases the bargaining power of American negotiators, but it also reduces the scope for international cooperation. It raises the odds for involuntary defection [failure to come to a beneficial agreement at the international level] and makes potential partners warier about dealing with the Americans.<sup>62</sup>

These requirements for Senate ratification have certainly delayed the ratification of arms control treaties in the US. Senate concerns delayed the ratification of the 1925 Geneva Protocol fifty years.<sup>63</sup> Likewise, Putnam argues that:

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<sup>60</sup> Robert Putnam, "Diplomacy and Domestic Politics: the Logic of Two-Level Games," International Organization, 42, no. 3 (Summer 1988), 434.

<sup>61</sup> Putnam, 339.

<sup>62</sup> Putnam, 448.

<sup>63</sup> Joseph Cirincione, "Historical Overview and Introduction," In Repairing the Regime: Preventing the Spread of Weapons of Mass Destruction, edited by Joseph Cirincione, (New York: Routledge, 2000), 7.

[all]-purpose support for international agreements is probably greater in smaller, more dependent countries with more open economies, as compared to more self-sufficient countries, like the United States, for most of whose citizens the costs of no-agreement are generally lower. *Ceteris paribus*, more self-sufficient states with smaller win-sets should make fewer international agreements and drive harder bargains in those that they do make.<sup>64</sup>

Both its structure of government and its self-sufficiency make the ratification of international agreements difficult in the US. Perhaps this is part of the reason for the failure of the BWC's verification protocol. This begs the question of **how a coalition of actors was able to work together to push through the ratification of the CWC, and particularly how they were able to overcome the constraints imposed by the Senate and the US's supposed self-sufficiency. It also begs the question of how and why another coalition of domestic actors was able to 'decrease the size of the win-set' and persuade the US to stop participating in negotiations over strengthening the BWC. We may also ask who the relevant domestic actors were in each case, and why they were more influential than other potential constituents.**

Putnam is vague on this point. He tells us that "it is reasonable to expect that those constituents whose interests are most affected will exert special influence on the ratification process.... As a general rule, the group with the greatest interest in a specific issue is also likely to hold the most extreme position on that issue."<sup>65</sup> For certain, both the pharmaceutical and chemical industries had a lot at stake in these negotiations; however, Putnam's theory is not able to answer the question of **why one industry strongly supported the CWC, and the other disapproved of the BWC verification regime.** Neither does it explain **what qualities made some interested parties, such as individuals with close personal relationships with policymakers or respected scientists, more influential than others.** Nor is it able to answer

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<sup>64</sup> Putnam, 443.

<sup>65</sup> Putnam, 445-446. Putnam also tells us that more politicized issues will attract a larger constituency, with a greater proportion of constituents who are 'less worried about the costs of no-agreement, thus reducing the effective win-set.' There is little indication that either negotiations over the CWC or BWC were more politicized than the other, so this isn't terribly relevant to our discussion.

the question of **why scientists would sometimes choose to weigh in on arms control matters for moral reasons.**

Putnam's idea of 2-level games offers a post-hoc explanation for how domestic politics can cause an international agreement to fail or succeed. It is however, indeterminate in explaining why domestic actors choose to support or oppose certain international agreements over others, or why some domestic actors are more influential than others. Nevertheless, interesting questions about how and why domestic actors interact to hamper or assist international agreements emerge from the areas where Putnam's concept of 2-level games is most indeterminate. Perhaps other theories are able to fill in these gaps.

### **Two-Level Games Continued: Helen Milner**

Helen Milner's 1997 book *Interests, Institutions, and Information: Domestic Politics and IR* expands on Putnam's 2-level game model. In particular Milner highlights how the interplay of industry and government can affect prospects for international cooperation.<sup>66</sup> Her model demonstrates how interest group preferences indirectly affect political actors' international policy preferences.

A key contribution of Milner's work is the importance she attributes to interest groups. "Rather than being just pressure groups ... interest groups act as information providers to political actors. They do not do this gratuitously but to influence policy."<sup>67</sup> Interest groups can provide information to "legislators who are not completely informed about the ramifications of policies... [and in this way act] as signalers, alerting political actors to the consequences of various policies."<sup>68</sup> If an interest group possesses information about the possible negative consequences of a policy favoured by government, or the policy best suited for the promotion of

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<sup>66</sup> Helen V. Milner, *Interests, Institutions, and Information: Domestic Politics and International Relations*, (Princeton: Princeton University Press, 1997), 33.

<sup>67</sup> Milner, 20.

<sup>68</sup> Milner, 60.

the wellbeing of the interest group and the entire state, it will share this information with political actors in order to persuade them to adopt their preferred policy. Without interest groups to perform this function, incomplete information can produce suboptimal results for industry as well as a failure of international cooperation.<sup>69</sup>

Milner's model also explains why business exerts so much influence over policy in the US. Large American businesses make significant campaign contributions and employ thousands of voters. Some industries also control the media attention political actors receive.<sup>70</sup> In order to gain these vital forms of support from business, political actors listen to lobbyists' requests and try to maintain favourable regulatory policies for these businesses. If these policies are successful at increasing profits and creating jobs, businesses might be expected to increase their support for their political benefactors, and their employees might be expected to vote for the administration that improved their financial situation.<sup>71</sup>

This seems to offer a satisfactory explanation for how the pharmaceutical industry and chemical industry exerted their influence over US arms control policy: As will be demonstrated in the case studies, these are both large and profitable industries that employ thousands of workers. Both industries have lobby groups – these being the Chemical Manufacturers Association (CMA) and the Pharmaceutical Research and Manufacturers of America (PhRMA) – who attempt to convince the US government to adopt regulatory policies that do not damage their profits. As we will see in the case studies, both industries have acted as information providers: The CMA helped test potential verification measures for the CWC, and advocated a system of measures that were the least costly and most effective. Likewise, PhRMA demonstrated to US negotiators how some of the measures advocated by the verification

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<sup>69</sup> Milner, 20.

<sup>70</sup> Milner, 35.

<sup>71</sup> Milner, 61-62.

protocol's authors could result in the loss of trade secrets and therefore profits.<sup>72</sup> In both cases, US policymakers paid attention and adopted these industries' preferred policies.

Still, Milner's model doesn't offer a complete explanation for the attitudes of the pharmaceutical industry and chemical industry towards arms control. **Why would the chemical industry lend its full support to a regime that at first glance appears to compromise its profits, while the pharmaceutical industry lobbied against similar verification measures?** Milner assumes the domestic actors in her study have the same goal of maximizing their net income,<sup>73</sup> and that they will "oppose policies entailed by international cooperation that detract from [this assumed goal.]"<sup>74</sup> It is safe to assume that all businesses and industries share this goal: after all any business or industry that does not have this goal does not stay in business for long. However, even if we assume that both industries share this goal, Milner's model is indeterminate in explaining why they would lobby the US government to adopt such different policies. This problem merits further consideration in the case studies.

Furthermore, even though Milner's model introduces the idea that information can be a source of power in that it used to help or hinder international cooperation, she treats it solely as a commodity wielded by industry to help it achieve the set goal of profit maximization. Nevertheless, as we will see in the case studies, in the late 1960s a small community of scientists used its specialized knowledge of microbiology to persuade the Nixon administration to reverse its policy of developing a capacity for biological warfare, and instead pursue the goal of universal biological disarmament. **Does this mean that other actors besides business interest groups – such as this group of scientists – can also use information to achieve their goals? If these groups don't control votes and campaign funding like industry, why would they have influence over policy? What is the source of their influence? And, what goals do these**

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<sup>72</sup> Alan Goldhammer, interview with author, 11 October 2005.

<sup>73</sup> Milner, 33, 37.

<sup>74</sup> Milner, 37.

**scientists pursue? Like business, do they pursue the assumed goal of profit maximization, or something else?** Although Milner's model gives us a good understanding of how the pharmaceutical and chemical industries persuade government to adopt their preferred policies, further theoretical assistance is required to adequately conceptualize the role played by communities of scientists.

### **The Military-Industrial Complex**

The idea of the Military-Industrial Complex (MIC) isn't so much a rigorous theory per se, as it is a literary tradition that, like neo-liberal institutionalism and 2-level games, seeks to explain outcomes in terms of interests. The MIC literature assumes that defence industries are always motivated solely by profit maximization, and politicians by a need for re-election. Like Milner and Putnam, this literary tradition shows us how domestic industry can influence US foreign policy, usually to the detriment of national security. The Military-Industrial Complex literature provides us with numerous examples of how close relationships between arms manufacturers and government have led to the adoption of expensive and frequently counter-intuitive defence policies by the US government. The MIC literature has taken to heart Eisenhower's warning that the "conjunction of an immense military establishment and a large arms industry is new in the American experience.... [We] must guard against the acquisition of unwarranted influence, whether sought or unsought, by the military industrial complex. The potential for the disastrous rise of misplaced power exists and will persist."<sup>75</sup>

Since Eisenhower's 1961 farewell address, authors working under the MIC tradition have found any number of instances of collusion between arms manufacturers in pursuit of lucrative government contracts, Pentagon officials after an increase to their own budgets, and

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<sup>75</sup> Quoted in Sanford Gottlieb, Defense Addiction: Can America Kick the Habit? (Boulder: Westview Press, 1997), 5.

Congressmen in pursuit of support from voters employed by arms manufacturers.<sup>76</sup> This relationship is blamed for everything from the US's failure to invest adequate resources in infrastructure and social services, to the creation of an inefficient economy devoted to the production of the means to make war. For instance, Sanford Gottlieb shows us that in the 1990's, the B-2 project involved over 3,000 subcontractors in 48 states, while carrier construction affects some 120,000 people in 40 states.<sup>77</sup> Some authors go so far as to suggest that arms manufacturers have an interest in the perpetuation of conflicts, and that they may use their 'unwarranted influence' to direct US foreign policy to follow paths that "are antagonistic to the most cherished ideals of the American Republic."<sup>78</sup>

This literature may therefore assist us with our attempt to comprehend the relationship between defence industries and arms control policy. The MIC literature also provides us with further insight about the mechanisms industries may employ to exert influence over government policy: Not only do the industries to be explored here employ thousands of voters in dozens of states, heads of corporations are often invited to participate in government planning committees and task forces.<sup>79</sup> As will be demonstrated in the case studies, both PhRMA and the CMA have developed long-standing consultative relationships with the US State Department and Department of Commerce. Both groups are also usually invited to be part of US government delegations to arms control conferences. These activities allow these industry lobby groups to influence negotiations directly, to let US negotiators know right away whether a proposed

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<sup>76</sup> See for example Ann R. Markusen, and Sean S. Costigan, eds., Arming the Future: A Defense Industry For the 21<sup>st</sup> Century, (New York: Council on Foreign Relations Press, 1999), Andrew L. Ross, ed., The Political Economy of Defense: Issues and Perspectives, (New York: Greenwood Press, 1991), William Greider, Fortress America: The American Military and the Consequences of Peace, (New York, Public Affairs, 1998).

<sup>77</sup> Gottlieb, 123.

<sup>78</sup> David Horowitz, "Introduction," In Corporations and the Cold War, edited by David Horowitz, (New York: Monthly Review Press, 1969), 9.

<sup>79</sup> G. William Domhoff, "Who Made American Foreign Policy, 1945-1963?" In Corporations and the Cold War, edited by David Horowitz, (New York: Monthly Review Press, 1969), 63.

agreement would be acceptable to member companies, and to be instantly aware of any developments that might affect their industries.

While the MIC tradition highlights these aspects of our cases, it is limited in a few key ways. Most examples of MIC literature are descriptions of how collusion and government waste leads to arms races and conflict:

Essentially, scholars from these fields have focused on descriptive case studies of decisionmaking and weapons development; analytical accounts of the economics and organization of procurement processes; examinations of the economic effects of military expenditures; [and] discussions of why arms control has failed....<sup>80</sup>

However, one of our cases did not result in the failure of arms control. Even though the chemical industry was an arms manufacturer into the 1970s, in the late 1980s and 1990s this industry did not use its influence over government to gain lucrative weapons procurement contracts that undermined arms control negotiations. In fact, as the case studies will demonstrate, the chemical industry refused to accept lucrative contracts for the production of CW precursor chemicals, and was an ardent supporter of arms control. These actions do not fit with the behaviour typically attributed to defence industries by the MIC literature. **Does this mean that there is an as-yet unanticipated reason that the chemical industry should not be considered part of the Military-Industrial Complex? Or does this mean that there is in fact something wrong with current understandings of the Military-Industrial Complex?** For certain none of the models or theories as yet explored offer perfect explanations for the problem set forth in the introduction. However, as we will see below, theories imported from the study of US domestic politics may be able to offer a more satisfactory explanation.

We must also recall that one of the industries considered here is *not* a defence industry, *per se*. The pharmaceutical industry has never produced arms, and though it accepts contracts

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<sup>80</sup> John L. Boies, Buying for Armageddon: Business, Society, and Military Spending Since the Cuban Missile Crisis, (New Brunswick, NJ: Rutgers University Press, 1994), 6.

for the research and production of biodefense materials, its largest customer is not the US Department of Defense (DoD).<sup>81</sup> Furthermore, even though the chemical industry produced materials like Agent Orange and napalm for the US military during the Vietnam War,<sup>82</sup> it has since refused similar contracts. The MIC literature does not usually concern itself with industries that produce goods for civilian consumption, even if it is reasonable to assume that they too may also influence government policies in a manner that serves their own narrow interests at the expense of the nation as a whole. Applying the concept of the Military Industrial Complex would therefore require a conceptual stretch of the Iron Triangle of defence industry, Pentagon, and Congress to include the industries considered here.<sup>83</sup>

### **US Public Policy Literature**

As argued above, discussions over US CBW policy are a 2-level game: state leaders must consider the interests of actors at both the international and domestic levels when formulating this policy. Since the formulation of CBW policy is a 2-level game, studies of how US public policy is created may also be relevant to this research project. Because the CWC and BWC verification protocol could have effects on domestic actors similar to that which could result from the introduction of new domestic regulatory policy, studies of how US regulatory policy emerges and is implemented may be applied to these case studies. Likewise, because domestic actors could seek to influence US CBW policy in the same manner in which these and other groups influence US domestic policy, studies of US interest group politics may also be applied to these cases.

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<sup>81</sup> T. Randolph Beard, "Industrial Organization and the Defense Industry: A Research Agenda," In Economics and National Security, edited by Jim Leitzel, (Boulder, Colorado: Westview Press, 1993), 30.

<sup>82</sup> However, it continues to produce tear gas and other incapacitants for the military and domestic law enforcement.

<sup>83</sup> However, the arms control experts interviewed accept the idea that these industries are a part of the MIC as unproblematic. Indeed Ambassador Thomas Graham Jr. recited Eisenhower's farewell address to me during our discussion of the pharmaceutical industry.

In 1951 David Truman defined interest groups as “any group that, on the basis of one or more shared attitudes, makes certain claims in the society for the establishment, maintenance, or enhancement of behaviour that are implied by the shared attitudes.”<sup>84</sup> Both the scientific communities and industry lobby groups considered in this study easily fit into this broad definition, in that they often share attitudes towards arms control and the introduction of regulatory policy, and have attempted to persuade government to establish, maintain, or enhance certain policies based on these shared attitudes.

That US policy is greatly influenced by private business interests is not a new idea. Indeed some American political scientists suggest that the US Constitution was intended to promote the interests of business and industry over the interests of the public as a whole. Michael Parenti argues that the goal of the framers of the Constitution was “to construct a centralized power to serve the expanding interests of the manufacturing, commercial, land-owning and financial classes.”<sup>85</sup> Parenti explains that, in common with many eighteenth century political theorists, the authors of the Constitution believed that the purpose of civil authority ought to be the defense of property to the benefit of the propertied rich against the propertyless poor. Furthermore, Parenti explains how property requirements in the original Constitution would prevent the poor from becoming candidates in elections. He also demonstrates that poor labourers were left out of Constitutional discussions on property law, and highlights James Madison’s warnings against the “leveling spirit” of the propertyless multitudes contained in the *Federalist Papers*.<sup>86</sup> Given the privileged position allocated to business interests in the formulation of the Constitution, US public policy scholars would not be at all surprised that these actors would also have a great effect on US CBW policy.

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<sup>84</sup> Quoted in Jack L. Walker, Jr., *Mobilizing Interest Groups in America: Patrons, Professions and Social Movements*, (Ann Arbor: University of Michigan Press, 1991): 4.

<sup>85</sup> Michael Parenti, “The Constitution as an Elitist Document,” in Robert A. Goldwin & William A. Schambra, eds., *How Democratic is the Constitution?* (Washington, DC: American Enterprise Institute for Public Policy Research, 1980): 39.

<sup>86</sup> This warning appears in No. 10. *Ibid.*, 44.

In his book *Mobilizing Interest Groups in America: Patrons, Professions, and Social Movements*, Jack Walker establishes that interest groups usually employ one of two broad strategies in their attempts to influence government policy. The first strategy, which he terms an 'inside' strategy,' is

based primarily upon close consultation with political and administrative leaders, relying mainly upon [the interest group's] financial resources, substantive expertise, and concentration within certain congressional constituencies as a basis for influence. Other groups become dedicated to 'outside' strategies based upon appeals to the public through the mass media and efforts at the broad scale mobilization of citizens at the grass roots.<sup>87</sup>

The close, cooperative, even chummy relationship between government and interest groups described as an 'inside strategy' is also termed 'policy subgovernments' or 'iron triangles,'<sup>88</sup> and is reminiscent of the strategies employed by business in the Military-Industrial Complex literature.

Walker explains that an interest group's choice of strategy depends on whether the group's membership is open to individuals or based on occupational or institutional roles, the patronage sources are available to the group, how much resources in general are available to the interest group, and the degree of conflict with organized political opponents. He argues that a group whose membership that is open to all people, that has few patronage sources, or other types of resources available to it, and has conflicting interests with already organized political interest groups are more likely to employ an outside strategy. Conversely, a group whose membership is composed solely of people possessing a certain occupation or institutional role, with many patronage and other types of resources available to it, and whose opponents employ an outside strategy will tend to rely on an inside strategy. Though his analysis focuses on groups

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<sup>87</sup> Walker, 9.

<sup>88</sup> Robert H. Salisbury, "Triangles, Networks, & Hollow Cores: the Complex Geometry of Washington Interest Representations," in Mark P. Petracca, ed., *The Politics of Interests: Interest Groups Transformed* (Boulder, CO: Westview Press, 1992): 131.

that choose to employ an outside strategy, Walker argues that groups that are able to employ an inside strategy are often able to persuade the US government to adopt their preferred policies.<sup>89</sup>

Walker's analysis provides considerable insight into the characteristics and behaviour of both the business lobbies and scientific communities considered here. Membership in industry lobby groups and scientific communities is limited to individuals representing industries from a certain sector or members of a certain profession, which lends both types of groups substantial expertise in policy issue areas, to which government officials might defer. The chemical, biotech and pharmaceutical industries wield considerable financial resources, and enjoy the protection of actors in Congress and the Senate who wish to maintain the profitability of these sectors, and are therefore receptive to industry lobbying efforts. Thus, both sets of actors are able to employ an inside strategy and lobby the highest levels of government directly instead of attempting to sway public opinion.<sup>90</sup>

Walker's study of interest groups fails to explain a key element of both case studies though. Walker argues that profit and non-profit lobby groups often adopt opposite sides in policy debates.

From the beginning of the interest-group system, there has been a sharp cleavage between representatives of the profit and nonprofit sides of the economy – a cleavage that carries great political significance. Professionals working on a fee-for-service basis have organized separate groups from professionals working for salaries in universities... and they often find themselves on opposite sides of political debates, providing political representation for different elements of society.<sup>91</sup>

However, as we will see in the case studies, a large portion of the biosciences advocated policies that coincided with those preferred by the biotech and pharmaceutical industry, while in the 1980s the chemical industry began to advocate chemical arms control, as scientists had been

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<sup>89</sup> *Ibid.*, 57.

<sup>90</sup> However, as we will see, in the 1980s when it became clear that the Reagan administration would not heed his warnings about the dangers of binary modernization, Matthew Meselson adopted an outside strategy, attempting to sway public opinion on the matter.

<sup>91</sup> *Ibid.*, 10.

doing since the 1960s. Clearly factors other than those considered by Walker can affect the motivation of interest groups. The US interest groups literature reinforces our emerging understanding that defining industry and scientific community interests is in no way a simple affair.

From the point of view of industry, the introduction of an arms control treaty regime containing a verification protocol that requires regular visits to private facilities is akin to the establishment of new, potentially costly, regulations. Several domestic government agencies in the United States – particularly the Food and Drug Administration (FDA) – conduct regular inspections of industry facilities to check that they are following proper procedures, and thus ensuring that the facility will manufacture safe, effective products. A confidence-building regime incorporating inspections would require similar visits to ensure the facility isn't involved in the illicit production of weapons. Because some of the effects of regulatory policies and arms control regimes are substantially similar, the literature on how US regulatory politics are created and how regulated bodies react to these regimes can be applied to arms control.

David Plotke examines the growth of business lobby groups in the 1970s and 1980s, and argues that this explosion was a reaction to increasing public anti-business sentiment and a corresponding increase in strong, costly regulations. Industries and businesses overcame collective actor problems and organized lobby groups to promote their interests in Washington. Plotke argues that the goals pursued by industry lobby groups did not appear automatically. Business lobby groups could have advocated a number of policies in their pursuit of an improved business climate, including a return to Keynesian politics, corporatism, and radical anti-statism. Political wrangling and discursive processes among business elites helped define the interests of

business lobby groups as the pursuit of cutbacks to regulations, free trade, the maintenance of countercyclical economic efforts, and the opposition of union growth.<sup>92</sup>

Paul Quirk examines the origins and development of the Food and Drug Administration, and demonstrates that the FDA's regulations were shaped by political forces that promote or resist regulation, problems within the drug industry, and the manner in which reformers interpreted these problems. Quirk notes that in many circumstances, pharmaceutical manufacturers can be ardent supporters of increased regulation. For example, in 1933 the pharmaceutical industry supported the regulation of advertising to keep false criticisms of other brands in check. Following scandals – such as the 1937 elixir sulfanilamide disaster<sup>93</sup> and 1961 thalidomide scare – the pharmaceutical industry will also accept the implementation of new regulations if failing to do so would generate further bad publicity.<sup>94</sup> Quirk concludes that industry “motivation is complex. Sometimes regulation that will protect consumers will also help an industry, or part of it. At other times, industry may support reform to prevent the passage of more drastic measures. Interpretation of regulatory legislation requires more sensitivity to the intricacies of industry motivation than is sometimes exercised.”<sup>95</sup>

James Wilson shares Plotke and Quirk's appreciation of the fact that industry can define its interests in a variety of ways, and therefore can pursue a number of different policies. For example, in the event of a scandal, an industry might not object to the implementation of new regulations if doing so might evoke further anti-business sentiment.<sup>96</sup> Industry might also support the establishment of costly regulations if these would prevent potential competitors from

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<sup>92</sup> David Plotke, “The Political Mobilization of Business,” in Mark P. Petracca, ed., The Politics of Interests: Interest Groups Transformed (Boulder, CO: Westview Press, 1992): 185-186.

<sup>93</sup> According to Quirk, in 1937 the “Massengill Company had rushed this new product to market with no prior testing for safety. Unfortunately for a large proportion of users, the solvent in which the drug was suspended produced excruciating and often fatal toxic side effects almost immediately. By the time the problem was discovered and the drug was recalled, at least 107 deaths were attributable to it.” Paul Quirk, “The Food and Drug Administration,” in James Q. Wilson, ed. The Politics of Regulation (New York: Basic Books, 1980): 196.

<sup>94</sup> *Ibid.*, 195-199.

<sup>95</sup> *Ibid.*, 201.

<sup>96</sup> James Q. Wilson, “The Politics of Regulation,” in James Q. Wilson, ed. The Politics of Regulation (New York: Basic Books, 1980) 364-365.

entering the market.<sup>97</sup> According to Wilson, neither the interests of industry or government are always what they are assumed to be in most rationalist – what Wilson terms ‘economic’ – theories. According to Wilson,

the economic perspective is a powerful analytical tool; provided the facts are consistent with the model, it offers an elegant and parsimonious way of explaining a great deal of human behaviour.... But are the facts consistent with the model? In one sense, the model is self-evidently true: almost all behaviour serves personal ‘interests,’ somehow defined, and thus is self-interested. But that is a circular and nearly useless interpretation of the theory.... to say that firms prefer higher profits, politicians more votes, and bureaucrats larger incomes is to make an important but incomplete assertion. If we wish to explain public policy by reference to such preferences, we must be able to say more – to show that policies are made so that profit-seeking firms can affect the votes won by vote-hungry politicians who will in turn constrain the behaviour of money-hungry ... bureaucrats, whose behaviour will in turn affect the profitability of firms. It is a long and complex causal chain.... [It] is not clear that [economic] theory is useful in all or most cases.<sup>98</sup>

Wilson advocates the problematization of industry and government interests. He shows how changing ideas and beliefs can transform these interests and result in sudden revolutions in regulatory policies. The ideas and actions of bureaucrats and executives are shaped by ideas, particularly those ideas to which they were introduced in University. As these ideas change, so do these individuals’ preferred regulatory policies. Wilson argues that the relationships between business and government aren’t limited to ‘iron triangles’ in which government agencies are captured by business, and costs are distributed widely but benefits are allocated to a select few. When entrepreneurs are able to challenge the existing order – often in response to a scandal – they can change public, government and even business interests. Changing interests can motivate the creation of regulations that allocate benefits widely, and concentrate costs to a few actors. For example, Ralph Nader was able to persuade government to establish the Auto Safety Act, which benefited the public in general, but was costly to the automotive industry.<sup>99</sup>

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<sup>97</sup> *Ibid.*, 358.

<sup>98</sup> *Ibid.*, 362.

<sup>99</sup> *Ibid.*, 370.

Frank Baumgartner and Brian Jones explain that ideas and public mobilization can lead to different regulatory subsystems for different issue areas. Their book *Agendas and Instability in American Politics*<sup>100</sup> examines how new understandings of a policy issue area can lead to policy change or stability, and has great relevance to our understanding of why the chemical and biotech/pharmaceutical industries behave the way they have.

Baumgartner and Jones demonstrate how new understandings of policy issues can mobilize the public and Congress and result in an entirely new regulatory subsystem for a specific policy area. They tell us that “understandings of important public policy issues have clearly changed over time. As these understandings have been altered, so policy processes and policy outcomes have changed as well.”<sup>101</sup> Often these new understandings arise as a result of destabilizing ‘external shocks’ that cast into doubt prevailing understandings of issues.<sup>102</sup> Changes in the understanding of an issue area occur when the experts who previously maintained a ‘policy monopoly’ on prevailing understandings of how an issue area should be thought of are challenged by entrepreneurs, who convince the usually apathetic public that they need to think of the issue in a new light.

If people outside the policy system can be convinced that the policy in question has impact beyond the existing set of participants, they can be brought into the conflict. Preferences are no longer uniform, and the system is not guaranteed to be stable.... Most issue change occurs during periods of heightened general attention to the policy. In the process of agenda-setting, the degree of public indifference to given problems changes dramatically. Since this is the structure on which policy subsystems are based, it should not be surprising if periods of agenda access are followed by dramatic changes in policy outputs.<sup>103</sup>

A new popular understanding of an issue, or ‘issue image’ will lead to the creation of new policies if that new image suggests a course of action that policymakers may take to ameliorate

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<sup>100</sup> Frank R. Baumgartner & Brian D Jones, *Agendas and Instability in American Politics* (Chicago: University of Chicago Press, 1993).

<sup>101</sup> Baumgartner & Jones, 12.

<sup>102</sup> Baumgartner & Jones, 21.

<sup>103</sup> Baumgartner & Jones, 19-20.

the problem. "Before a problem is likely to attract the attention of government officials, there must be an image, or an understanding, that links the problem with a possible governmental solution."<sup>104</sup> Baumgartner and Jones explain that when these policy changes occur within an issue area, they tend to happen in 'waves,' which is to say that many policies within the issue area will change dramatically and in a short period of time. Even though these changes occur rapidly, they are not reversible, and the new policy structures produced in these flurries of change can stay in place for a long time – at least until the understanding of the issue area changes too. "New political movements take shape, gain momentum, and become irreversible.... Political ideas become popular quickly and diffuse throughout large areas of the political system until they have replaced many old ones."<sup>105</sup> As Baumgartner and Jones demonstrate in their own case studies, wildly disparate but stable policy structures have developed to govern different issue areas. These 'policy subsystems' emerged as the public and policymakers acquired new understandings of issue areas and parlayed these understandings into different but stable regulatory systems.

The public policy scholars' realization that industry can have different interests in regards to regulations, has a clear relevance to our consideration of the chemical and biotech/pharmaceutical industries, whose differing reactions to US CBW policy suggest that they may possess different and evolving interests. **What are the chemical and biotech/pharmaceutical industries interests in regards to arms control or regulatory policies? Have they changed over time? Have these changes occurred in response to changing ideas? What role did scandals and public understanding of the issue area play in the evolution of these industries' interests?**

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<sup>104</sup> Baumgartner & Jones, 27.

<sup>105</sup> Baumgartner & Jones, 17.

Though the US public policy literature will likely add a great deal to our consideration of how the chemical and biotech/pharmaceutical industries affected US CBW policy, it has little to say about other elements of our case studies: in particular the role played by and interests of scientific communities, and the process in which industry preferences are translated into foreign policy and the eventual success or failure of an international regime. Nevertheless, theories already covered – for example realism and 2-level games – consider how state and domestic actor interests become international behaviour – and as we will see below, the epistemic communities literature has considered the role played by scientific communities, if not the interests of scientists yet.

### **Sociological Institutionalism and Social Constructivism**

Sociological institutionalism argues that state behaviour is governed by shared ideas, values, and norms that “structure and give meaning to international political life.”<sup>106</sup> States desire certain things because the system in which they and their citizens exist socialize them to want these things.<sup>107</sup> Thus, “it’s all fine and well to assume that states want power, security, and wealth, but what kind of power? Power for what ends? What kind of security? What does security mean? How do you ensure or obtain it? Similarly, what kind of wealth? Wealth for whom? How do you obtain it?”<sup>108</sup> Sociological institutionalism and constructivist approaches in international relations argue that the shared ideas, norms, and values that states obtain from their citizens and the society of states help them answer these questions, thereby defining their interests and even identity.<sup>109</sup> For sociological institutionalists, international institutions in particular can introduce new ideas and help “socialize states to accept new political goals and

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<sup>106</sup> Martha Finnemore, National Interests in International Society, (Ithaca: Cornell University Press, 1996), 2.

<sup>107</sup> *Ibid.*, 2.

<sup>108</sup> *Ibid.*, 1.

<sup>109</sup> See for example: Peter J. Katzenstein, The Culture of National Security: Norms and Identity in World Politics, (New York: Columbia University Press, 1996).

new values that have lasting impact on [international relations].”<sup>110</sup> Social constructivists in IR have also underscored the role of moral entrepreneurs and non-state actors such as transnational civil society and advocacy networks in developing norms.<sup>111</sup>

The implication of these approaches for our study is that the introduction of a new idea or norm in the late-1960s might be the reason that the US changed its objective from developing its BW capacity to eliminating worldwide stocks of these weapons. Furthermore, perhaps the scientists who introduced this idea to Kissinger and Nixon are responsible for this dramatic turn of events. These hypotheses will be investigated in the case studies.

There is an interesting sense in which these perspectives highlighting the role of moral norms are embodied in the contemporary position of the US State Department on the BTWC, if not to the end of international cooperation that constructivists have typically sought to explain. Even though it is apparent in many instances that US policymakers tend to view the world through a realist lens, representatives of the State Department have justified the decision to not pursue a verification regime for the BWC by relying on a very sociological and constructivist argument. Representatives of the State Department describe BWC as a “normative convention,”<sup>112</sup> that unequivocally prohibits the use of biological weapons. Because the BWC is a normative document, according to the State Department, it is not necessary to change it to include verification measures, because as the treaty exists right now it is both “unambiguous, but also flexible enough to cover changes in technology.”<sup>113</sup>

The State Department’s reliance on a normative argument is quite at odds with the position often taken by key U.S. arms control decision makers regarding reliance on moral

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<sup>110</sup> *Ibid.*, 3.

<sup>111</sup> See for example: Finnemore, 2; Margaret Keck & Kathryn Sikkink, Activists Beyond Borders: Transnational Advocacy Networks in International Politics, (Ithaca: Cornell University Press, 1998); Richard Price, “Reversing the Gun Sights: Transnational Civil Society Targets Land Mines,” International Organization, 52, no. 3 (July 1998).

<sup>112</sup> Representative of US State Department, interview.

<sup>113</sup> Representative of US State Department, interview.

norms. In 1997, for example, influential Republicans and key members of the current administration dismissed the normative value of the Chemical Weapons Convention. In a hearing of the Senate Foreign Relations Committee on 8 April 1997, Donald Rumsfeld and Richard Cheney, along with Caspar Weinberger and James Schlesinger – all former secretaries of defense at the time – argued against the ratification of the CWC. At the hearing “Weinberger dismissed the importance of ‘norms’ that would outlaw the development, stockpiling and use of CW. ‘I don’t think for a moment that it would make the slightest difference to Saddam Hussein whether it was legal or illegal for him to use poison gas.’”<sup>114</sup>

If the US State Department intends for the norm embodied in the BWC to prevent states from developing and using biological weapons, it could do a lot more to strengthen this norm, or at least stop undermining it. For example, publicly maligning attempts by member states to repair the Convention as incapable of achieving their objectives and beyond repair,<sup>115</sup> and continued secret BW research doesn’t speak of a great respect for the BWC. Norms may structure and give meaning to state behaviour, but in return individual state behaviour gives norms meaning and significance. As Alan Pearson, the director of the Center for Arms Control and Nonproliferation's biological and chemical weapons control program, explains,

Norms don’t maintain themselves. They need to be maintained. It’s a problem if everyone says that the treaty is worthless, because a worthless treaty -- even as a source of a norm -- isn’t going to last very long. The danger is that with the treaty so shall go the norm. Treaties are living documents; they can’t just be put on a shelf with the expectation that the norms they embody will be maintained. Other actions can’t undermine treaty, they must synergize and complement it.<sup>116</sup>

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<sup>114</sup> Erik J. Leklem, “Majority Leader Emerges as Key to Fate of CWC in Senate,” Arms Control Today, (March 1997): 2.

<sup>115</sup> Ambassador Don Mahley, Quoted in “Press Conference by Ambassador Donald A. Mahley Special Negotiator for Chemical and Biological Arms Control Issues July 25, 2001, Palais des Nations Geneva, Switzerland,” US Mission Geneva Press Releases 2001, <http://www.us-mission.ch/press2001/0725mahleybriefing.htm>, December 2005.

<sup>116</sup> Alan Pearson, interview.

If the US wants the BWC to embody a strong preventive norm prohibiting the use of biological weapons, it must be seen to take this treaty seriously and with respect. The US certainly cannot be perceived as undermining the BWC, or disdainful of multilateralism in general., Despite the State Department's rhetorical commitment to the moral prohibition on BW, then, not all of the US' actions speak of a strong commitment in practice to the norm embodied by the BWC. Thus the exact role of norms and their carriers in these cases merits further investigation.

### **Epistemic Communities**

Another approach that emphasizes the power of ideas explains how scientific communities in particular can influence state interests and behaviour. Haas' concept of the epistemic community concentrates on lobby groups who pursue their agendas on the basis of knowledge rather than predetermined parochial interests as important determinants of political outcomes. Peter Haas tells us that an epistemic community is

A network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain or issue-area.... [Members of these communities possess] 1) a shared set of normative and principled beliefs... 2) shared causal beliefs... 3) shared notions of validity... 4) and a common policy enterprise.<sup>117</sup>

Haas tells us that epistemic communities are likely to have the greatest effect in issue areas characterized by uncertainty, and those in which scientific communities may make plausible claims to technical expertise.<sup>118</sup> Haas explains that

...in the face of uncertainty... many of the conditions facilitating a focus on power are absent. It is difficult for leaders to identify their potential political allies, and to be sure of what strategies are most likely to help them retain power..... [Epistemic] communities can elucidate the cause-and-effect relationships and provide advice about the likely results of various courses of

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<sup>117</sup> Peter Haas, "Introduction: Epistemic Communities and International Policy Coordination," International Organization, 46, no. 1 (Winter 1992), 3.

<sup>118</sup> James K. Sebenius, "Challenging Conventional Explanations of International Cooperation: Negotiation Analysis and the Case of Epistemic Communities," International Organization, 46, no. 1 (Winter 1992), 323.

action. In some cases, they can help decision makers gain a sense of who the winners and losers would be as a result of a particular action or event....<sup>119</sup>

According to criteria laid out by Haas, the issue areas to be considered here are ripe for influence from epistemic communities in that they both exhibit uncertainty and plausible claims to technical expertise. During negotiations over strengthening the BWC there was general disagreement as to what course of action would better serve US interests, with president Clinton and his National Security Council (NSC) declaring their support for the new protocol, and the Senate taking the opposing view. While negotiating the format of the treaty that would become the CWC, many policymakers and industry groups experienced doubts about the costs and effectiveness of the new regime.<sup>120</sup> In 1969, Nixon and Kissinger contemplated whether the benefits of CBW outweighed their moral costs.<sup>121</sup> In each of these instances, scientific communities who possessed specialized knowledge about the science behind these weapons were also present. This study will attempt to answer several questions about the role played by communities of scientists: **Were these scientists at least partly responsible for the policy choices the US ended up making? In what issue areas in matters related to chemical and biological weapons did scientific communities get involved? What was the composition of these scientific communities? What objectives they hoped to achieve in these issue areas? What methods did they employ to achieve these goals? In particular, how did these scientists seek to influence government? Were these scientific communities were successful at achieving their goals? Why or why not?**

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<sup>119</sup> Haas, 15.

<sup>120</sup> Kathleen C. Bailey, "Problems With the Chemical Weapons Convention," In Shadows and Substance: The Chemical Weapons Convention, edited by Benoit Morel and Kyle Olsen, (Boulder, Colorado: Westview Press, 1993), 35.

<sup>121</sup> Jeanné Guillemain, Biological Weapons: From the Invention of State-Sponsored Programs to Contemporary Bioterrorism, (New York: Columbia University Press, 2005), 122-125.

Other authors working in the epistemic communities tradition have recognized the influence that scientific communities have exerted over arms control negotiations. Their work raises interesting questions that merit further examination in my case studies. Emanuel Adler shows us how an epistemic community composed of strategists and nuclear scientists "played a key role in creating the international shared understanding and practice of nuclear arms control.... [Adler analyzes] how the community's theoretical and practical ideas became political expectations, were diffused to the Soviet Union, and were ultimately embodied in the 1972 antiballistic missile (ABM) treaty."<sup>122</sup>

Similarly, Matthew Evangelista shows us how transnationally-operating groups of scientists, such as Pugwash, sought to "moderate Soviet and US military policies in order to bring about some accommodation through arms control and disarmament...."<sup>123</sup> In particular, Evangelista explores how these 'citizen-activists' were able to produce change in the closed world of Soviet politics. Evangelista's analysis emphasizes the role played by government and cultural structures in determining openness to transnational influence. He tells us that,

certain aspects of the domestic structure of the Soviet Union -- in particular the domination of a weak, fragmented society by a strong, hierarchical party-state apparatus -- made it difficult for new ideas to find their way to the top of the policy process. Once a window of opportunity provided policy entrepreneurs with access to the leadership, however, such ideas were often implemented quickly.<sup>124</sup>

Thus, one of Evangelista's most interesting findings is that it wasn't so much the everyday, 'functionalist' relationships between technical bureaucrats in the US and USSR that mattered in changing Soviet attitudes towards disarmament, as it was the personal relationships that international citizen-activists developed with high-level Soviet policymakers. Thus we may ask:

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<sup>122</sup> Emanuel Adler, "The Emergence of Cooperation: National Epistemic Communities and the International Evolution of the Idea of Nuclear Arms Control," *International Organization*, 46, no. 1 (Winter 1992), 101.

<sup>123</sup> Matthew Evangelista, *Unarmed Forces: The Transnational Movement to End the Cold War*, (Ithaca, New York: Cornell University Press, 1999), 5-6.

<sup>124</sup> Evangelista, 8.

**Does the same hold true in the United States, which after all possesses different government and cultural structures?**

Susan Wright looks at the mutually empowering relationship between science and industry in the field of biotechnology, and how this relationship has affected arms control policy. She tells us that 31% of biologists in the United States are employed by, sit on the boards of, or otherwise receive funding from private biotechnology firms. She argues that these tight connections between science and industry have transformed "biotechnology from an essentially academic field characterized by strong norms of openness to a field with extensive corporate connections,"<sup>125</sup> and a preoccupation with the protection of industrial secrets. "What is clear," argues Wright, "is that ... concerns with protection of trade secrets have so far haunted the collective consciousness of the biotechnology industry, and have influenced national policy, perhaps particularly that of the United States."<sup>126</sup> **Does the closeness or distance of the relationship between the chemical science community and the chemical industry likewise make a difference towards chemical scientists' attitudes towards arms control policy?** This study will probe this relationship to see if the same holds true in the CWC case -- a task that Wright declares to be "beyond the scope of [her own] study."<sup>127</sup>

The epistemic communities literature tells us how international cooperation is produced by international communities of experts working together to influence state policy. But in seeking to explain international cooperation via epistemic communities, this approach has for the most part chosen its cases based on the dependent variable. As these cases will show, communities of scientists do not always work together to produce international policy coordination. It is evident that lately the US microbiology community has failed to pursue this goal, and instead use their recognized expertise to promote policies that will not result in the

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<sup>125</sup> Susan Wright and David Wallace, "Varieties of Secrets and Secret Varieties: The Case of Biotechnology," *Politics and the Life Sciences*, 19, no. 1, (March 2000), 45.

<sup>126</sup> Wright & Wallace, 54.

<sup>127</sup> Wright & Wallace, 54.

creation of an additional system of costly regulations. Thus, while the epistemic communities approach has thus far for the most part not been harnessed to explain how epistemic communities may in fact work to prevent international cooperation such as treaties, this study will indeed seek to do so and in the process further our understanding of the role of science and experts.

These concerns raise a crucial issue for the future of arms control: **What are the implications of the increasing commercialization of science in sciences such as microbiology?** Furthermore, as will become clear in the case studies, the scientific communities that seek to influence US arms control policy have steadily declined in activity and influence since the 1980s. **Why? Is this a problem of supply or demand? Most importantly, can this development be accounted for by the theory of epistemic communities as it now exists?**

The theoretical approaches, concepts, models and traditions reviewed above offer competing and complementary explanations for the problem of why the US chose to discontinue negotiations over adding a verification protocol to the BWC, but ratified the CWC, which contained similar verification procedures. They also offer different answers for the question of what role, if any, that scientific communities and industry played in these decisions. At this juncture it appears that the 2-level games model, the US public policy literature and the idea of the Military-Industrial Complex offer partial explanations for how the chemical and pharmaceutical industries sought to influence arms control policy. The concept of the epistemic community offers persuasive insight into how scientific communities can influence arms control policy. In the next two chapters these approaches provide the analytical tools that will be applied to the cases to see the extent to which the variables and processes respectively identified in them are responsible for the observed outcomes.

### Chapter 3 – CASE STUDY #1 – CHEMICAL WEAPONS CONTROL: 1965-1997

#### “Chemists are People too!”

This chapter will examine the effects of the sciences and the US chemical industry on US policy towards chemical weapons. It will begin by tracing the history of interactions between the US scientific community and chemical weapons policy between 1965 and 1997, when the US Senate ratified the Chemical Weapons Convention. Following that, this chapter will scrutinize the effects of interactions between the US chemical industry and chemical weapons policy over the same period.<sup>128</sup> It will conclude by answering some of the theoretical questions about the role played by science and industry in determining US arms control policy posed in the last chapter.

#### In the Beginning...

Before the mid-1960s, attitudes towards chemical warfare among American scientists and the public in general were generally ambivalent. Likewise, “US policy concerning the use of chemical... weapons [was] ambiguous and contradictory.”<sup>129</sup> Though the US maintained CW stockpiles across the country, in Germany, and on islands in the Pacific, the use of deadly chemical agents was not generally incorporated into American military strategies, and in 1943 the US had affirmed its commitment to the principles enshrined in the 1925 Geneva Protocol.<sup>130</sup> The US Chemical Corps subsisted on about \$35 million per year until 1959, when a publicity campaign undertaken with the assistance of the Armed Forces Chemical Association – a group of military officers and industry executives financed by chemical manufacturers – helped persuade the public and military that chemical warfare would result in ‘wars without death,’ in

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<sup>128</sup> At this point, it may appear that this method of organization will result in the repetitive recounting of similar events. However, as it happens, this won't be the case, because as the influence of one actor wanes, the other grows. This is in no way a coincidence.

<sup>129</sup> Elinor Langer, “Chemical and Biological Warfare (I): The Research Program,” *Science*, 155 (11 January 1967): 174-175.

<sup>130</sup> More properly known as the Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous, or Other Gases, and of Bacteriological Methods of Warfare

which entire enemy populations would fall asleep and be captured without resistance. This campaign, known as 'Operation Blue Skies' was successful in increasing the armed services' CBW budget to about \$158 million in 1964. The American Chemical Society had opposed the ratification of the Geneva Protocol since 1925,<sup>131</sup> and in 1959 had endorsed Operation Blue Skies' proposed expansion of the US Chemical Corps.<sup>132</sup>

In the early 1960s, the Army expanded CW research and production programs, though their reasons for doing so were poorly considered. The justification was that chemical and biological weapons could provide the same destructive power as nuclear weapons, but at a much cheaper cost.<sup>133</sup> The flaw with this logic lies in the argument that if chemical agents were effective yet inexpensive, countries with fewer resources to allocate the development and production of weapons could also afford them, and use them against the US. This would eliminate the strategic advantage the US maintained as one of only a few states possessing nuclear weapons. In the 1960s, however, American policymakers discounted the dangers of chemical and biological proliferation.

### **Vietnam & the Geneva Protocol: Changing Ideas About Chemical Weapons**

During the Vietnam War, the US Army and Air Force made extensive use of riot-control agents such as CS and herbicides such as Agent Orange. Herbicides were sprayed on foliage and crops in order to deprive the Viet Cong of ground cover and food. It is due to this use of chemical agents, albeit nominally non-lethal ones, against the Vietnamese people that American scientists began to reconsider their ambivalence towards chemical weapons.

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<sup>131</sup> Elinor Langer, "Chemical and Biological Warfare (II): The Weapons and the Policies," *Science*, 155 (20 January 1967): 302.

<sup>132</sup> Langer, "Chemical and Biological Warfare (II): The Weapons and the Policies," 174.

<sup>133</sup> *Ibid.*, 174.

Some scientists objected to the use of herbicides due to their potential for wreaking havoc on the fragile Vietnamese ecosystem. In May of 1968, a Harvard Forestry professor sent a letter to the editor of *Science* arguing that

[there] can be no doubt that the DOD [Department of Defense] is, in the short run, going beyond mere genocide to biocide. It commandeered the entire US production of 2,4,5-T (the active ingredient in Agent Orange) for 1967 and 1968 (some 13 to 14 million pounds).... If one combines this with the other chemicals the DOD concedes it is using, there is a sufficient amount to kill 97 percent of the aboveground vegetation on over 10 million acres land ... an area so big that it would require over 60 years for a man to walk on each acre.<sup>134</sup>

Other scientists lamented the fact that Asian countries seemed to be the target of choice for American weapons of mass destruction. As an editorial in *Chemistry* noted, "One very unfortunate aspect of this episode is that once again white men have used an unusual weapon against Asians. Nuclear warfare, it may be remembered, was first used by the West against Asians also."<sup>135</sup>

Many scientists objected to the use of herbicides and riot-control agents for humanitarian reasons. Often for these scientists, the use of chemical agents was just part of the larger problem of the war in Vietnam. In January of 1966, twenty-nine scientists and physicians from Harvard University and the Massachusetts Institute of Technology sent a letter to President Johnson stating:

We emphatically condemn the use of chemical agents for the destruction of crops.... [Such] tactics are barbarous because they are indiscriminate; they represent an attack on the entire population of the region where the crops are destroyed, combatants and non-combatants alike.... The fact that we are now resorting to such methods shows a shocking deterioration of our moral standards. These attacks are also abhorrent to the general standards of civilized mankind, and their use will earn us hatred throughout Asia and elsewhere.<sup>136</sup>

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<sup>134</sup> Thomas O. Perry, "Vietnam: Truths of Defoliation," *Science*, 160 (10 May 1968): 601.

<sup>135</sup> "Gas Warfare," *Chemistry*, 38, no. 5 (May 1965): 3.

<sup>136</sup> "Scientists Protest Viet Crop Destruction," *Science*, 151 (21 January 1966): 309.

Some scientists argued that the people who would be hardest hit by US herbicide spraying programs would not be Viet Cong soldiers, but peasant women and children. These scientists – often public health professionals or physicians – argued that

adults, and particularly adult men, survive usually much better than the rest of the population. Bands of armed men do not starve and ... find themselves entirely justified in seizing what little food is available so as to be able to continue the fight. Destruction of food thus never seems to hamper enemy military operations but always victimizes large numbers of children.<sup>137</sup>

Still other scientists objected to the use of these weapons for visceral, emotional reasons, relating to the loss of valour that would result from the use of these most unchivalrous weapons.<sup>138</sup>

And so it began that a few diverse individual scientists began to do what they could to change US policy towards chemical weapons. Some, as suggested above, sent letters to the editors of science magazines. A group of scientists and physicians known as the Committee of Responsibility to Save War-Burned and War-Injured Vietnamese Children raised private funds to bring injured Vietnamese children to the US for medical treatment.<sup>139</sup> In 1966, a Harvard microbiologist named Matthew Meselson circulated a petition asking for a review of US CBW policy. It was eventually signed by over 5000 American scientists.<sup>140</sup>

Some scientists persuaded the professional organizations to which they belonged – such as the American Anthropological Association, the American Association for the Advancement of Science (AAAS), the Federation of American Scientists (FAS), and Physicians for Social Responsibility, to name a few -- to adopt resolutions condemning the use of chemical herbicides and riot-control agents in Vietnam. In January of 1966 the AAAS declared that the “[prolongation] of the Vietnamese War, with its increasing danger of universal catastrophe,

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<sup>137</sup> Jean Mayer, “Crop Destruction in Vietnam,” *Science*, 152 (15 April 1966): 291.

<sup>138</sup> Matthew Meselson, interview with author, 18 October 2005.

<sup>139</sup> Langer, “Chemical and Biological Warfare (II): The Weapons and the Policies,” 302.

<sup>140</sup> Jeanne Guillemin, *Biological Weapons: From the Invention of State-Sponsored Programs to Contemporary Bioterrorism*. (New York: Columbia University Press, 2005): 118.

threatens not only the lives of millions, but the humanitarian values and goals which we are striving to maintain.”<sup>141</sup> Some scientists at universities where government research into CBW was conducted – for instance the University of Pennsylvania – lobbied to have these projects excised from their school’s research agenda. George Kistiakowsky, formerly Eisenhower’s science advisor, left his position as DOD science adviser out of opposition to the Johnson administration’s policies in Vietnam.<sup>142</sup>

Unconvinced by DOD assurances that no long term harm would come to the Vietnamese ecosystem from extensive herbicide use,<sup>143</sup> in 1967 plant physiologists, arguing on the basis of “special knowledge of the effects of chemicals on plants....”<sup>144</sup> wrote to Johnson that the use of such persistent herbicides as Agent Orange could result in the end of agriculture in the region for some years, as well as permanent damage to the ecosystem.

Even though distaste for the Johnson administration’s CBW and Vietnam policies was widespread, it was not universal.<sup>145</sup> Nor was the belief that scientists ought to pursue moral or political goals such as the discontinuation of the use of herbicides in Vietnam. Some scientists objected to the AAAS’ condemnation of CW use as a misuse of the Association’s power.<sup>146</sup> Many scientists believed that pursuing such moral goals would harm their objectivity and therefore credibility. Their opponents argued that since the dawn of the nuclear age, it has been clear that scientists wield incredible power, and therefore had the responsibility to ensure that this power was used wisely. Their critics responded by arguing that many scientists pursued

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<sup>141</sup> John Walsh, “Scientists and Civil Defense: Dialogue at Berkeley,” *Science*, 151 (7 January 1966): 55.

<sup>142</sup> D.S. Greenberg, “Kistiakowsky Cuts Defense Department Ties Over Vietnam,” *Science*, 159 (1 March 1968): 958.

<sup>143</sup> Philip M. Boffey, “Defense Issues Summary of Defoliation Study,” *Science*, 159 (16 February 1968): 613; Gordon H. Orians & E.W. Pfeiffer, “Ecological Effects of the War in Vietnam,” *Science*, 168 (1 May 1970): 544.

<sup>144</sup> Langer, “Chemical and Biological Warfare (II): The Weapons and the Policies,” 302.

<sup>145</sup> For example, D. Richard McKeen, “CB Weapons: Powder Keg or Deterrent?” *Science*, 157 (15 August 1967): 874-876.

<sup>146</sup> Louis Lykken & Donald S. Dean, “Scientists and Social and Political Problems,” *Science*, 151 (11 March 1966): 1173-1174.

moral and political goals only distantly related to their area of expertise.<sup>147</sup> This quarrel has never been settled to the satisfaction of either side. Though they do not turn up as frequently as they did in the late 1960s, editorials and letters from readers rehashing this argument continue to appear in many science publications today.

Scientists were certainly not alone in their criticism of the conduct of the war in Vietnam. The general public and segments of Congress were growing increasingly resentful of the war, and the criticisms offered by scientists reinforced their low opinion of it. In 1968, an accident in Utah served to heighten public and Congressional fears about the destructive potential of chemical weapons.<sup>148</sup> On the 13<sup>th</sup> of March, an accidental release of the chemical agent VX at the Dugway Proving Ground in Skull Valley, Utah, resulted in the accidental death of about 6,000 sheep on a nearby ranch. The incident revealed to policymakers and the public a surprising dearth of safety regulations governing open-air testing of chemical weapons. Congress found the cavalier manner with which Dugway scientists regarded the incident most disturbing. In a House subcommittee meeting assessing dangers of open-air CBW testing, Congressman Henry S. Reuss (D-Wis.) told Mortimer Rothenberg, chief scientist at Dugway, "Doctor, you frighten me. You really do. Who gave you your authority to spew these poisons all over the environment? Who told you to do that?"<sup>149</sup> Congressman Richard McCarthy (D-NY) pressed the Pentagon and White House for greater transparency and accountability for the CW program.

In addition, in 1968 questions emerged about the Army's plans for the transportation, storage, and disposal of chemical weapons. It was revealed that the Army planned to transport thousands of obsolete (and possibly leaking) nerve gas bombs, containing 27,000 tons of deadly chemical agents across the country, and through major urban centres, by train. The Army would then seal these bombs in decommissioned Navy ships, and sink them in the Atlantic Ocean.

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<sup>147</sup> Stanley Buckser, "Vietnam," *Science*, 158 (15 December 1967): 1393.

<sup>148</sup> Philip M. Boffey, "6000 Sheep Stricken near CBW Center," *Science*, 159 (29 March 1968): 1442.

<sup>149</sup> Philip M. Boffey, "CBW: Pressures for Control Build in Congress, International Groups," *Science*, 164 (June 1969): 1378.

Besides the civilian deaths that could result from a train accident, the US public feared the ecological consequences of dumping thousands of tons of chemical agents in the ocean, to say nothing of the possibility of the release of a giant cloud of nerve agents that could drift over the Eastern seaboard.

Representative McCarthy called for a Congressional review of risks to populations living along the transport route. The Army asked the National Academy of Sciences (NAS) to form a panel to assess the risks associated with its plan for chemical disposal. This panel, headed by George Kistiakowsky, concluded that the disposal plans as then conceived posed a catastrophic risk to civilians living along the route. It would be far safer to detoxify the deadly agents through chemical means on site. Both of these events made the public and Congress more aware of CBW issues, and they too began to support a reformulation of US CW policy.<sup>150</sup>

Though such a reformulation would undoubtedly receive support from Congress, the public, and scientists, the attempts to alter CBW policy described above met with limited success. Lyndon Baines Johnson was not inclined to bow to the wishes of scientists. He was not known for listening to advice on CBW matters offered to him by the Arms Control and Disarmament Agency (ACDA). In 1967, after receiving Matthew Meselson's petition advocating the reexamination of US CBW policy, which as mentioned above featured the signatures of more than 5000 prominent American scientists, Johnson's only response was to have his science adviser Donald Hornig issue a "perfunctory acknowledgment [that]... said in effect 'thank you for your interest in national security.'"<sup>151</sup> In response to the petition, Johnson changed no policies; however, in September of 1967 he agreed to meet with a group of Harvard and Radcliffe professors to discuss his Vietnam policies. Though this group was largely sympathetic to Johnson's Vietnam predicament, and had approached the president with offers to help him

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<sup>150</sup> Guillemin, 119-121.

<sup>151</sup> Elinor Langer, "Chemical and Biological Weapons: Once Over Lightly on Capitol Hill," *Science*, 166 (26 May 1967): 1073.

avoid an extension and intensification of the war, Johnson used the opportunity to harangue the group about the intractability of the situation. The professors admitted that “after a little while [they] felt a little bit like fourth graders being lectured.”<sup>152</sup> Even if these actions had little direct effect on LBJ’s CBW or Vietnam policies, the petition and the incidents described above served to bring even more public and Congressional scrutiny to CBW issues.

If Johnson was able to ignore this pressure for the remainder of his presidency, Nixon did not. Following Nixon’s presidential victory in November of 1968, Congress began calling for an open review of US chemical arms control policies, in order to placate an increasingly worried public. Nixon’s National Security Advisor (NSA) Henry Kissinger assented to this request in May of 1969, and on behalf of the president he directed the Political-Military Group in the National Security Council (NSC) to perform a review of US CBW policies and programs. In June of 1969 he asked Matthew Meselson, a former colleague from Harvard, for his assistance.<sup>153</sup> Meselson wrote a position paper in which he questioned the wisdom of developing weapons that were inexpensive enough for any country to possess. As he puts it: “It would be crazy to pioneer an ultra-cheap WMD, when we had an ultra-expensive one... It would be best for the US if war was so expensive that no one could afford it but us.”<sup>154</sup> The NSC’s review committee received position papers from diverse branches of government as well, none of which depicted deadly chemical or biological agents as decisively useful in wartime, as they could be easily defended against with gas masks and protective clothing. Additionally, CW use would probably result in escalation and retaliation in kind, and the weapons were difficult to control or aim effectively. Nevertheless, the President’s Science Advisory Committee (PSAC) recommended the replacement of existing stockpiles of chemical bombs with binary weapons,

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<sup>152</sup> Bryce Nelson, “LBJ Meets Professors on Vietnam,” *Science*, 158 (13 October 1967): 231.

<sup>153</sup> Guillemin, 123.

<sup>154</sup> Matthew Meselson, interview with author.

which were said to be safer to transport and would present less risk of leaking.<sup>155</sup> As for riot-control agents, most branches of government saw little benefit from their use either, as their effects were again uncertain and difficult to control. The Department of Defense appears to have been alone in its advocacy of the retention of non-lethal agents.<sup>156</sup>

Nixon and the NSC Political-Military Group reviewed the interdepartmental reports. The argument that Nixon found most persuasive was the one that argued "there was no point in putting the huge resources of US technical genius into a technology that could provide poor weak countries with cheap powerful force-multipliers."<sup>157</sup> Thus, on 25 November 1969 Nixon released the following statement:

Under the auspices of the National Security Council, the Departments of State and Defence, the Arms Control and Disarmament Agency, the Office of Science and Technology, the intelligence community, and other agencies worked closely together on this study for over six months. These government efforts were aided by contributions from the scientific community through the President's Scientific Advisory Committee. This study has now been completed and its findings carefully considered by the National Security Council. I am now reporting the decisions taken on the basis of this review.... As to our chemical warfare program, the United States: Reaffirms its oft-repeated renunciation of the first use of lethal chemical weapons and extends this renunciation to the first use of incapacitating chemicals. Consonant with these decisions, the administration will submit to the Senate, for its advice and consent to ratification, the Geneva Protocol of 1925, which prohibits the first use in war of 'asphyxiating, poisonous or other gases and of bacteriological methods of warfare'. The United States has long supported the principles and objectives of this protocol. We take this step toward formal ratification to reinforce our continuing advocacy of international constraints on the use of these weapons.<sup>158</sup>

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<sup>155</sup> These weapons kept two chemical components separate until they are fired, at which time the chemicals would mix and form a deadly nerve agent. They were thought to be safer than existing 'unitary' gas bombs.' Binary weapons will be discussed at greater length later in the chapter

<sup>156</sup> Guillemin, 124.

<sup>157</sup> J.P. Perry Robinson, Thomas Stock & Ronald G. Sutherland, "The Chemical Weapons Convention: the Success of Chemical Disarmament Negotiations," in *SIPRI Yearbook 1993: World Armaments & Disarmament* (Oxford: Oxford University Press, 1993): 712.

<sup>158</sup> Quoted in Andrew Hamilton, "CBW: Nixon Initiative on Treaty Anticipates Congressional Critics," *Science*, 166 (5 December 1969): 1249. Nixon's statement also included the total renunciation of biological weapons. This will be discussed in the next chapter.

Though announcing the intention to submit the Geneva Protocol to the Senate – which eventually occurred on 19 August 1970 – was an important step towards the control of chemical arms, the White House spokesman made it clear that the Administration did not consider the use of herbicides or riot-control agents in Vietnam to be prohibited by the Protocol. After all, neither agent was “in a technical sense either lethal or incapacitating.”<sup>159</sup> Senators who criticized Nixon’s use of herbicides and tear gas in Vietnam were annoyed at this exception, but were forced to “judge whether making a fuss about CW in Vietnam [would] jeopardize the chances for favourable action,” in regards to the ratification of the Geneva Protocol.”<sup>160</sup>

Nixon’s announcement, and in particular his exceptions for herbicides and tear gas, met with mixed responses. On 16 December 1969, the United Nations General Assembly resolved that the Geneva Protocol should be interpreted as encompassing tear gas and herbicides.<sup>161</sup> In 1970, the ACS reconsidered its long-standing opposition to the Geneva Protocol and decided to support the president’s position, including his reservations for tear gas and herbicides. The State Department and DOD disagreed as to how the herbicide and tear gas reservation should be handled, with DOD advocating a formal exception and State recommending delaying ratification until things blew over in Vietnam. The House Subcommittee on National Security Policy and Scientific Developments recommended that the Protocol be ratified, and that afterwards the US should convene an international conference to decide the issue. Nixon was in quite a quandary as he wished to maintain the option of using herbicides and non-lethal agents in Vietnam, but a

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<sup>159</sup> *Ibid.*, 1249.

<sup>160</sup> *Ibid.*, 1250.

<sup>161</sup> Samuel Z. Goldhaber, “CBW: Interagency Conflicts Stall Administration Action,” *Science*, 168 (11 July 1970): 455; United Nations 1836<sup>th</sup> Plenary Meeting. “Resolution 2603 (XXIV): Question of Chemical and Bacteriological (Biological) Weapons.” Twenty Fourth Session of the General Assembly. New York: United Nations General Assembly, 16 December 1969.

formal reservation to the Protocol would likely result in the loss of much of the positive response he received from his original pronouncement.<sup>162</sup>

The Senate and Administration remained deadlocked over this issue for over 5 years. Once the Senate Foreign Relations Committee even sent the protocol back to the White House, and refused to begin its consideration of the 1972 BWC until the Administration altered its views on herbicides and tear gas. In 1974, the American Chemical Society changed its own policy towards chemical weapons. No longer supporting the president's reservations over non-lethal agents and herbicides, it declared in Congressional testimony that after much consideration it had determined that it would be in the United States' best interests to halt all production and use of chemical weapons, including binary weapons.<sup>163</sup> On 16 December 1974, the Senate agreed to provide advice and consent for the Geneva Protocol, because it had reached a compromise with the White House. In return for sending the Protocol to the Senate without formal changes, "[the Senate] allowed the Administration to announce a 'national policy' to the effect that tear gas and herbicides are not covered by the Protocol. A national policy carried less weight than a formal interpretation. The national policy further states that the United States will renounce first use of herbicides except in a few specific military situations."<sup>164</sup>

While the Senate and Nixon (and later Ford) Administrations debated the ratification of the Geneva Protocol, other changes to US chemical weapons policy were also underway. Recall that in late 1960s scientists protested against herbicide use in Vietnam. After over 3 years of planning, in early 1970 a team of researchers sponsored by the AAAS – and led by Matthew Meselson – left for Vietnam to generate an impartial study of the ecological effects of herbicide spraying. Though there were few studies on the long-term effects of extensive herbicide use at

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<sup>162</sup> *Ibid.*, 456.

<sup>163</sup> Michael Heylin, "Plan to Build New Chemical Weapons Criticized," *Chemical & Engineering News*, (30 May 1983): 22.

<sup>164</sup> Deborah Shapley, "Impact of Protocol Passage Diluted by Senate Compromise," *Science*, 187 (17 January 1975): 149.

the time, J.S. Foster, the Director of Defense Research and Engineering at DOD, was so confident in his belief that herbicide usage would result in no lasting harm, that he announced that "the Department... would not use these chemicals if it judged that seriously adverse ecological consequences would occur."<sup>165</sup>

In the fall of 1970, the team returned to the United States to report that herbicide use had resulted in widespread environmental devastation. The team found that 1/5 to 1/2 of South Vietnam's mangrove forests were utterly destroyed with almost no signs of life returning; half of the trees in the hardwood forests to the northwest of Saigon were dead and replaced with worthless bamboo, and a high rate of stillbirths and birth defects occurred in heavily sprayed regions. In short, the "military use of herbicides [was] considerably more destructive than anyone had previously imagined."<sup>166</sup> Meselson also discovered that the study on which DOD had based its assertion that the crop-destruction program would have little negative impact on civilian food supplies suffered from simple mathematical errors, including one that threw off its results by a factor of 100.<sup>167</sup>

The White House was informed of the Meselson team's findings and their intentions to denounce the crop-spraying program before the team itself was able to publish them. On 26 December 1970, the White House announced that

authorities in Saigon were 'initiating a program for an orderly, yet rapid, phase-out of the herbicide operations.'... During the phase-out period, the use of herbicides would be restricted to the perimeter of US bases or to remote unpopulated areas.... [Authorities] planned to use up the existing stockpile of herbicides on these two restricted uses and then drop the spraying program entirely, probably by spring.<sup>168</sup>

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<sup>165</sup> Gordon H. Orians & E.W. Pfeiffer, "Ecological Effects of the War in Vietnam," *Science*, 168 (1 May 1970): 545.

<sup>166</sup> Philip M. Boffey, "Herbicides in Vietnam: AAAS Study Finds Widespread Destruction," *Science*, 171 (8 January 1971): 43.

<sup>167</sup> *Ibid.*, 45.

<sup>168</sup> *Ibid.*, 44.

Though the White House statement made no mention of Meselson's study, "several knowledgeable Washington operatives... suggested that the AAAS study had been a major factor spurring the White House announcement."<sup>169</sup> Here, in short, the scientific community appears to have had a palpable and even decisive effect on US CW policy.

Though it appears that the Nixon administration allowed itself to be pressured by scientists into changing US CW policy, it is unlikely that he was happy to submit to their authority. Towards the end of his presidency, Nixon took a number of steps to remove activist scientists from positions of power in Washington. In January of 1973, he abolished the position of presidential science advisor, dissolved PSAC, eliminated the Office of Science and Technology (OST), and relegated its duties to National Science Foundation (NSF). In May of 1973, he stripped ACDA of most of its duties – including negotiating arms control treaties – and relegated it to a modest advisory role.<sup>170</sup> Whether or not Nixon reduced the influence of activist scientists out of revenge is a matter for debate, but the fact remains that scientists were greatly concerned about this loss of influence,<sup>171</sup> and remained so even after Ford reinstated the position of presidential science advisor in June of 1975.<sup>172</sup>

### **Additional Examples of a Politically Active and Influential Scientific Community**

In the years following the ratification of the Geneva Protocol, scientists undertook a number of additional endeavours aimed at influencing US policy regarding chemical weapons and related issues. The first, and most enduring of these efforts revolved around the issue of dioxin-contaminated Agent Orange. In 1971, laboratory tests revealed that stocks of Agent Orange, the Army's most widely used herbicide in Vietnam, were contaminated with 2,3,7,8-

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<sup>169</sup> *Ibid.*, 44.

<sup>170</sup> Luther J. Carter, "Arms Control Agency: Fred Ikle New Captain of a Disabled Ship," *Science*, 180 (11 May 1973): 370.

<sup>171</sup> Nicholas Wade, "Science Adviser's Exit: What Does it Mean for Science Policy?" *Science*, 179 (2 February 1973): 458-459.

<sup>172</sup> Robert Gillette, "White House Science Adviser: You *Can* Go Home Again," *Science*, 188 (6 June 1975): 995. 70

tetrachlorodibenzo-*p*-dioxin, a potent carcinogen.<sup>173</sup> The Army discontinued the use of Agent Orange soon after, but starting in about 1977 Vietnam veterans began to wonder whether dioxin contamination was responsible for the myriad of health problems from which they seemed to suffer. Vietnam veterans claimed to suffer from rashes, numbness, liver dysfunction, and radical mood changes. Some veterans who developed cancer since returning from Vietnam, or whose children were born with birth defects, wondered whether dioxin was to blame. Veterans groups demanded that the government study the link between dioxin and their multiple health complaints. When it was revealed that chemical manufacturers knew of the dioxin contamination while the Agent Orange spraying program was still underway in Vietnam, but neglected to alert the public,<sup>174</sup> veterans sued the firms that manufactured the components of Agent Orange.

The scientific community did not rush to defend either the veterans or the government's position. Instead, scientists assessed the evidence of dioxin's health risks, and assisted with studies of Vietnam veterans to see whether exposure to Agent Orange could be correlated with an increased risk of disease later in life. Though their position earned them no friends among veterans, scientists such as Matthew Meselson stated that "[we] don't think there is convincing evidence that [dioxin] is causing serious widespread health problems."<sup>175</sup> In 1979, Congress called upon the Veterans' Administration (VA) to perform a large scale epidemiological study on the health effects of dioxin exposure. The VA requested that the Centers for Disease Control (CDC) conduct the study, and the results were published in 1987. The findings were inconclusive, mostly due to the unreliability of available data.<sup>176</sup> During the Vietnam War, the

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<sup>173</sup> Boffey, 45.

<sup>174</sup> There is some evidence that the Army knew of the contamination, but did nothing to limit soldiers' exposure to Agent Orange either.

<sup>175</sup> Constance Holden, "Agent Orange Furor Continues to Build," Science, 205 (24 August 1979): 771.

<sup>176</sup> "Agent Orange: More Data Help Define Dioxin Danger," Chemical & Engineering News, (11 July 1983): 4; Benjamin J. Luberoff, "Help us Spread the Whole Truth About Dioxin," Chemtech, (January 1984): 1-3; Ralph R. Cook & Janice B. Cartmill, "Dioxin: Comparing Apples and Oranges," Chemtech, (September 1984): 534-537; 71

Army kept spotty and vague records of troop movements and spraying locations. Thus it would be difficult to differentiate between soldiers who had been exposed to Agent Orange and those who had not. Asking soldiers to assess their own level of exposure would be unreliable, as those who were suffering from health problems would assume that they had experienced greater exposure.<sup>177</sup> If the CDC could not differentiate between exposed and unexposed troops it could not reasonably conclude that the symptoms from which so many veterans were suffering were not caused by another variable, albeit one related to their service in Vietnam.

These honest but vague conclusions certainly didn't win the scientific community any friends among veterans. Nor was industry or the Army particularly pleased, because such inconclusiveness gave ill veterans and their families sufficient justification to continue filing lawsuits against industry, and to continue pestering the government with requests for further studies of the matter. Indeed in 1992, the Institutes of Medicine (IOM) agreed to conduct another epidemiological study,<sup>178</sup> only to reach the same conclusions. Still, the incident serves to demonstrate that the scientific community was not swayed by concerns for popularity among veterans, government, or industry, and instead allowed its own scientific assessment of the evidence to dictate its position. In this case, the scientific community cannot be said to have changed policy – in fact, its judgment that the data was inconclusive merely perpetuated the animosity between ill veterans and the US government – but their fair assessment of the evidence demonstrates that the scientific community's judgment was not dependent on its own

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"Groups Dispute Study of Agent Orange Victims," Chemical & Engineering News, (7 September 1987): 8; "Agencies Handling of Agent Orange Studies Hit," Chemical & Engineering News, (21 September 1987): 8; David Hanson, "New Reports Find Little Effect by Agent Orange on Veterans," Chemical & Engineering News, (15 April 1991): 12-13.

<sup>177</sup> William Booth, "Agent Orange Study Hits Brick Wall," Science, 236 (11 September 1987): 1285.

<sup>178</sup> Richard Stone, ed. "IOM to Study Agent Orange," Science, 257 (4 September 1992): 1335.

ideological leanings against the Vietnam war,<sup>179</sup> nor could they be bullied into offering conclusions that supported government's position.

This objectivity came into play again in 1981, when the US State Department claimed that the USSR was using a T2- trichothecene mycotoxin-based biological weapon, which the US called 'yellow rain,' in Afghanistan and Southeast Asia.<sup>180</sup> Scientists including Matthew Meselson assessed the scant evidence in support of the State Department's accusation: this consisting of a Soviet gas mask contaminated with toxins; a few scrapings of yellow spots on rocks, and blood samples containing metabolites of T2 toxin. Meselson concluded that the concentration of toxins in the samples was too low to do serious harm,<sup>181</sup> and were probably from a natural source. He surmised that the yellow spots found on rocks and trees after a supposed yellow rain attack were in all likelihood bee feces. The ill effects supposedly produced by toxin attack were probably caused by naturally occurring toxins and bacteria. The State Department "was clearly abashed by the reluctance of American scientists to rally behind the government's cause,"<sup>182</sup> and in response to this skepticism released further classified evidence.

The journal *Science* interviewed a dozen trichothecene toxin experts, who all expressed unease with some of the claims made by the State Department. In particular, they questioned how it could be that blood samples taken from victims months after an alleged attack would still contain the toxin or its metabolites. They also asked why victims of an attack supposedly suffered ill effects in the form of vomiting, diarrhea, and convulsions immediately after exposure, when it takes hours for similar symptoms to appear in the laboratory. In addition, plant pathologists wondered why Soviets would choose to use such an expensive material as T2 toxin to make their weapons. In 1982, a gram of T2 cost \$7000 US, and it would take 35 milligrams of

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<sup>179</sup> To wit, the scientific community did not use this opportunity to misrepresent the data in order to provide further criticism for the war in Vietnam.

<sup>180</sup> "Two More Yellow Rain Studies Surface," *Chemical & Engineering News*, (10 October 1983): 5; Michael Heylin, "Yellow Rain Still Stirs Passions," *Chemical & Engineering News*, (16 September 1985): 3.

<sup>181</sup> Constance Holden, "Unequivocal Evidence of Soviet Toxin Use," *Science*, 216 (9 April 1982): 154.

<sup>182</sup> Eliot Marshall, "Yellow Rain: Filling in the Gaps," *Science*, 217 (2 July 1982): 31.

the toxin to kill a full grown man. Thus it would cost tens or hundreds of thousands of dollars to wipe out a village. Several scientists asked why no artillery shells, bombs, or gas canisters had been retrieved, if 5000 to 10,000 people had been killed by toxin attacks, as the State Department claimed. Clearly scientists were not at all convinced by the State Department's scanty evidence.<sup>183</sup>

Still, the debate raged on until 1984 when *Chemical & Engineering News* released a special issue devoted to the yellow rain controversy. In this issue several scientists disputed the state department's evidence, arguing that "all [of it] appears to be hearsay, it all seems to be nonprovable, and it all seems to be evidence that can be read either way."<sup>184</sup> According to the editor of *Chemical & Engineering News*, the US government took the article's criticisms to heart:

Since the C&EN article appeared, there have been two indications that the government may be lowering the level of its rhetoric.... On Feb. 9 the Senate adopted a mildly worded resolution calling on the US to encourage other governments to assess carefully the evidence of suspected chemical warfare and, when possible, to conduct their own investigations. It also calls on the US to help the United Nations investigators to obtain access to areas where toxin and chemical weapons use is suspected.... Last week the State Department submitted to the UN the latest in a series of reports on chemical warfare in Afghanistan and Southeast Asia. More carefully phrased than its predecessors, it states that the US has not been able to confirm any use of chemical weapons....<sup>185</sup>

Although the State Department never admitted it had made a mistake in accusing the USSR of using toxin weapons, there is now widespread tacit agreement that yellow rain was a natural event. In short, the scientific community used its expertise with toxins to call into question the State Department's evidence of chemical weapons use, thereby compelling the US government to cease its accusations.

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<sup>183</sup> *Ibid.*, 31-33.

<sup>184</sup> Lois R. Ember, "Yellow Rain," *Chemical & Engineering News*, (9 January 1984): 8-34.

<sup>185</sup> Michael Heylin, "Science, Not Polemic," *Chemical & Engineering News*, (27 February 1984): 5.

Yet another issue area in which the American sciences community took a stand against government was in discussions over the Strategic Defence Initiative (SDI)<sup>186</sup> – Reagan’s space-based missile defense system. The physical science community described SDI as “technically dubious and politically unwise.”<sup>187</sup> In 1987, the American Physical Society issued a report on the technical feasibility of Reagan’s SDI plans:

The weighty tome was generally hailed as the work of men who knew of what they spoke.... The panel was composed of experts chosen from academic, industrial, and government labs, most of them intimate with the technologies they addressed.... [The study group] concluded that at least a decade of research and major technical advances [would] be needed to determine whether space-based laser and particle beam weapons could effectively shield the United States from Soviet attack.<sup>188</sup>

In 1985, chemical and physical scientists working at Cornell and the University of Illinois signed a group statement indicating their unwillingness to conduct research that could contribute to the development of SDI components. Several hundred scientists signed this pledge before the project was eventually scrapped.<sup>189</sup> The chemical and physical sciences stood to gain considerable funding if the SDI program was implemented in earnest because their expertise would be necessary for research and production of new laser and optical technology. Nevertheless, many scientists still refused to participate in such research. The fact that the scientific community would take an apparently moral stance and advocate a policy that does not promote its own material well-being is worthy of note. This action seems to distinguish this community from most interest groups, which invariably lobby for policies that promote their own self-interest. As will be discussed further later in the chapter, these selfless actions seem to indicate that the

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<sup>186</sup> Daniel Charles, “Bringing SDI Down to Earth,” *Science*, 237 (August 1987): 713.

<sup>187</sup> “Scientists’ Opposition to Star Wars Growing,” *Chemical & Engineering News*, (22 July 1985): 7-8.

<sup>188</sup> William Booth, “Weapons Designers Challenge SDI Report,” *Science*, 237 (10 July 1987): 127.

<sup>189</sup> “Studies Warn Against Hasty Moves in SDI.” *Chemical & Engineering News*, (17 August 1987): 5.

scientific community observed here is therefore *not* just an interest group, but is perhaps an epistemic community.<sup>190</sup>

### **Binary Weapons: Diminishing Influence**

The American scientific community involved itself in a number of issues related to chemical weapons and their control throughout the 1960s and 1970s, and into the 1980s. In many issue areas the actions of scientists appear to have directly contributed to changes in US policy. Nevertheless, it appears that the influence of the American scientific community diminished significantly during the 1980s, particularly in regards to the debate surrounding binary weapons.

The Department of Defense had toyed with the idea of replacing its stock of 'unitary' chemical weapons with binary weapons since 1949. Congressional support for a large-scale chemical weapons modernization program was nonexistent<sup>191</sup> until the 1980s, when the Carter and later the Reagan administrations made a determined effort to obtain funding for binary weapons. In part, the binary modernization plans represented a continuation of the CW policy developed in 1969, when PSAC convinced the Nixon administration that binary weapons would be safer and cleaner than existing stock of 'unitary' chemical weapons. The Army also argued that the Soviet Union was conducting a massive buildup of its chemical stockpiles. In response, civilian scientists argued that there was "no hard evidence [that the USSR had made] any major effort to improve its chemical warfare capability."<sup>192</sup>

Though the House of Representatives consistently deleted funding allocated to the construction of binary weapons, throughout the 1980s the Senate was consistently split over the binary weapons question. During the Reagan administration Vice-President George H.W. Bush

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<sup>190</sup> Recall that an epistemic community is a network of professionals united by shared causal and normative beliefs, shared ideas of validity and a shared policy enterprise who can influence policy in periods of uncertainty.

<sup>191</sup> Eliot Marshall, "Approval Sought for Nerve Gas Pilot Plant," *Science*, 206 (7 December 1979): 1164.

<sup>192</sup> Constance Holden, "House Reopens Nerve Gas Issue," *Science*, 209 (15 August 1980): 786.

was frequently required to cast tie-breaking votes in favour of binary weapons. Again, Matthew Meselson led the charge in criticizing the Defense Department's plans for upgrading the chemical arsenal. In July of 1980, Meselson visited the White House, the DOD, and the Capitol to try to persuade policymakers that producing binaries would be "a costly and foolhardy exercise that is only likely to undercut current efforts at negotiating a chemical warfare treaty with the Russians."<sup>193</sup> Since 1972, the Conference of the Committee on Disarmament (CCD) in Geneva had been making slow progress negotiating an international treaty banning all development, stockpiling, and production of chemical weapons.<sup>194</sup> Concurrently, since 1977 the US had met with the Soviet Union to negotiate the creation of a bilateral chemical disarmament treaty.<sup>195</sup> Meselson believed that stockpiling binary weapons would thwart both efforts.

Meselson argued that binary chemical weapons would be seen as less 'dirty,' and more psychologically acceptable, which could lead to their widespread use in a future European conflict. Meselson also repeated the argument that there was no solid evidence the Soviets had used chemical weapons such as 'yellow rain' in Asia.<sup>196</sup>

In August of 1980, the Defense Science Board, a consultative group charged with advising the Secretary of Defense on matters related to defense acquisitions and technical matters, convened to take a comprehensive look at US chemical weapons policy. The panel unanimously decided that it was high time existing stocks of unitary weapons were replaced with binary weapons. The group argued that only chemical weapons would deter a chemical attack by the Soviet Union, and dismissed all of Meselson's other concerns.<sup>197</sup>

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<sup>193</sup> *Ibid.*, 786.

<sup>194</sup> Shapley, Deborah, "Chemical Warfare: Binary Plan, Geneva Talks on a Collision Course," *Science*, 184 (11 June 1974): 1267.

<sup>195</sup> Robinson, Stock & Sutherland, 714-715.

<sup>196</sup> Holden, 786; Lois R. Ember, "Chemical Weapons: Build Up or Disarm?" *Chemical & Engineering News*, (15 Dec 1980): 23..

<sup>197</sup> Constance Holden, "Chemical Warfare: Panel Promotes Binaries," *Science*, 209 (12 September 1980): 1215. 77

In 1983, Representative Clement J. Zablocki (D-Wis.) called on the General Accounting Office (GAO), the House's investigatory body, to assess the necessity of the binary program and its possible effects on disarmament negotiations. The GAO report, entitled "Chemical Warfare: Many Unanswered Questions,"<sup>198</sup> strongly criticized the binary modernization plan. It pointed out that the DOD's "assertions about the specific technological advantages of binary weapons... are not supported by empirical evidence and must be recognized as possibly inaccurate."<sup>199</sup> Further, it criticized the DOD for failing to assess alternative ways to modernize the US chemical arsenal, and demonstrated that one variety of binary weapon – the BigEye – consistently failed to meet minimum standards for safety and effectiveness in repeated tests.<sup>200</sup>

Defense Secretary Casper Weinberger responded to these criticisms with a posture paper arguing that it was necessary to replace existing stocks of bombs containing the non-persistent agent GB, with binary bombs containing the persistent nerve agent VX, which would be marginally more useful for surgical strikes against airfields. The Pentagon argued that all safety issues associated with the BigEye had been worked out, and that America's lack of binary arms actually contributed to the problem of chemical proliferation. "Our comparative weakness in this area," a Defense official argued, "invites other nations to acquire chemical weapons as a cheap alternative to increasing conventional military power."<sup>201</sup> Meselson and Julian Perry Robinson, a colleague from the University of Sussex, called this argument "ridiculous... If the leading

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<sup>198</sup> General Accounting Office, Chemical Warfare: Many Unanswered Questions, GAO/IPE-83-6, (Washington, DC: US GAO, 1983).

<sup>199</sup> Heylin, 23.

<sup>200</sup> The BigEye was intended to be a 'lift and loft' gliding bomb – meaning that it would be transported by airplane to a location nearby the intended delivery site, the chemical components would be combined, and the bomb would be released and allowed to glide to the impact site where it would disperse the well-mixed nerve agent. The only problem was that the BigEye bombs had to be transported at a precise altitude or they would spontaneously explode. Airplanes traveling at this precise altitude would be easy targets for enemy anti-aircraft defenses.

<sup>201</sup> Quoted in Lois R. Ember, "Pentagon Pressing Hard for Binary Weapons Chemical Arms Funds," Chemical & Engineering News, (25 February 1985): 27.

military power goes in for new technology, then that's an example of a fashion everyone else may feel a need to emulate."<sup>202</sup>

The Reagan administration countered by appointing a presidential review commission to examine US chemical warfare policy in April of 1985. A mere six weeks after beginning its review, the Chemical Warfare Review Commission (CWRC) concluded that the existing stockpile should be replaced with binary weapons because they were safer and would facilitate arms control. However, questions soon arose about the composition of the Commission. Of the eight policymakers to serve on the Commission, six were on record as supporting a modernized chemical arsenal before their appointment to the panel. Critics of this maneuver contended that, with the deck stacked so blatantly in favour of binary weapons, the panel's conclusions could hardly be considered objective. Furthermore, dissenting Congressmen criticized the panel's report – which was completed in just eight weeks – for being “riddled with inconsistent arguments.... [It] is chock-full of statements that argue against a so-called modernization program.”<sup>203</sup> The GAO noted that the “Commission's records are so scanty that it [could not] ‘trace the process that led the CWRC to the conclusions in its ... report.’”<sup>204</sup> Nevertheless, the Commission's report was credited with changing the minds of enough freshman Congressmen for the House to finally reverse its longstanding disapproval of binary weapons. In June of 1985, the House voted to allocate \$124.5 million to the production of binary arms. However, the issue was far from settled. For two more years, dissenting Senators and Representatives tried to delete money for binary arms from Defense funding bills, and attached many conditions and deadlines to CW funding bills. Two examples include a requirement to obtain the permission of European

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<sup>202</sup> Quoted in *Ibid.*, 27.

<sup>203</sup> Lois Ember, “Intense Lobbying Behind House Binary Vote,” Chemical & Engineering News, (1 July 1985): 21.

<sup>204</sup> Lois Ember, “Chemical Arms Panel Accused of Violations,” Chemical & Engineering News, (23 February 1987): 24.

allies before moving the new bombs to stockpiles overseas, and the requirement to destroy one old unitary weapon for every binary weapon produced.<sup>205</sup>

It is clear, however, that the argument over binary weapons was an in-house matter: between the Senate, DOD, the White House, and the House. Outside scientists were no longer party to discussions. Since about 1980, the only scientists to consistently argue against binary weapons were Meselson and his English colleague Julian Perry Robinson. The issue had failed to garner the attention of as many scientists as similar issues had previously. The American Chemical Society hadn't even discussed the binary issue since 1974. In addition, it was clear that the Reagan Administration would not be persuaded by Meselson's arguments against binary modernization. As we have seen above, previous administrations had changed their chemical warfare-related policies in reaction to criticism from the scientific community, but Reagan would not be deterred by Meselson's arguments. In the summer of 1987, analysts were reasonably certain that the US would begin to manufacture binary arms over the objections of critics like Matthew Meselson.

After it assumed power in 1989, the Bush administration was criticized for its apparent duplicity regarding US CW policy: "In September 1989, Bush solemnly promised the UN General Assembly that he would do all he could to eliminate chemical weapons from the face of the earth. But at the same time he made a secret promise to the Pentagon – revealed a week later in the Washington Post – that he would retain the right to produce a new generation of chemical munitions, even after a convention was concluded."<sup>206</sup>

An important puzzle then is why the influence of scientific communities seems to have waned over this issue. Though no one explanation stands out as superior to the other others,

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<sup>205</sup> *Ibid.*, 21.

<sup>206</sup> John Isaacs, "We Love Them, We Love Them Not," *Bulletin of the Atomic Scientists*, 47, no. 6 (July/August 1991): 9.

below are a few possible reasons why the scientific community did not exert as much influence over this issue as it once did.

For one, it seems clear that by the 1980s, science advice to government in general had diminished in importance relative to advice from other sources – particularly business. Case in point is the diminished significance of the Presidential Science Adviser and PSAC. While the Presidential Science Adviser was a key member of cabinet during the Eisenhower and Kennedy administrations, Reagan did not even appoint a science adviser – his first being George Keyworth – until almost a year after becoming president. Moreover, under Reagan the science adviser's total budget shrank to less than it was under the Johnson administration twenty years earlier – approximately \$1.89 million, with over half of its staff on loan from other agencies. Further, under Reagan the science adviser lost much of its direct contact with the president. “[In the Reagan years] the science adviser [did not function as] a true presidential assistant. Instead, he ... functioned more as an adviser to the President's assistants.”<sup>207</sup> This was not due to a dearth of issues requiring science advice. Besides CW policy, there were several events during Reagan's presidency for which science advice could have been incredibly useful, including the Challenger disaster, and the decline in US industrial competitiveness.

Several possible explanations may be offered for the science adviser's apparent decline in significance: Jerome Wiesner, Kennedy's science adviser, argued that Reagan was content to let individual agencies evaluate their own programs instead of relying on science advice from PSAC. Nixon's science adviser, Edward E. David, Jr, acknowledges that PSAC lost credibility in Nixon's eyes when it began to advocate certain policies for ideological reasons instead of limiting itself to simply advising the president on scientific matters. This would seem to be in accord with the epistemic communities literature, which posits that a major source of solidarity and therefore influence for epistemic communities is their objectivity. According to Haas, “[the]

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<sup>207</sup> Colin Norman, “Science Advice: Back to the Future,” *Science*, 239 (4 March 1988): 1082.

solidarity of epistemic community members derives not only from their shared interests... but also their shared aversions, which are based on their reluctance to deal with policy agendas outside their common policy enterprise or invoke policies based on explanations that they do not accept.”<sup>208</sup>

Like Nixon, Reagan did not wish to heed the advice of an independent and activist scientific community, and instead preferred to rely on science advice from his own appointed White House Science Council, “a committee of scientists who [were] generally in political tune with the Administration.”<sup>209</sup> If Reagan preferred to obtain his science advice from a committee that already supported his policies, perhaps it is no surprise that he was not persuaded by Meselson’s arguments. In short, in contrast to the substantive role played by science in the Nixon administration, the Reagan era accords more with theoretical views that states only use science as a ‘ventriloquist’s dummy,’ to provide a veneer of scientific justification for policies undertaken for other reasons. That is to say, neither theoretical approach is simply and always correct: some presidents allow themselves to be influenced by scientists; others prefer to insulate themselves from outside science advice.

While the importance of some sources of advice from independent scientists diminished under Reagan, other sources increased in importance. Compared with the 1960s, the 1980s saw an explosion in the number of sources of scientific and technical advice. Besides a huge number of government agencies tasked with offering science advice to government – for example the GAO, the OTA, and the Congressional Research Service – business and industry offered their own science advice as part of their lobbying efforts. Reagan, like George W. Bush later, was well known to be sympathetic to business interests.<sup>210</sup>

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<sup>208</sup> Peter M. Haas, “Introduction: Epistemic Communities and International Policy Coordination,” International Organization, 46, no. 1 (Winter 1992): 20.

<sup>209</sup> Norman, 1083.

<sup>210</sup> The next chapter will provide numerous examples to support this argument.

President Clinton increased the importance of advice from the scientific community by re-establishing his science adviser – Jack Gibbons – as a top-level cabinet member. Even so, under the younger Bush the significance of science advice has declined to a new low. Not only does Bush adhere to policies with which the scientific community in general disagrees, the scientific information on which he bases his policies has not even been subjected to peer review – the *sine qua non* of good science. In addition, the White House has been frequently criticized for publishing reports that “[lack] scientific rigour... [and do] not meet certain standards for quality and objectivity.”<sup>211</sup> In 2004, the Union of Concerned Scientists lambasted the White House “for ignoring or suppressing findings that don’t support the Administration’s views on everything from Iraqi weapons to climate change.... Researchers say the government needs to take immediate steps.... to restore scientific integrity in the formation and implementation of public policy.”<sup>212</sup> Instead of arguing in favour of one policy over another, today scientists can only plead for the Bush Administration to base whatever policies it chooses on solid, peer reviewed science.

Beyond a general decline in the importance of advice from independent scientists under Reagan, there is a second possible reason for the apparent decline in the importance of advice from the scientific community over the binary issue. This is the increasing significance of other scientific problems, which may have diverted the attention of activist scientists away from the issue of CW arms control. The 1980s saw the emergence of the threat of HIV/AIDS, and a dramatic increase in the prominence of environmental issues such as acid rain, deforestation, extinction, climate change, and especially environmental contamination. The dangers of nuclear power and the wisdom of nuclear arms control treaties such as START and SALT II<sup>213</sup> were increasingly prominent topics of discussion among scientists during the 1980s as well. Perhaps

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<sup>211</sup> Jocelyn Kaiser, “Low Quality Climate Report?” *Science*, 301 (15 August 2003): 905.

<sup>212</sup> David Malakoff, “Political Science Decried,” *Science*, 303 (20 February 2004): 1119.

<sup>213</sup> Strategic Arms Reduction Treaty and Strategic Arms Limitation Talks, respectively.

the increasing significance of these issues drew the attention of scientists and the public away from the older and less immediately threatening subject of chemical stockpile modernization. It wasn't that advice from scientists no longer mattered as much, but that different scientific issues arose that drew away the attention of policymakers and activist scientists,

A third possible reason for Meselson's advice on binary weapons to have apparently been ignored is the gradual solidification of US policymakers' understanding of chemical weapons issues. In the 1960s, scientists such as Matthew Meselson were instrumental in convincing the US that its best interests lay in stemming the tide of CW proliferation. For this reason, the US ratified the Geneva Protocol and sought the creation of an arms control treaty that would help prevent the use of chemical weapons against itself. But even in 1969, the US did not intend to give up all of its own chemical weapons, at least until it was sure all other states had done so. On the advice of PSAC the CW policy that Nixon chose to follow was to both pursue the international control of chemical arms, and to maintain the deterrent value of the chemical stockpile by replacing existing weapons with binary arms. This dual policy governed US actions into the late 1980s. Indeed even during the last stages of negotiations over the CWC the US insisted on its right to modernize its arsenal until the treaty came into force, and announced its intention to keep at least 2% of its chemical stockpile until all other chemical weapons capable states had signed the treaty.<sup>214</sup>

The understanding among defense policymakers that it was necessary to maintain a CW deterrence capability until a universal chemical disarmament treaty had been ratified and entered into force had prevailed since 1969. By the 1980s it was very difficult for Meselson and critics in Congress to argue convincingly that this long-standing but ambiguous policy could be counter-productive. Meselson's prediction – that modernizing one's CW stockpile would be interpreted

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<sup>214</sup> Michael Heylin, "US Boxed in by Stance on Chemical Arms," Chemical & Engineering News, (27 November 1989): 7.

as indicating a poor commitment to arms control, and would compel other states to develop their own CW in response<sup>215</sup> -- seems persuasive. However, some real world events seemed to support the Reagan administration's preferred interpretation. After all, the USSR began making major concessions in negotiations over the CWC in the summer of 1987, at about the same time the Department of Defense began its major binary weapons lobbying effort. While the two events could certainly be connected, further research would have to confirm whether these or other factors account for Soviet policy. The fact remained however that Meselson was unable to convince American policymakers to change their minds after 25 years of thinking the same way.

### **The Chemical Weapons Convention**

Despite this eventual loss of influence, it is clear that American scientists once had a significant impact on US policy towards a number of issues related to chemical weapons. By evaluating existing evidence, scientists demonstrated flaws in the way government interpreted scientific data. Through criticism of prevailing policies and the articulation of possible negative consequences that would follow the enactment of poorly thought out policies, scientists convinced leaders to reconsider their CW strategies. But what of the Chemical Weapons Convention itself? The consideration of this treaty has been left until last, both because it is most prominent and because the process of its creation occurred over nearly three decades during which the influence of scientific communities waxed and waned. Thus, the above history will provide some context for the present discussion of the effects scientists have had on the negotiation, signing, and successful ratification of the Chemical Weapons Convention itself. This section will begin with a brief history of negotiations over the CWC to set the context, then proceed to consider how the US scientific community influenced these negotiations and US policy towards the CWC.

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<sup>215</sup> Recall the discussion of the Stag Hunt in the last chapter.

As mentioned above, discussions over the treaty that would become the Chemical Weapons Convention began in Geneva in 1972, two years before the US ratified the Geneva Protocol. In fact one of the first impetuses to begin negotiations came from the text of the Biological Weapons Convention, which the US signed in April of 1972. Article Nine of the BWC reads:

Each State Party to this Convention affirms the recognized objective of effective prohibition of chemical weapons and, to this end, undertakes to continue negotiations in good faith with a view to reaching early agreement on effective measures for the prohibition of their development, production and stockpiling and for their destruction, and on appropriate measures concerning equipment and means of delivery specifically designed for the production or use of chemical agents for weapons purposes.<sup>216</sup>

Between 1972 and 1977, preliminary drafts of the CWC were published by the USSR and its allies, a group of neutral countries, Japan, and Great Britain. In June of 1977, President Carter directed his National Security Advisor, Zbigniew Brzezinski, to begin negotiations with the Soviet Union towards the creation of a bilateral chemical disarmament treaty. In 1984, the United States offered a draft proposal that included a requirement for 'anytime-anywhere' inspections – meaning that a state suspected of possessing chemical weapons would be required to open any of its facilities, both government and private, to international inspectors with a maximum of 48 hours notice. The Soviet Union consistently responded to this suggestion by arguing that “a signatory state should be allowed to refuse comprehensive access to militarily sensitive installations.”<sup>217</sup> For three years, the Soviets declared that there was no way they could submit to such a regime, but in June of 1987, the USSR unexpectedly agreed to the proposal. In an interview with the British Broadcasting Corporation, Viktor Karpov, head of the Arms Control & Disarmament Directorate in the Soviet Foreign Ministry stated: “We agree to

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<sup>216</sup>United Nations. Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction. (Geneva: Committee of the Conference on Disarmament, 1972).

<sup>217</sup> David Dickson, “Chemical Weapons Pact Edging Closer,” Science, 235 (2 March 1987): 1452.

challenge inspection (*sic*), and we agree that these inspections should be obligatory. There should not be the right to refuse such an inspection.”<sup>218</sup> At first, the US assumed that the Soviets meant that they had consented to a British draft of the treaty, which was less stringent than the American proposal in that it stated that a challenged state simply had to satisfy the suspicions of the accusing states, without specifying how this would happen.<sup>219</sup> However, the Soviets soon made it clear that they had agreed to the American plans for intrusive challenge inspections.

“[Apparently] seeking to protect its supersecret technology development programs in non-CBW military areas from liability to international inspection under the chemical treaty...” the US reconsidered its commitment to its own proposed inspection protocol,<sup>220</sup> prompting critics to argue that the US had only issued its ‘anytime-anywhere’ proposal in the first place because it knew the Soviets would never agree to it. In 1988, progress slowed on negotiations in Geneva while the US consulted with domestic industry about the proposed inspection regime. Negotiators in Geneva devoted more attention to

politically difficult North-South issues.... [such as] ‘who will pay for implementing the convention, and whether technical assistance will be given to developing countries as a quid pro quo for their participation in it.... Some supranational organization [would] have to be established to ensure compliance with a chemical warfare treaty. But .... non-aligned nations with no chemical weapons [were] reluctant to become parties to a treaty that would require a costly organization.’<sup>221</sup>

Despite the loss of momentum in the CCD, the US and USSR made significant progress in negotiating their bilateral agreement, which the US had intended to complete before signing a multilateral treaty anyway.<sup>222</sup> By June of 1989, the two countries had reached agreement on procedures for challenge inspections, on the requirement for an early exchange of data on

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<sup>218</sup> Quoted in “Inspections Bug Chemical Arms Negotiations,” Chemical & Engineering News, (15 June 1987): 6.

<sup>219</sup> *Ibid.*, 6.

<sup>220</sup> *Ibid.*, 6.

<sup>221</sup> Lois Ember, “Progress on Chemical Warfare Treaty Slows,” Chemical & Engineering News, (8 February 1988): 5.

<sup>222</sup> Lois Ember, “Chemical Weapons: Major Initiatives Expected this Week,” Chemical & Engineering News, (16 September 1989): 4.

stockpiles and capabilities, and on a timetable for the destruction of weapons and production facilities. Questions remained however about several technical details of the destruction and verification procedures, and whether the data exchange should take place before or after the signing of the bilateral treaty.<sup>223</sup>

During bilateral negotiations taking place in Jackson Hole, Wyoming between the 22<sup>nd</sup> of September and second of October 1989, the US suggested that it would immediately destroy 80% of its current stockpile of 30,000 tons of chemical agents if the Soviet Union would agree to cut its own stockpile of 50,000 tons to the same level. The US also offered to destroy all but 2% of its stocks within eight years of signing a treaty, and to destroy those remaining stocks within two years if all states capable of producing or using chemical arms were to sign the multilateral chemical disarmament treaty and destroy their own weapons. In return Soviet Foreign Minister Eduard Shevardnadze called on the US to "join his country in stopping the production of all chemical weapons, including the US binary arms, immediately."<sup>224</sup> Bush absolutely refused to consent to this, arguing that the US had a right to modernize its stockpile while it waited for other states to disarm.<sup>225</sup>

Congress criticized the Bush Administration for allowing the Pentagon's desire to retain deterrent stocks of chemical weapons to hinder progress towards the Chemical Weapons Convention.<sup>226</sup> A bipartisan group of sixteen Congressmen argued that "ambiguity on this issue may seriously undermine the momentum of negotiations."<sup>227</sup> Britt Theorin, a Swedish delegate to the CCD called Bush's plan "potentially crippling.... [and would leave] a glaring loophole in

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<sup>223</sup> Lois Ember, "US, Soviets Inch Closer to Chemical Arms Ban," Chemical & Engineering News, (24 July 1989): 5.

<sup>224</sup> Lois Ember, "US, Soviet Chemical Talks in High Gear," Chemical & Engineering News, "2 October 1989): 6.

<sup>225</sup> *Ibid.*, 6.

<sup>226</sup> Lois Ember, "Bush's Chemical Arms Shift Draws Fire," Chemical & Engineering News, (23 October 1989): 5.

<sup>227</sup> Michael Heylin, "US Boxed in By Stance on Chemical Arms," Chemical & Engineering News, (27 November 1989): 6.

the regime, thereby providing an excuse for other countries to retain – or to acquire – chemical weapons.”<sup>228</sup>

As we will soon see, the chemical industry resolved the deadlock regarding binary production after criticism from Congress and scientists could not. This allowed for the bilateral agreement to be signed in June of 1990. Just a year later<sup>229</sup> Bush forswore the right for the US to retain 2% of its stockpile, and committed to the destruction of all chemical weapons stockpiles and production facilities within ten years of the treaty’s entry into force.<sup>230</sup> Fears of chemical weapons use during the Gulf War<sup>231</sup> had intervened and forced Bush to recognize “that chemical weapons must be banned – *everywhere* in the world.”<sup>232</sup> After this announcement, negotiations proceeded quickly in Geneva. Bush called upon the CCD to “stay in continuous session to resolve all major issues by the end of this year [1991],”<sup>233</sup> and set 1992 as a deadline for the completion of the treaty. The final draft of the CWC allowed states “the right to take measures [during challenge inspections] to protect sensitive installations, and to prevent disclosure of confidential information and data, not related to this Convention.”<sup>234</sup> This was a substantial compromise, but ultimately agreeable to the 130 states parties who signed the treaty on the 13<sup>th</sup> of January 1993.

It seems clear, in short, that security concerns about the spread and use of CW – issuing from the use of CW by Iraq – drove US policy on agreeing to the CWC. But in terms of the form that agreement would take, from the start representatives of the US scientific community assisted

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<sup>228</sup> Quoted in “Chemical Warfare Talks Resume in Geneva,” Chemical & Engineering News, (12 February 1990): 17.

<sup>229</sup> On 13 May 1991

<sup>230</sup> Lois Ember, “Chemical Weapons: US Seeks to Spur Talks on Global Ban,” Chemical & Engineering News, (20 May 1991): 4.

<sup>231</sup> Michael Heylin, “A New Focus on Chemical Weapons,” Chemical & Engineering News, (13 August 1990): 3.

<sup>232</sup> Ember, “Chemical Weapons: US Seeks to Spur Talks on Global Ban,” 4. My emphasis.

<sup>233</sup> Lois R. Ember, “Prospects Brighter for Chemical Weapons Treaty in 1992,” Chemical & Engineering News, (29 July 1991): 16.

<sup>234</sup> United Nations, Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction, (Article IX, paragraph 11, c) (Geneva: Conference of the Committee on Disarmament, 1992).

with negotiations in Geneva by refining the US position, providing technical advice for early drafts, developing lists of prohibited chemicals, and designing several drafts of verification procedures under the treaty's Preparatory Commission. Besides experts in arms control, international legal scholars, historians, chemists and physical scientists working for academia, government, and intergovernmental organizations such as the UN and the International Atomic Energy Association (IAEA) participated in these activities.

Alongside these official negotiations, non-governmental science-based organizations, such as the Federation of American Scientists, the Pugwash Conferences on Science and World Affairs, the Union of Concerned Scientists, the Stockholm International Peace Research Institute, and Physicians for Social Responsibility (PSR), assisted by publishing background material on technical and historical matters to assist with negotiations, and convening international conferences and workshops on chemical arms control.<sup>235</sup> On April 1st 1974, even the large and venerable American Chemical Society – which is typically conservative and not inclined towards political activism – organized an all-day panel on chemical arms regimes at its annual meeting in Los Angeles.<sup>236</sup> In 1987, relationships that developed between international experts in Pugwash's CBW Workshop series helped the US and USSR to reach an agreement to allow chemical weapons experts to visit production facilities in each other's countries for the first time.<sup>237</sup> Many of these organizations continue to host regular conferences on the CWC, even almost a decade after it came into force. These conferences are still attended by acknowledged experts in chemical weapons control and they continue to play a vital role: that of providing an assessment of successes and failures in treaty implementation. Not only do these regular

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<sup>235</sup> For example, S.J. Lundin, ed. Non-Production by Industry of Chemical-Warfare Agents: Technical Verification Under a Chemical Weapons Convention. SIPRI Chemical & Biological Warfare Studies. (Oxford: Oxford University Press, 1988.)

<sup>236</sup> "ACS Supports the Geneva Protocol," Chemistry, 47, no. 2 (February 1974): 5; "Schedule of Technical Sessions: ACS Chemical Exposition," Chemical & Engineering News, (7 January 1974): 36.

<sup>237</sup> Lois Ember, "Soviets to View US Chemical Arms Facility," Chemical & Engineering News, (16 November 1987): 5.

workshops serve as a forum for the discussion of new ideas to improve implementation, they keep the public and policy community somewhat aware of the continued significance of the treaty.

Just as importantly, many of these non-governmental organizations published newsletters and fact sheets on the dangers of chemical warfare and on the US government's negotiation position in Geneva. These publications were intended to create public support for chemical arms control, and to give members some oversight into what was traditionally a matter of sole concern to diplomats.

Since the entry into force of the CWC, the Organization for the Prohibition of Chemical Weapons (OPCW) has employed scientists in its Technical Secretariat, which among other duties is tasked with carrying out the treaty's verification procedures, and the Scientific Advisory Board, which is composed of eminent international scientists who provide science and technical advice to the Conference of the States Parties and the Technical Secretariat's Director-General.<sup>238</sup> Other scientists have assisted with the implementation of the regime at the national level, by working with national authorities such as the US Bureau of Industry and Security (BIS), and with the preparation of declarations of national chemical stockpiles.

It is difficult to pinpoint a single event that illustrates how important scientists working as part of an official negotiating mission or a non-governmental organization have been towards the creation and entry into force of the Chemical Weapons Convention. From the start of negotiations to the present day, scientists have used their expertise to craft practicable verification procedures that balance effectiveness and international acceptability. Clearly, without scientists this treaty would not exist. Formulating the schedules of prohibited and monitored chemicals required specialized knowledge not only of the chemical structure of existing chemical weapons, but also basic components that are several chemical reactions

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<sup>238</sup> Currently, one member of the Scientific Advisory Board is an American: Dr. James Robert Gibson.

removed from being dangerous chemical agents. Likewise the creation of verification procedures that can discern a legitimate chemical enterprise or storage facility from an illicit chemical weapons plant or stockpile requires familiarity with a whole range of manufacturing techniques and equipment. Without the input of the American scientific community, inspectors wouldn't know what they ought to look for in an inspection, let alone what materials ought to be prohibited.

Without a doubt science advice has been vital for the creation and enforcement of the CWC, but how did the US scientific community affect US policy towards this treaty? If frequency of articles devoted to this topic appearing in *Science* or *Chemical & Engineering News* is any indication, the scientific community in the US was not particularly concerned with negotiations over the Chemical Weapons Convention until about 1984, when the US announced its 'anytime-anywhere' verification proposal. Scientists reacted to this proposal favourably, indicating an approval of stringent verification procedures. From perspectives emphasizing the role of self-interested actors, this might appear rather puzzling since the chemical sciences might easily be seen to resist such proposals given their potential costliness, resulting from the possible introduction of new safety and security measures, the exposure of new developments in research, or the time-consuming preparation of annual declaratory reports. Likewise, when the US reconsidered its position following the Soviet acceptance of the 'anytime-anywhere' proposal in 1987,<sup>239</sup> scientists reacted with criticism and disappointment. In general, the scientific community approved when progress was made towards the completion of the treaty. When it believed that momentum towards the completion of the treaty had slowed, members of the community reacted by lobbying policymakers.

For example, in 1988 the scientific community was disheartened that the progress made in 1987 had not been translated into a completed treaty, and began to exert what pressure it could

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<sup>239</sup> Robinson, Stock & Sutherland, 715.

on the US government to reach an agreement. In September of 1988, 116 NAS and Nobel prize winning scientists – mostly chemists – wrote letters to the two presidential candidates, George H.W. Bush and Michael Dukakis, to express their concern over the slow pace of negotiations in Geneva.<sup>240</sup> The letters urged the candidates to “to speak of the issue during and after the campaign and to make it a priority to do all you can to end the threat of chemical warfare, without delay.”<sup>241</sup> In February of 1997, while the US Senate was considering whether or not it ought to ratify the CWC before it came into force, the AAAS Board urged “every member of the Senate to ratify the CWC.... *Science* [also urged] its US readers to make their feelings known to the Senate and [asked] its international readers to support the CWC locally.”<sup>242</sup>

However, in contrast to some of the other events described above, there is little decisive evidence that these activities directly contributed to changes in US policy towards the CWC. Indeed, Ambassador Thomas Graham, Jr., former acting director of the ACDA and Clinton’s special ambassador for nuclear disarmament issues, has indicated that he thought the influence of these scientist-sponsored petitions was “minimal... and invariably ignored by government.”<sup>243</sup> As explained at greater length in the discussion of Meselson’s influence over the binary issue, there are many possible reasons for this lack of decisive influence over US policy ranging from a gradual solidification of defense policymakers’ ideas about the chemical arms issue to Reagan’s, and later Bush’s, lack of interest in advice from independent scientists.

While little evidence exists to support the conclusion that scientific communities exerted a great deal of influence over US policy towards the CWC, this is not to say that there is little or no relationship between the actions of scientific communities and US CW policy. In the 1960s, scientists played a vital role in explaining to US policymakers that it was in their best interests.

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<sup>240</sup> As we will see in the next chapter, scientists were unable to likewise capture the attention of Clinton or George W. Bush over the BWC issue.

<sup>241</sup> Quoted in Lois Ember, “Dugway, Iraq Focus of Chemical Arms Concerns,” *Chemical & Engineering News*, (26 September 1988): 8.

<sup>242</sup> Floyd E. Bloom, “Ratify the Chemical Weapons Convention,” *Science*, 276 (11 April 1997): 179.

<sup>243</sup> Amb. Thomas Graham, Jr., interview with author, 12 October 2005.

for the US to pursue the creation of a multilateral treaty condemning the use and development of chemical arms. Before that time, the US Senate wouldn't even consent to ratify a no-first-use agreement. Afterwards, the US became a driving force behind the CWC negotiations in Geneva, and was determined to create an effective regime that contained a workable verification protocol. The policy scientists helped craft in 1969 continued to govern US actions in regards to chemical arms control well into the 1990s. Thus, even if their influence was limited in the years immediately preceding the completion of the treaty, scientists' greatest contribution to multilateral chemical arms control was to convince the US that such a thing was a good idea in the first place.

Granted, the influence of scientific communities appears to have declined in the 1980s. Nevertheless, as scientists were losing their persuasiveness, another group – the US chemical industry – was beginning to gain influence over US CW policy. Indeed, while the scientific community was unable to convince the US to reconsider its long-standing intention to modernize the chemical arsenal with the purchase of binary arms, the chemical industry was able to do just that. It is to this actor that we shall now direct our attention:

### **The US Chemical Industry**

As previously noted, after the Second World War the US chemical manufacturing industry was an ardent supporter of the US Army's Chemical Corps. In 1959, a group of military officers and industry executives funded by chemical companies formed the Armed Forces Chemical Association (AFCA), and "dedicated [itself] to the scientific and industrial preparedness for common defense in the field of chemical, biological, radiological, and related technology commonly referred to as chemicals."<sup>244</sup> Together with the Chemical Corps, the

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<sup>244</sup> Elinor Langer, "Chemical and Biological Warfare (I): The Research Program," *Science*, 155 (13 January 1967): 174.

AFCA lobbied for increased funding for CBW research and stockpiling. They were largely successful: between 1959 and 1964, the Pentagon's budget for CBW increased from \$35 million to \$158 million per year.

During the 1960s, the US chemical industry profited handsomely from its relationship with the Chemical Corps. In the mid-1960s, approximately 65% of the military's CBW research and development budget went to private industry, which was reported to be "the most productive source of new compounds."<sup>245</sup> In particular, Arthur D. Little, Inc. and DuPont were said to be "prominent contributors to the CBW program."<sup>246</sup> Between 1960 and approximately 1969, the Food Machinery Corporation, a private firm operating in Newport, Indiana, received \$3.5 million per year to manufacture chemical weapons containing the chemical agent Sarin. At the Food Machinery Corporation production facility, 300 plant workers operating 24 hours a day, 365 days a year produced Sarin and loaded the chemical into landmines, rockets, and artillery shells. Other private firms manufactured chemical weapons in Muscle Shoals, Alabama. In 1962, the Pentagon entered into contracts with ten chemical manufacturers for research and development of new chemical defoliants for the war in Vietnam. The Pentagon bought most of the chemical defoliants used in Vietnam, such as Agent Orange, from private, commercial firms.<sup>247</sup> Indeed, in 1967 and 1968, the Pentagon commandeered all of the 2,4-dichlorophenoxyacetic acid (2,4-D) and 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) – the two commercial phenoxy herbicides that were combined and concentrated to make Agent Orange – produced in the United States in those years for use in Vietnam.<sup>248</sup>

Before their shortlived resumption in 1987 under the binary modernization plan, the last time deadly chemical weapons were produced in the United States was 1969. That year, the

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<sup>245</sup> *Ibid.*, 178-179.

<sup>246</sup> *Ibid.*, 179.

<sup>247</sup> Elinor Langer, "Chemical and Biological Warfare (II): The Weapons and the Policies," *Science*, 155 (20 January 1967): 299.

<sup>248</sup> Thomas O. Perry, "Vietnam: Truths of Defoliation," *Science*, 160 (10 May 1968): 601.

reader will recall, was the year that Nixon submitted the Geneva Protocol to the Senate for ratification. In 1970, after Meselson's study revealed the widespread environmental damage chemical defoliants had caused in Vietnam, the Pentagon stopped purchasing herbicides from private firms. In about 1970, scientists realized that the manufacturing process used to make 2,4,5 trichlorophenoxyacetic acid<sup>249</sup> also produced the dioxin 2,3,7,8-tetrachlorodibenzo-para-dioxin (TCDD) as a side effect. Dioxins were understood to be some of the deadliest chemicals known to mankind. Ingestion or inhalation of the chemical was linked with soft tissue cancers and birth defects in animals. Though people are routinely exposed to dioxins from a variety of sources<sup>250</sup> and suffer few ill effects, soldiers in Vietnam came in contact with high levels of dioxin through their regular use of highly concentrated herbicides. Many veterans began to worry that their exposure would lead to serious health problem for them and their children.

As demonstrated in the previous section, all US government studies exploring the correlation between Agent Orange exposure in Vietnam and later health problems have been inconclusive due to the poor quality of available data. Nevertheless, Vietnam veterans sued the chemical industry for compensation. In 1984 seven chemical firms<sup>251</sup> accepted liability for dioxin exposure and agreed to pay \$180 million to soldiers who were exposed to Agent Orange in Vietnam, as well as to their survivors. According to Richard J. Mahoney, then chairman of the Monsanto Company:<sup>252</sup>

We knew that there was no way to get the public or the veterans to focus on the more narrow legal issues in the case. The level of passion was too high and the spotlights were too bright. In the final analysis, Monsanto did not believe that anyone benefited from our company becoming part of the last battleground of the most divisive and painful incident in our nation's recent history, the Vietnam War.... Are the claims of these veterans and their families legitimate?... Some veterans are suffering... but we unequivocally maintain that there is no credible scientific evidence to suggest that their medical

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<sup>249</sup> A component of Agent Orange

<sup>250</sup> such as diesel engines, metal smelting, or the burning of a variety of materials

<sup>251</sup> These being Monsanto, Diamond Shamrock, Dow Chemical, Hercules, Thompson Chemical, TH Agriculture & Nutrition, and Uniroyal.

<sup>252</sup> Monsanto was ordered to pay 46% of the total settlement, or about \$83 million.

problems are caused by dioxin. Despite the evidence, the veterans, their families, and many Americans will never believe that.... [The] settlement is, in our opinion a fair arrangement to put the Agent Orange case behind us once and for all.<sup>253</sup>

Industry reports alleged that the Agriculture Department likely knew of the possibility of dioxin contamination while Agent Orange was in use in Vietnam, but it had made no "serious attempt to assess the likely health effects of spraying the defoliant in concentrations far exceeding those normally used...."<sup>254</sup> The seven chemical companies sued the federal government to force them to share the cost of the settlement, but the courts found that the federal government was not liable. However, the judge presiding over the case warned the federal government not to be

shortsighted in its refusal to assist contractors who voluntarily produced at government request what amounted to critical war supplies.... Undoubtedly, the U.S. will pay a high price for its present position.... In the future, many contractors will require indemnification, and increased insurance costs will be added to the price of the goods....<sup>255</sup>

Besides these financial losses, the Agent Orange incident contributed to a growing 'Merchant of Death' image for the US chemical industry. In 1962, the publication of Rachel Carson's *Silent Spring* revealed the shocking effects that the chemical pesticide DDT had on ecosystems, and the chemical industry's apparent disregard for these dangers.<sup>256</sup> Growing concerns about the introduction of artificial chemicals to foods and the resultant organic food movement also contributed to a terrible public image for the American chemical industry. Dow Chemical's production of napalm during the Vietnam War,<sup>257</sup> environmental contamination scares at Love Canal in 1978,<sup>258</sup> and the Bhopal disaster in 1984<sup>259</sup> all served to reinforce this

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<sup>253</sup> Richard J. Mahoney, "The Agent Orange Case," *Chemtech*, (August 1984): 455.

<sup>254</sup> "The Government Knew Plenty," *Chemical Week*, (20 July 1983): 3.

<sup>255</sup> "Government Relieved of Agent Orange Payment," *Chemical & Engineering News*, (20 May 1985): 6.

<sup>256</sup> Rachel Carson, *Silent Spring*, (Boston: Houghton Mifflin, 1962).

<sup>257</sup> In 1966 and 1967, hundreds of student demonstrations took place across America when Dow's recruiters visited college campuses.

<sup>258</sup> Hooker Chemical and Plastics Corporation, a subsidiary of Occidental Petroleum, buried 19,000 cubic yards of toxic waste in Love Canal between 1942 and 1952, some of them dioxins. In the 1950s, housing developers built low-income housing and an elementary school on the site, neglecting to inform the residents of the chemical waste.

image. In the 1980s, the chemical industry lamented "The biggest challenge we have is convincing the public that we are their friends and not their enemy. They depend on us. And we depend on each other. Chemists are people too."<sup>260</sup>

The chemistry industry perceived itself to have been unfairly vilified for its former relationship with the Chemical Corps, when responsibility for purchasing and using chemical arms lay with government.<sup>261</sup> In 1990 the editor of Chemtech recounted an incident that occurred in the late 1960s:

I'd just come from a campus where the kids had made the Dow recruiter feel most unwelcome because Dow was making napalm. I asked what Dow told such kids. The answer went something like this: 'Your government has decided that it needs napalm. We say 'your government' because even though corporations pay taxes, they can't vote. But as good citizens of your government we abide by its wishes and make napalm because we can do it better than anyone else. If we refused to make napalm your government would have to find a less efficient producer. And if all firms refused... well, then your government itself would make it. And you know how efficient that would be. So the answer isn't to rail at companies that supply your government. Instead you have to exercise the power of the ballot box, 'throw the devils out.' We can't. We can't vote, remember?<sup>262</sup>

In the 1970s, the chemical industry's relationship with government was further soured following the creation of the Environmental Protection Agency (EPA) and Occupational Safety & Health Administration (OSHA). The chemical industry resented these two organizations for

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buried beneath their neighbourhood. In the 1970s, residents of Love Canal began observing strange chemicals oozing up through their lawns, and noticed that they and their children were suffering from an unusually high number of birth defects and illnesses such as cancer. After a long and desperate legal battle, residents were able to prove that the chemicals on their property came from the landfill, and that their health problems were likely a result of chemical contamination. The government moved the residents out of the area, and compensated them for their homes. Occidental paid \$200 million to clean up the former landfill, even though when it sold the contaminated land to the Niagara Falls schoolboard in 1952, it had warned the board of the dangers of building on top of a toxic waste dump.

<sup>259</sup> On the night of December 3<sup>rd</sup>, 1984, a holding tank containing 40 tons of methyl isocyanate (MIC) in a chemical plant owned by Union Carbide (now a subsidiary of Dow chemical) overheated and released a cloud of deadly MIC gas into the city of Bhopal, killing thousands immediately and producing long-term health problems for hundreds of thousands of people. Investigations revealed extreme negligence in regards to safety on the part of Union Carbide. In 1989, Union Carbide agreed to pay \$470 million in damages.

<sup>260</sup> "SCI Medalist Heckert Discusses Public View of Chemical Industry," Chemical & Engineering News, (9 October 1989): 10.

<sup>261</sup> George S. Hammond, "The Three Faces of Chemistry," Chemtech, (March 1987): 143.

<sup>262</sup> Benjamin Luberoff, "Who Leads Whom?" Chemtech, (May 1990): 257.

subjecting them to safety and environmental regulations that were created with no attempt to incorporate industry input.<sup>263</sup> According to industry sources, these costly new regulations stifled research and development and contributed to economic woes for the chemical industry in the 1970s and early 1980s.<sup>264</sup> Wishing to avoid the implementation of further stifling regulations, in 1979 the newly renamed Chemical Manufacturers Association vowed to take an active role in lobbying government for more input on the creation of new industry regulations. "The change is due in part to several things," said a company representative at the time, "...[The membership] has given the organization a mandate to move quickly and forcefully on key government issues affecting the industry. Overshadowing all this is a key fact: The chemical industry has come under more federal regulation since 1970 than in its entire history."<sup>265</sup>

Wishing to avoid further financial and reputational losses, in the 1980s the chemical industry began to review methods to improve its public image. At the same time, the chemical industry began to realize that its formerly profitable relationship with the military had become a liability. As Congress debated the purchase of binary arms, the chemical industry began to reconsider whether it wanted to produce chemical arms for the US government again.

In 1981, the chemical industry was moderately receptive to government contracts for binary weapon production. Chemical companies anticipated that the forthcoming binary modernization program "would mean hundreds of millions of dollars in business for the chemical industry...."<sup>266</sup> Though a number of industry executives "acknowledged they [were] far from eager to get involved in a program such as chemical warfare,.... most industry executives [said] their companies [would] step forward if called upon."<sup>267</sup> A spokesman for Dow Chemical

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<sup>263</sup> "Controversy Envelopes Environment Standards," Chemical & Engineering News, (4 March 1974): 15-17.

<sup>264</sup> Richard J. Seltzer, "Broad Changes Urged to Boost Slowing U.S. Industrial Productivity," Chemical & Engineering News, (5 June 1989): 10.

<sup>265</sup> Chris Murray, "CMA Charges ahead Under New Mandate," Chemical & Engineering News, (13 August 1979): 17. The CMA is now called the American Chemistry Council.

<sup>266</sup> "The Quiet Comeback of Chemical Warfare," Chemical Week, (19 August 1981): 52.

<sup>267</sup> *Ibid.*, 52.

stated, "As long as we have a freely elected government determining national priorities, we believe we should support those policies. If we get criticized for that, so be it."<sup>268</sup>

However, by 1982, most chemical companies had reconsidered this position. In December of 1981, the Army published a 'show-of-interest solicitation' in *Commerce Business Daily* asking for bids from chemical manufacturers for the production of methylphosphonic dichloride, a component of the nerve agent GB. At the same time, the Pentagon surveyed the willingness of large chemical firms to produce ethyl 2-(diisopropylamino) ethylmethylphosphonite, or QL, a component of the nerve gas VX. All of the large chemical companies contacted by the Army – in particular those that had been pilloried for their involvement in the Vietnam War – adamantly refused to consider such a contract. A spokesman for Mobil indicated "that it had no interest in producing QL [for the Army].... [Mobil] does not intend to reply [to the Army's solicitation],' the company is not interested in it."<sup>269</sup> A spokeswoman for American Cyanamid said that her firm "decided not to bid on it because it was not an attractive business opportunity for the firm, both economically and because of the potential adverse public reaction to such a venture."<sup>270</sup> A spokesman for Pennwalt declared that "Pennwalt is not going to bid on it.... The company has no interest in this business of chemical warfare."<sup>271</sup> An official of a large firm who asked not to be named said "Short of a national emergency, all the large firms will back away from it,"<sup>272</sup> Only a few small firms indicated they were interested in producing components of chemical arms, mostly because of the equipment upgrades such contracts would entail. However, the Army was doubtful smaller firms would be capable of producing the desired chemicals efficiently and inexpensively.<sup>273</sup>

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<sup>268</sup> Quoted in *Ibid.*, 52.

<sup>269</sup> Lois R. Ember, "Army Seeks Firm to Make Nerve Gas Chemical," *Chemical & Engineering News*, (23 August 1982): 32.

<sup>270</sup> Quoted in *Ibid.*, 32.

<sup>271</sup> Quoted in *Ibid.*, 32.

<sup>272</sup> Quoted in *Ibid.*, 34.

<sup>273</sup> *Ibid.*, 34.

Not to be deterred by the recalcitrance of the chemical industry, in August of 1983, the Pentagon requested and received from the Senate \$35 million dollars for the construction of a facility in Pine Bluff, Arkansas where it could produce the necessary chemical precursors itself. In later debates over binary funding, Congress included a stipulation that to receive further production funds, the Army had to meet certain deadlines for the production of chemical weapons. By January of 1990, it was evident that the Pentagon would not be able to meet Congress' springtime deadline for the production of a set volume of Sarin gas precursors, because the Army's chemical production facility, which was supposed to have been completed in September 1989, was months behind schedule.<sup>274</sup>

In a last ditch effort to meet Congress' schedule, the Army extracted precursor chemicals from its 1950s-era chemical stockpile. In January of 1990, stocks of thionyl chloride, a precursor of Sarin, ran out, and the Army approached two American chemical manufacturers – Occidental Chemical<sup>275</sup> and Mobay, a subsidiary of Bayer – with a contract to produce 160,000 lb of the chemical.

Citing company policy and corporate responsibility, both firms adamantly refused to accept the contract. Occidental spokesman Frank Ashley declared that Occidental would “not sell or distribute chemicals that contribute to the proliferation of chemical weapons.”<sup>276</sup> In response, the Army requested that the Commerce Department invoke the 1950 Defense Production Act, which would effectively force one of the firms to accept the production contract. Hermann Strenger, chairman of Bayer, declared that Mobay would “take all legal action at its disposal to resist pressure from the Army.”<sup>277</sup> If the firms took the matter to court, it was likely

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<sup>274</sup> Lois R. Ember, David J. Hanson, Janice R. Long and Pamela S. Zurer, “Congressional Outlook '90,” Chemical & Engineering News, (8 January 1990): 10.

<sup>275</sup> Or OxyChem

<sup>276</sup> Lois Ember, “Chemical Weapons: Firms Deny Sale of Chemical to Army,” Chemical & Engineering News, (2 April 1990): 4.

<sup>277</sup> *Ibid.*, 4.

that the Army would not receive the necessary precursor chemical by the Congressional deadline.<sup>278</sup>

Left without the supply of thionyl chloride necessary to meet the production deadline, the Pentagon and Bush administration made the best of a bad situation by offering to halt binary production during the ongoing bilateral chemical disarmament negotiations with the USSR. As discussed above, the US' insistence on the right to modernize its chemical stockpile had been a major sticking point in both the bilateral negotiations and negotiations in Geneva over the CWC. The Soviets were won over by Bush's apparent compromise; nevertheless, industry insiders understood that "Bush's concession [was] really a necessity.... [The Army had not] acquired any of the chemical... so production [had] been stopped."<sup>279</sup> In 1991, the US Army made the final decision to not proceed with binary modernization.<sup>280</sup> On 3 June 1990, less than 3 weeks after the offer to halt production, George Bush and Mikhail Gorbachev completed negotiations over the bilateral chemical disarmament treaty.<sup>281</sup> It was argued that this show of support for disarmament on the part of the superpowers greatly assisted in the completion of negotiations over the CWC,<sup>282</sup> which was signed less than two years later. Undoubtedly, without the chemical industry's refusal to produce thionyl chloride, negotiations over the CWC, and the bilateral negotiations that preceded them, would have progressed more slowly, and would have been significantly more problematic. Without this halt to CW production, which was most unwelcome to the Pentagon and Bush Administration at the time, other states would have questioned the US' commitment to chemical disarmament, and likely would have continued their own CW research and development programs.

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<sup>278</sup> It should be noted that the US made no attempt to procure the thionyl dichloride from foreign sources, for as yet unknown reasons.

<sup>279</sup> "US Offers to Halt Binary Chemical Arms," Chemical & Engineering News, (14 May 1990): 5.

<sup>280</sup> Spurgeon M. Keeny, Jr. & Erik J. Leklem, "John D. Holum - the Future of the Chemical Weapons Convention," Arms Control Today, (January/February 1997): 2.

<sup>281</sup> John Isaacs & Jacquelyn Walsh, "A Little Chemistry for the Summit," Bulletin of the Atomic Scientists, 46, no. 5 (June 1990): 1.

<sup>282</sup> Lois Ember, "U.S.-Soviet Pact on Chemical Arms Likely," Chemical & Engineering News, (19 February 1990): 5.

Besides effectively forcing the Bush administration to give up its binary production efforts, the US chemical industry assisted with the creation of the Chemical Weapons Convention in other ways.<sup>283</sup> Its reasons for becoming an ardent support of the new regime were twofold: First, perceiving the creation of further regulations under the forthcoming treaty to be inevitable, the chemical industry sought to pursue as large a role as it could in ongoing negotiations so that it could have input over any new rules for industry that could emerge from the new treaty. This way it could avoid the implementation of stifling new rules for industry, as had occurred in the 1970s under the EPA and OSHA.<sup>284</sup> The chemical industry also hoped that assisting with the creation and implementation of the CWC would improve its public image. Indeed, the Chemical Manufacturers Association declared that “a signed and ratified [CW] treaty would likely enhance the industry’s image.... At least it would put to bed the notion that ... the chemical industry harbours a merchant-of-death mentality.”<sup>285</sup> Theoretically, one might make the rationalist argument that the industry was thus acting in its own self-interests, though those interests only make sense in a context in which moral norms matter and a multilateral treaty was regarded as inevitable, developments not adequately accounted for by most interest-group or realist accounts. Moreover, by stridently refusing lucrative contracts to produce precursor chemicals, which the Pentagon needed to obtain further funding for the binary project, the chemical industry was acting quite at odds with the expectations of the Military-Industrial Complex thesis, which invariably depicts the relationship between defense industries and the Pentagon as close and mutually supportive.

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<sup>283</sup> John V. Parachini, “US Senate Ratification of the CWC: Lessons for the CTBT,” The Nonproliferation Review, (Fall 1997): 66-67.

<sup>284</sup> Lois Ember, “Fashioning a Global Chemical Weapons Treaty,” Chemical & Engineering News, (28 March 1988): 15.

<sup>285</sup> *Ibid.*, 15.

The Chemical Manufacturers Association “materially [assisted] the progress of the Geneva [CWC] negotiations,”<sup>286</sup> by directing representatives to assist the US delegation in Geneva, testing verification procedures, and helping member companies to implement the changes required by the treaty. Indeed, as Bill Clinton remarked in later years, the “CMA led the way in establishing an unprecedented degree of cooperation on CWC-related matters between the US government and US industry, and played a crucial role in mobilizing foreign chemical industries on behalf of the Convention.”<sup>287</sup>

The chemical industry accepted that “[an] effective verification scheme for a chemical arms treaty [had] to include on-site inspections [even though such] inspections open the chemical industry to loss of technical and commercial information.”<sup>288</sup> In order to create a treaty that could “be effectively implemented, and yet does the least harm to the industry,” the chemical industry involved itself closely in the treaty drafting process.<sup>289</sup> In February of 1989, Akzo Chemicals of Gallipolis Ferry, West Virginia volunteered its facilities for use in a mock inspection to test the effectiveness of a verification protocol developed by the CMA. Facilities in other countries were subjected to other proposed procedures, and the results were combined to produce guidelines for effective inspections.<sup>290</sup> Despite these efforts “to effectively protect confidential commercial and proprietary information,”<sup>291</sup> the finished format of the verification procedures still posed a danger of exposing new research developments to international scrutiny. The CMA acknowledged that “there are major concerns about the disclosure of trade secrets to or by the compliance commissions, [but stressed that] that is a cost the industry is willing to

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<sup>286</sup> “World Chemical Makers Back Chemical Arms Ban,” Chemical & Engineering News, (25 September 1989): 7.

<sup>287</sup> Quoted in Ronald Begley, “CMA Honored for Work on Convention,” Chemical Week, (17 May 1995): 12.

<sup>288</sup> Lois R. Ember, “Fashioning a Global Chemical Weapons Treaty,” Chemical & Engineering News, (28 March 1988): 14.

<sup>289</sup> *Ibid.*, 15.

<sup>290</sup> Lois Ember, “Plant Inspection Tried for Chemical Arms Pact,” Chemical & Engineering News, (27 February 1989): 6.

<sup>291</sup> “CMA Urges Change in Chemical Arms Treaty,” Chemical & Engineering News, (26 October 1987): 7.

bear.”<sup>292</sup> Such willingness to accept costs anticipated to result from the implementation of the CWC appears to defy most rationalist theories that depict industry as wholly interested in the maximization of profits. Rather, such behaviour is reminiscent of those industries considered in the public policy literature, which, like the US chemical industry, supported costly regulations when doing so might improve a tarnished public image.

In 1996, while the CWC was awaiting ratification in the Senate. Senate Foreign Relations Committee Chairman Jesse Helms (R-NC) argued that the new CWC regulations and verification procedures would be bad for small business. To the contrary, however, the CMA itself insisted “that most of the convention’s recordkeeping and inspection requirements [would] fall on CMA member companies. [And that] ‘we concluded long ago that the benefits of the treaty far outweigh the costs.’”<sup>293</sup> In March of 1997, the National Federation of Independent Business (NFIB) and the CMA distributed statistics demonstrating that the CWC would not burden small business. Small chemical companies “that might be affected number perhaps some 1000 with about 2000 facilities where discrete organic chemicals are produced. What they would be required to do is fill out a one-page form that would consist of checking quantity boxes – a matter of minutes annually, not a heavy, burdensome requirement.”<sup>294</sup> “That took the air right out of their business arguments,” said a triumphant CMA spokesman.<sup>295</sup> Nevertheless, Senator Helms continued his protest of the CWC, by continuing to discredit it in the Foreign Relations Committee and the Senate floor, and describing it as “worse than nothing.”<sup>296</sup>

Prominent Republican senators and former secretaries of defense indicated they had doubts about the new regime’s effectiveness. Indeed as late as mid April, the fate of the CWC

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<sup>292</sup> Gregory D.L. Morris, “Summitry for Chem Weaponry,” Chemical Week, (30 May 1990): 12.

<sup>293</sup> Peter Fairley, “CMA, Helms Dispute Treaty’s Impact,” Chemical Week, (14 August 1996): 12.

<sup>294</sup> Keeny & Leklem, 6.

<sup>295</sup> Peter Fairley, “Helms Holds Lock on Treaty,” Chemical Week, (26 March 1997): 11.

<sup>296</sup> Erik J. Leklem, “Senate Gives Advice and Consent; US Becomes Original CWC Party,” Arms Control Today (April 1997): 2.

remained uncertain.<sup>297</sup> Nevertheless, some prominent Republican senators came to support the CWC. Senate Majority Leader Trent Lott (R-MS) argued that “there would be ‘real and lasting consequences’ if the United States failed to ratify the treaty,” for example, if the US failed to ratify by the 29<sup>th</sup> of April – the day when the CWC entered into force – it would not become an original signatory to the treaty. It would therefore be unable to participate in the OPCW’s Executive Council or Secretariat. American citizens would not be able to act as OPCW inspectors. Of major concern was the possibility of sanctions on the American chemical industry. According to then-ACDA director John Holum,

Our own chemical industry, which exports about \$60 billion worth of chemicals per year and is very much concerned about the loss of business that would ensue if the United States is not a party to the treaty. Not only will formal trade restrictions phase in, but industry is concerned that its competitors, particularly in Germany and Japan, which are members of the treaty, will market opportunistically, saying their governments have ratified the convention while the United States has not and may not, and so their customers should look elsewhere for stable supplies.<sup>298</sup>

Wishing to avoid this outcome, Lott became a keen supporter of the CWC, and was able to persuade many freshman Republican Senators to reconsider their objection to the treaty. Thus it appears that while Executive support for the CWC seems to have been driven more by security concerns, the Senate’s support appears to have hinged more upon the interests of influential domestic actors. That government can be pulled in different directions by competing international and domestic pressures is recognized by the two-level games approach. This approach also recognizes that in the US in particular, domestic pressures often trump international ones.<sup>299</sup> Thus Senate approval for the CWC was vital to the treaty’s success.

Negotiations between Helms, Lott, Senate Minority Leader Tom Daschle (D-SD), National Security Advisor Samuel Berger, and ranking minority member of the Senate Foreign Relations Committee Joseph Biden (D-DE) resulted in the creation of a set of 28 conditions “that

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<sup>297</sup> Leklem, “Majority Leader Emerges as Key to Fate of CWC in Senate,” 1-2.

<sup>298</sup> Quoted in Keeny & Leklem, 3.

<sup>299</sup> Putnam, 443.

would accompany a resolution of advice and consent to ratification.”<sup>300</sup> Five of these 28 conditions pertain directly to the US chemical industry. Condition 9 required the president to provide annual certification that American chemical, biological and pharmaceutical companies were not being “significantly harmed” by the Convention’s regulations. Condition 16 required the president to notify Congress whenever he received persuasive evidence that an OPCW employee willfully disclosed confidential business information. In addition, this condition required the OPCW to waive immunity for such individuals, or risk the withholding of US contributions to the OPCW budget. Condition 21 required the OnSite Inspection Agency (OSIA) in the Department of Defense to provide assistance “in advance of all routine and challenge inspections in the United States, with the consent of the owner or operator of the inspected facility.”<sup>301</sup> Condition 23 required the president to give notification if additional chemicals are proposed to be added to the schedules of restricted chemicals. The president’s report would “detail the impact of the change on US industry, including a cost-benefit analysis.”<sup>302</sup> Condition 28 required the president to certify that

a criminal search warrant will be obtained for any US facility subject to challenge inspection, if consent of the owner or operator has been withheld.... This [condition responds] to concerns that US citizens and businesses might be subject to unreasonable searches and seizures by the OPCW, that would contravene their rights under the Fourth Amendment to the Constitution.<sup>303</sup>

In addition to the 28 conditions, Helms was able to extract a “commitment from the Clinton administration to consolidate three foreign policy agencies [including ACDA] within the State Department, a bureaucratic reorganization that Helms had been seeking since the previous session of Congress.”<sup>304</sup> The Senate discussed the CWC and the conditions attached to it on 24

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<sup>300</sup> *Ibid.*, 1.

<sup>301</sup> “Summary of the Senate Resolution of Ratification to the Chemical Weapons Convention,” Arms Control Today, (April 1997): 2.

<sup>302</sup> *Ibid.*, 4.

<sup>303</sup> *Ibid.*, 5.

<sup>304</sup> Parachini, 65.

April, 1997. After an 11-hour debate, the Senate approved the resolution of advice and consent to ratification, by a vote of 74 to 26.<sup>305</sup>

Though it surely appreciated the protection these conditions offered, it must be recalled that the US chemical industry 'unequivocally' supported the treaty years before such conditions were attached to it.<sup>306</sup> While the chemical industry's support for the CWC appears altruistic at first glance, if we take into account the context in which the chemical industry was operating we can see that its behaviour, in common with most industries, was actually motivated by self-interests. The chemical industry sought to improve its public image and ensure that the inspection regime called for under the CWC would be effective and would not put trade secrets at risk of exposure – though as demonstrated above, the chemical industry accepted the possibility that this could occur. Refusing to produce precursor chemicals for the binary modernization, supporting the CWC, and assisting with negotiations over it were ideal ways to achieve these goals. However, most rationalist theories are unable to explain why the chemical industry chose to define its interests as the improvement of its public image through the support of chemical disarmament and arms control instead of simply short-term profit maximization through the avoidance of costly regulations, as industries are usually assumed to pursue. The US chemical industry rationally pursued its goals, but rationalist theories are indeterminate in explaining what those goals will be in a given circumstance and how an industry's recent history can affect the policies it supports, a point already recognized in the US public policy literature, but equally important to considerations of how and why industry influences American foreign policy.

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<sup>305</sup> Leklem, "Senate Gives Advice and Consent," 1.

<sup>306</sup> Barry Kellman & Edward A. Tanzman, "Chemical Treaty Deserves Ratification," The Bulletin of the Atomic Scientists, (January/February 1997): 16.

## Chemical Weapons Control since 1997

Despite the continued enthusiastic support of the US chemical industry for the CWC, the implementation of the regime has been rather problematic. Though in 2000 the United States was far ahead of schedule in regards to the destruction of its chemical weapons stockpile,<sup>307</sup> every signatory to the Convention is now behind schedule. Not a single nation will meet the original 2007 deadline for stockpile destruction, nor likely an extended deadline in 2012. "In May [2000] the US General Accounting Office ... released a report estimating that the USA would not meet the ... deadline ... because incineration is unacceptable to Colorado and Kentucky and because the proposed alternative technologies have not yet been proven safe and effective."<sup>308</sup>

In addition, the implementation legislation enacted by the US Senate in 1998

contains a number of provisions that could undermine international adherence to the CWC.... [Of particular concern are] a national security waiver that would allow the president to block a challenge inspection, and a provision that would prevent the transfer of inspection samples from U.S. facilities outside of the United States for analysis. Both violate the letter and intent of the convention.<sup>309</sup>

Another US exemption reduces the number of industry facilities that have to declare chemicals that might be combined to make chemical weapons. As we will see in the next chapter, the US demanded that analogous provisions be included in the verification regime for the BWC.

America's contemporary aversion to arms control regulations has extended to the implementation of regulations regarding annual declarations for industry and industry inspections. In December of 2000, the Commerce Department finally "issued regulations

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<sup>307</sup> Jean Pascal Zanders, Melissa Hersh, Jacqueline Simon & Maria Wahlberg, "Chemical and Biological Developments and Arms Control," *SIPRI Yearbook 2001: Armaments, Disarmament & International Security*, (Oxford: Oxford University Press, 2001): 518.

<sup>308</sup> *Ibid.*, 522.

<sup>309</sup> Erik J. Leklem, "CWC Implementing Legislation Passed by Senate: Future Uncertain," *Arms Control Today*, (May 1998): 1; Zanders, *et al.*, 514.

specifying procedures for submitting US chemical industry declarations under the ... CWC, effectively ending over two years of technical US non-compliance with the ... treaty.”<sup>310</sup> Also in 2000, the US Commerce Department announced its intention

to send a host team – consisting of officials from the Commerce Department, the FBI and the Defense Threat Reduction Agency – to accompany each OPCW inspection team. The Commerce Department, claiming budget shortfalls and insufficient staffing, is not planning to host nearly as many industry inspections as the OPCW wants to conduct. Furthermore, citing concerns over the protection of commercial proprietary information, the department is not planning to support sequential industry inspections or industry inspections that occur within one week of each other. Also, the department does not intend to host more than one OPCW inspection at a time.<sup>311</sup>

In addition, though private industry happily accepts international inspections, military facilities have not been as welcoming, and have sought to sabotage the efforts of international inspectors.<sup>312</sup> As we will see in the next chapter this reaction is similar to the Pentagon’s reaction to the proposed establishment of BW verification protocol. Even though the implementation of the CWC in the United States has not proceeded without difficulties, the signing, ratification and entry into force of this treaty remains a significant achievement. The states party to this treaty are legally bound to accept international inspections of government and private facilities to ensure that they are complying with treaty obligations. Even if some member states attempt to sidestep their treaty obligations, the status of the CWC as international law gives other states with compliance concerns a legal basis to remind evasive states of their responsibilities. As we will see, without a similar inspection regime with equal status in international law, the BWC has no provisions requiring states to accept inspections, and no mechanism to reassure concerned states that their fellows are adhering to their obligations.

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<sup>310</sup> Seth Brugger, “US Chemical Industry Regulation,” Arms Control Today, (January/February 2000): 1.

<sup>311</sup> *Ibid.*, 1-2.

<sup>312</sup> Amy Smithson, “US Implementation of the CWC,” The Chemical Weapons Convention: Implementation Challenges and Solutions, ed. Jonathan Tucker (Monterey, California: Monterey Institute of International Studies, 2001), 23-26.

## Questions and Answers

This chapter will conclude by offering preliminary answers to some of the theoretical questions about scientists, industry, and their relationship to each other posed in the last chapter. As they were in chapter 2, the questions to be answered will be rendered in bold lettering. The answers will follow each group of questions:

As we saw in Chapter Two, the two-level games literature raised important questions regarding the manner in which the interaction of domestic and international forces affected US policy. Specifically the questions raised by this approach were: **How was a coalition of actors able to work together to push through the creation and ratification of the CWC? In particular, how were they able to overcome the constraints imposed by the Senate, and the tendency towards US self-sufficiency? Who were the relevant actors, and why were they more influential than others? What qualities made some interested parties more influential than others?**

Without repeating the history presented above, the chemical industry formed the core of a coalition that also included sympathetic Congressmen, and domestic and international scientists and arms control experts working on the text of the Convention. The conditions imposed by Congress on the funds allocated to the binary modernization plans were sufficiently strict that the Pentagon could not meet them, forcing it to seek chemical components from industry. By refusing to produce binary weapons for the Pentagon, the chemical industry removed any chance it had of meeting the Congressional funding deadline. Forcing the chemical industry to produce chemical weapons would require a lengthy legal battle that would draw a lot of attention to the issue, and would likely portray the supporters of the binary plan in a negative light. Rather than risk this embarrassment, President Bush, Senators pushing for binary weapons, and the Pentagon

decided to take the high road and renounce the continued production of CW. This decision removed the ambiguity of the US position<sup>313</sup> on CW and reinforced the Bush Administration's commitment to the creation of the CWC. Once the binary option had been removed from the table, George H.W. Bush pushed hard for the fast completion of the CWC.

The chemical industry then worked with arms control experts and CCD negotiating parties to create a reasonably effective and acceptable chemical regime that was able to protect the interests of domestic industry. When the Senate considered the treaty for ratification, the chemical industry was able overcome the standard objection to multilateral regimes – that they can hurt domestic business – by arguing that CMA member companies were willing to shoulder any burden produced by the CWC. The actions of the US chemical industry are not easily accommodated by the Military-Industrial Complex literature, which portrays defense industries as always eager to accept government contracts.<sup>314</sup> Rather, such behaviour can only be understood if it is appreciated that industry can define its interests in a number of ways, depending on the context. As acknowledged by Wilson, Plotke, and Quirk in the public policy literature, industry motivation is complicated, and can be affected by recent crises that generate bad publicity for the industry.

It appears that these actors were able to overcome the objections of the Senators and DOD officials both because they controlled necessary resources and because public opinion was on their side. Congress controlled the Pentagon's access to funds for binary weapons, and though it eventually allocated funds for their production, it attached many conditions that had to be met for further funding to be allocated, such as the production deadline. The Pentagon couldn't meet this deadline on its own, so it had to approach private industry, which adamantly refused to accept a contract for the production of chemical weapons components.

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<sup>313</sup> Highlighted in Isaacs, 10.

<sup>314</sup> Milner, 33, 37.

It seems that policymakers who had supported the binary modernization plan were unwilling to start a legal battle because of the unwelcome public attention such a battle would bring to the issue. Undoubtedly, in a legal battle the chemical industry would seek to portray DOD, the White House, and the Senators who supported binary weapons as warmongers. Instead, by giving up the binary plan and pushing for the CWC, Bush was able to win some domestic and much international support.

The chemical industry was able to overcome objections raised by Jesse Helms during the ratification process because they were able to demonstrate the invalidity of his argument that the treaty would harm domestic industry. Even if Senator Helms possessed a personal antipathy towards multilateralism, he could hardly use that as a justification for his opposition to the treaty. Left without a clear argument as to how the treaty would harm the interests of Americans, Senator Helms abandoned the fight. Again, theories that assume that defense industry interests are solely limited to profit maximization, offer no explanation for the chemical industry's apparent interest in improving its public image. That this industry could develop new interests resulting from recent interactions with other actors is however recognized by some authors in the US public policy literature and the constructivist approach in international relations, as suggested in Chapter Two. It is increasingly apparent that the actions of the US chemical industry cannot be understood without reference to these theories.

This therefore is an excellent opportunity to answer the questions regarding the actions and interests of industry arising from the Military-Industrial Complex literature that were posed in the last chapter. These questions included: **Why would the chemical industry lend its full support to a regime that stood to compromise its profits? Should the chemical industry be considered part of the Military Industrial Complex, or is there something wrong with**

**current understandings of the MIC?** The US public policy literature suggested a few related questions about the motivations of industry: **What are the chemical and biotech/pharmaceutical industries interests in regards to arms control or regulatory policies? Have they changed over time? Have these changes occurred in response to changing ideas? What role did scandals and public understanding of the issue area play in the evolution of these industries' interests?**

As we saw, the chemical industry supported the CWC both because it was in dire need of a boost to its public image, and because it believed that by being an active participant in negotiations over the treaty's verification procedures, it could help create a regime that offered reasonable protection to trade secrets. Adhering to CWC regulations, preparing reports for the BIS, and the possibility of losing trade secrets through inspections are probably still costly to the chemical industry. However, the US chemical industry accepted such costs as necessary towards the achievement of its goal of an improved public image. In the long run, an improved public image could contribute to greater public trust, reduced regulations, a CWC that protected its interests, and therefore increased profits for the chemical industry. However, these actions cannot be interpreted as the result of a simple financial cost-benefit analysis. After all, even if the public truly reviled the US chemical industry, it would still be largely dependent on it for many products. So would an improved public image really make much difference to industry profits? And how could industry be certain that its efforts to improve its public image would necessarily translate to greater public trust, a reduction of costly regulations, and an increase to profits? Wouldn't simply accepting government contracts for CW production be a less uncertain, more tried-and-true strategy towards the maximization of profits?

The US chemical industry's decision to pursue profit maximization by ending its former relationship with the Army in order to improve its public image represented a real leap of faith

for the chemical industry – refusing short term profits from weapons contracts in hopes of achieving long term profits by improving public image. Such a redefinition of interests does not fit with how international relations scholars depict how weapons industries operate. In particular, it does not fit with how the Military-Industrial Complex literature portrays the behaviour of defence industries, as the US chemical industry once was.

As we have seen above, the US chemical industry received huge government contracts for the production of chemical arms, and along with the Pentagon, it lobbied for more funding for chemical weapons, which Congress gladly allocated to it out of anticipation that this industry could develop deathless wars. However, concerns for public opinion compelled the chemical industry to abandon its once close and mutually profitable relationship with the military. The Military-Industrial Complex literature doesn't usually acknowledge that industries may be affected by public opinion in this manner. Instead, it portrays defense industries as either blatantly unconcerned with public opinion, or capable of hiding from public scrutiny behind a screen of shady backroom deals and catchall spending bills.

Though the MIC literature would be at a loss to explain the behaviour of the chemical industry, other theories may be able to. As explained in Chapter 2, the US public policy literature has long been aware that in the wake of external shocks, such as the Agent Orange scandal or disaster at Bhopal, industry can support the implementation of regulations if doing so will prevent further damage to their public image. From this case it is apparent that under similar circumstances industry may also lend its support to costly arms control inspection regimes. As will be discussed further in the last chapter, this realization that – like the industries examined in the US public policy literature – former Military-Industrial Complex industries can actually support regulatory policies that at first glance seem costly and counterintuitive, may be one of this dissertation's major contributions to IR theory.

Recall from the discussion of epistemic communities in the second chapter that in their analysis of the biosciences and biotech industry, Susan Wright and David Wallace suggested that the close connections<sup>315</sup> between this science and industry have led to the biosciences' preoccupation with intellectual property, and that this preoccupation has influenced US policy towards the BWC. This begged the question of whether a more distant relationship between the sciences and chemical industry would lead to the fracturing of an alliance that might otherwise use its combined influence to get the US government to forego arms control in favour of the protection of intellectual property. Thus, the question to be answered is: **Does the closeness or distance between the chemical sciences and the chemical industry make a difference?**

The relationship between science and the chemical industry has certainly been frosty and distant. Tensions between science and industry seem to have begun after the Second World War, when the US government began to invest heavily in chemical research. In the post-war era:

Government increasingly offered scientists, including a great many young ones just beginning their careers, the best of both worlds – to live in academia on a Washington income.... And where industry, whenever it offered support, had the insulting habit of expecting results, government was willing to support the scientist for science's sake, or so it seemed. Indeed, anyone who in the palmy days of the early 1960s raised such nasty questions as the accountability of grant-receiving scientists for performance and results risked being branded an anti-intellectual.... As a consequence, science became accustomed to large sums of public money.... [and] came to consider the question of economic application and economic benefits to be irrelevant and irksome."<sup>316</sup>

Thus, government funding became preferable to industry funding, and chemists adopted the notion that 'pure' research was preferable and more important than applied chemistry. This relationship worsened during the 1970s, "[when tensions] over Vietnam and the general rebellion during the sixties alienated university and industry. Some schools pressured by

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<sup>315</sup> In terms of financial support and promotion of each other's interests

<sup>316</sup> Peter F. Drucker, "Antagonistic Interdependence," *Chemtech*, (March 1981): 144.

students' demands passed up research money from large corporations associated with the war effort."<sup>317</sup>

In the early 1990's, this estrangement was still prevalent, as a mini-survey of academia and industry conducted by the ACS revealed:

It was interesting that one professor at a large university felt that 'industrial chemistry has no place in the chemistry curriculum,' and industry should 'confine its interests to more substantial contributions to academic basic research....The extent of interaction with industry by academe and with academe by industry are not impressive.... Although industrial chemistry is slowly being integrated into undergraduate curricula, colleges and universities are slow to recognize the importance and value that accrue from doing so.'<sup>318</sup>

Even though it is apparent that, as predicted, the relationship between the chemical sciences and the chemical industry is distant and distrustful, it is unsafe to conclude that the relative distance of this relationship is a major cause of the differences observed between the two cases. Granted, the scientific community's criticism of the chemical industry during the Vietnam War may have been a source of shame for industry, which provided an added impetus for it to improve its public image. However, there is little evidence to support the conclusion that the relative distance of this relationship hampered either party's effectiveness at lobbying government. In particular, the chemical industry has been quite effective at lobbying government to adopt verification procedures that adequately protect trade secrets. Thus, even though there is a definite correlation between the closeness or distance of the bond between science and industry and the success or failure of arms control negotiations, the relationship is entirely too complex to accept that this correlation indicates causation.

The discussion of epistemic communities in Chapter Two suggested several questions about the motivations of scientists, and how they sought to influence policy. Some of the questions

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<sup>317</sup> Gilbert F. Richards, "Technologists Need Liberation," Chemtech, (October 1980): 586-587.

<sup>318</sup> Philip S. Landis, "Industry and Academia: A Vital Interface," Chemtech, (March 1988): 158-159.

suggested by this literature were: **In what matters related to CW did scientists involve themselves? What was the composition of the community that tried to influence CW policy? What goals do these scientists pursue? Why would scientists sometimes choose to weigh in on arms control matters for moral reasons? Do these communities pursue profit maximization like other lobby groups? Should this community be considered an epistemic community?**

As described above, a community of American scientists sought to influence policy in regards to a large number of issues related to chemical weapons. These issues included the ratification of the Geneva Protocol, the end of herbicide usage in Vietnam, the Soviet Union's alleged use of 'yellow rain' in Asia, the health risks Agent Orange posed to Vietnam Veterans, the costs and benefits of SDI, nuclear weapons control, the binary issue, and the creation and ratification of the Chemical Weapons Convention.

This research project began with the assumption that the scientists who would be most interested in matters related to chemical weapons would be chemists. After all, Haas tells us that an epistemic community ought to have an "authoritative claim to policy-relevant knowledge within that domain or issue-area."<sup>319</sup> Who would have more claim to policy relevant knowledge on chemical weapons than chemists? However, it has become evident that along with chemists, physicians, plant biologists, and physicists have worked together to influence policy in the same issue areas, even if their own areas of expertise are virtually unrelated to the matter at hand. Thus, instead of describing the actions of the 'chemical science community,' this chapter has referred to the 'scientific community' in general.

This begs the question of whether this group ought to be considered an epistemic community or simply an interest group, if what unites them is not their expertise in and shared knowledge of a particular issue area, but simply a shared interest in matters related to chemical

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<sup>319</sup> Haas, 3.

weapons. To answer this question it is necessary to realize that even though significant disagreement persists over whether scientists ought to pursue moral or political ends, when scientists do decide to pursue these ends, there is very little disagreement among them or their critics that the goals they pursue and the policies they promote are the ones supported by conclusions that are scientifically valid. That is to say, even though the scientists who choose to involve themselves in policy arguments about chemical weapons come from many diverse sciences, the policies they advocate are always the same: the ones that are most supported by existing evidence. Therefore, while the activist element of the scientific community is certainly united in its belief that scientists ought to pursue certain moral and political ends, it is also united in its shared notions of how one establishes validity, as is a defining feature of an epistemic community.<sup>320</sup>

For example, even though their distaste for the Vietnam War might have made the scientific community ideological allies of the veterans who wished to establish a link between Agent Orange exposure and later health problems, scientists concluded that the data was too spotty for such a link to be made. A shared understanding that it would not be valid to conclude that the multiple health problems suffered by veterans could only have been produced by Agent Orange prevented these scientists from accepting the connection between the two even if politically it would have been convenient for their ideological views. From this case we can see that it was shared notions of validity that determined the actions of scientists, and not shared interests with Vietnam veterans. Indeed, Haas tells us that epistemic communities are likely to be reluctant to “invoke policies based on explanations that they do not accept.”<sup>321</sup>

These shared notions of validity are likely derived from a collective adherence to the scientific method, which allows scientists to discern compelling evidence and arguments from

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<sup>320</sup> *Ibid.*, 17-18.

<sup>321</sup> *Ibid.*, 20.

the specious reasoning often offered by government and accepted by the general public. Objectivity, the necessity of ruling out other explanations, sound reasoning, and the importance of solid evidence on which to base one's conclusions are factors that scientists must always consider in their own work. These considerations also form the basis of scientists' critique of government policy. As we have seen, there are many examples from this topic area of scientists demanding the objective study of issues to see whether government's preferred interpretation of events is the correct one. There are also numerous examples of scientists warning against negative, or morally unacceptable consequences of government's preferred policies. Even though individual members of the US scientific community specialize in wildly different areas, they are united in their ability to provide critical analysis of government policy based on scientific evidence. Indeed, authors working in the epistemic communities tradition have long accepted that their members can come from different professions or disciplines, but can still be united in their beliefs that one policy is more scientifically sound than another.<sup>322</sup>

Since the members of this community study vastly different areas of the natural and social world, it is difficult to conclude that they possess the shared causal beliefs Haas describes as necessary to "serve as the basis for elucidating the multiple linkages between possible policy actions and desired outcomes."<sup>323</sup> Such connections between policy and desired outcome are not always obvious, particularly in these cases when scientists are asked to comment on what sort of verification regimes are necessary to produce global confidence that other states aren't cheating. There is no clear way to determine how much verification will satisfy all actors, so recommending one policy over another can be more a judgment call than an objective explanation of causal connections. However, it may be argued that shared causal beliefs often follow from shared notions of validity. Even if all members of the community do not wield the

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<sup>322</sup> Emmanuel Adler, "The Emergence of Cooperation: National Epistemic Communities and the International Evolution of the Idea of Arms Control," *International Organization*, 46, no. 1 (Winter 1992): 101.

<sup>323</sup> *Ibid.*, 3.

specialized knowledge necessary to make these causal connections, as long as non-specialist members use their own critical faculties to evaluate whether the causal links made by the members possessing this specialized knowledge are cogent, and then accept the linkages between policies and predicted outcomes as true, the community can be said to share the same causal beliefs.

The scientists studied in this case appear to share other qualities beyond shared notions of validity that are also necessary to be considered an epistemic community, including a shared policy enterprise, motivations that are not limited to material gain, and a transnational element. Whether or not these scientists choose to act on their critical analysis by trying to change government policy towards one that is more scientifically or morally sound, appears to be a matter of personal belief. Scientists like Matthew Meselson chose to involve themselves in CW matters out of dread for what it would mean for humanity if developments in genetic engineering could be applied to CBW. Such visceral reactions are entirely personal matters. However, it is reasonable to assume that most scientists – even those who develop chemical and biological weapons – are united in a belief that science ought to improve the lives of human beings or the wellbeing of the planet. As mentioned previously though, some scientists believe that their objectivity would be compromised if they were to pursue moral or political goals, and thus will not allow their personal beliefs to direct their actions. Other scientists, referring to the work of Robert Oppenheimer, suggest that because scientists now wield such power, they have an obligation to make sure it is used wisely.<sup>324</sup> It is these scientists who take action to promote policies that are scientifically and morally sound that form the core of this epistemic community.

Lending further support to the assertion that the scientific community observed here ought to be considered an epistemic community is the fact that this community has not been united by a desire to promote shared financial interests. As we learned in the sections on SDI and

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<sup>324</sup> Don K. Price, "J. Robert Oppenheimer," *Science*, 155 (3 March 1967): 1194.

nuclear arms control, chemists and nuclear physicists actually rejected profitable government research contracts that could contribute to the development of Star Wars technology or nuclear arms. While a business-based lobby group might be motivated by a desire to maximize its member companies' profits, it is clear that this community was motivated by a normative desire to prevent the development of nuclear and space-based weapons.

Furthermore, as is the case with epistemic communities, the US scientific community possesses a transnational element. In negotiations over the CWC, scientists representing official negotiating parties and NGOs worked together to create a workable, effective verification regime. Furthermore, prior to the ratification of the Geneva Protocol, scientists in Britain – which supported the cause of chemical arms control much earlier than the US – wrote letters to the editors of American science journals, calling on their American colleagues to take what action they could to promote the Protocol. Furthermore, in the American scientific community there has been a strong sense of collegiality towards foreign scientists. For instance, American chemists were ardent supporters of colleagues who were jailed or subjected to internal exile by the Soviet and Chinese regimes.<sup>325</sup> Out of concern for such prominent scientists as Andrei Sakharov, Orlov, and the *refuseniks*, US scientists appealed to their own governments and refused to participate in exchanges with the offending states.<sup>326</sup> Not only has this transnational element assisted with the coordination of international efforts towards crafting the CWC, it gave the US scientific community a wider worldview by allowing it to better understand the actions of governments in other countries.

Nevertheless, transnational connections between scientists are a key element of Haas' definition of epistemic communities: it is these connections that widen scientists' worldview and

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<sup>325</sup> Richard Seltzer, "US Scientists Urge Release of Jailed Chinese Colleagues," Chemical & Engineering News, (15 June 1992): 20.

<sup>326</sup> "Concern Grows Over Soviet Dissident Scientists," Chemical & Engineering News, (18 July 1983): 5; "Protests, Appeals to Free Sakharov Growing," Chemical & Engineering News, (23 May 1983): 5; "Sakharov Treatment Protested in US," Chemical & Engineering News, (24 November 1975): 5.

assist them with the coordination of policies across many states. The connections between the scientists studied in this case and counterparts overseas have admittedly been understudied. While the scientists observed in this case certainly possess these connections, in future analysis it will be useful to probe further how their connections with foreign colleagues affected these scientists' viewpoints and actions.

In sum, the scientific community examined in this chapter possesses the shared set of normative beliefs, shared notions of validity, shared causal beliefs, and common policy enterprise necessary to be called an epistemic community. They also have a transnational quality, and do not merely pursue profit maximization, as a mere lobby group would. In this way, the community examined above meets all of the requirements necessary to be classified as an epistemic community, and will be referred to as such in subsequent analysis.

Another set of questions regarding the declining influence of scientists arose from the discussion of epistemic communities in Chapter Two: **Were scientists at least partially responsible for the policy choices the US ended up making? Were they always successful? Why not? Why has there been less and less influence from scientific communities in regards to chemical weapons since the 1980s? Can the epistemic communities literature account for this?**

It is clear from the above analysis that the CW epistemic community observed here influenced US policy in regards to the ratification of the CWC, the end of herbicide use in Vietnam, yellow rain, and to some extent the creation of the CWC. There is not enough evidence to conclusively determine whether the community's actions resulted in any changes to SDI, nuclear weapons, or binary weapons policy, but this wasn't for lack of trying. The nuclear and SDI issues are far too complex and unrelated to CW policy for lengthy consideration here, though they both merit further attention in later studies to compare with the cases of this

dissertation. As for the binary question, as suggested above, the scientific community's failure to persuade the US to give up its production plans appears to be the product of Reagan's declining respect for science advice in general, a diversion of the community's attention to other matters requiring science advice, an increasing amount of science advice from other sources, and, most interestingly, a gradual solidification of ideas about chemical weapons policy among American policymakers.

This decline in influence might appear to indicate that the CW epistemic community is not a significant explanatory variable, but this is not true either. The epistemic communities literature is actually capable of explaining this decline in influence. Haas tells us that conditions of uncertainty characterized by a

strong dependence of states on each other's policy choices for success in obtaining goals.... give rise to demands for particular sorts of information.... [consisting of] depictions of social or physical processes... and the likely consequences of actions that require application of considerable scientific or technical expertise.... Epistemic communities are one possible provider of this sort of information and advice.... The members of a prevailing community become strong actors at the national and transnational level as decision makers solicit their information to them.<sup>327</sup>

In the same way, during the presidential CW policy review Kissinger and Nixon solicited assistance from Matthew Meselson, who was a close friend of Kissinger's and had been an ACDA advisor since 1963. Meselson used this opportunity to clarify the causal relationship between chemical weapons and US security. He explained that it would be foolhardy to develop an inexpensive weapon of mass destruction because when poor states got a hold of this technology, they would use it to offset the strategic dominance offered by nuclear weapons. To avoid this outcome, the US now saw that it had to pursue the goal of international chemical weapons control, even if it also wished to maintain its own stockpile for deterrence purposes.

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<sup>327</sup> Haas, 4.

Haas makes it clear that it is primarily under conditions of uncertainty that epistemic communities can exert influence over policymakers. Furthermore, policymakers must be aware of the uncertainty of the situation, and solicit the advice of the epistemic community. However, Haas acknowledges that "Decision makers do not always recognize that their understanding of complex issues and linkages is limited, and it often takes a crisis or shock to overcome institutional inertia and habit and spur them to seek help from an epistemic community."<sup>328</sup> By the 1980s the US had been pursuing the same chemical weapons policy for almost 20 years. As mentioned above, these dual goals were the product of the policy review conducted in 1969, when Matthew Meselson introduced the idea that it would be in the United States' best interests to prevent the proliferation of CBW to other states, and PSAC suggested that until all other states had destroyed their own chemical stockpiles, the United States ought to maintain its CW capabilities with the acquisition of binary weapons.

By the 1980s Reagan and his DOD advisors saw no reason to change their minds on this issue. No shocks occurred to prove to them that their existing understanding of the issue was wrong. In fact Soviet concessions in the summer of 1987 served to confirm their understanding that building binary weapons would assist in the creation of the chemical weapons regime. These policymakers saw no reason to believe their understanding was incorrect, so they did not seek the advice of an epistemic community, and Matthew Meselson's advice was left unheeded. As we can therefore see, Reagan's disregard of Meselson's later advice is not so much a testament to the failure of an epistemic community, as it is an indication of the strength and persistence of the ideas about chemical weapons policy that Meselson helped impart to US policymakers in the 1960s.

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<sup>328</sup> *Ibid.*, 14.

A final set of questions arises from Robert Putnam and Helen Milner's discussions of two-level games, which have difficulty explaining how an interest group that doesn't control a lot of votes or resources – such as the groups of scientists studied in the epistemic communities literature – could have significant influence over policy. Though the two-level games approach offers great insight into how government must balance between competing interests at the domestic and international levels, this approach, and the study of interest groups in general, have difficulty accounting for the influence of ideas. Thus, the questions regarding the role of scientific communities arising from this approach were: **If scientists don't control votes or campaign funding, why would they have influence over policy? What is the source of their influence? Do personal relationships with policymakers matter more than everyday relationships between bureaucrats? What methods did this community employ to influence government?**

Government seems to have deferred to the judgment of Matthew Meselson and the scientists discussed above largely because of their inarguable expertise in matters where government's own understanding was demonstrably faulty. Kissinger deferred to Meselson's judgment over the dangers of chemical weapons in part because he was a respected colleague and leader in the burgeoning field of molecular biology, but also because Kissinger himself admitted that his understanding of CBW issues was limited.<sup>329</sup> The US Army deferred to Meselson's judgment about the environmental effects of herbicide use in Vietnam because he and other expert colleagues could demonstrate specific areas where existing Army studies of the matter were faulty, and because he himself had gone to Vietnam to study the problem in depth, and had even invented a new method of measuring dioxin contamination for the study.

Furthermore, even though the epistemic community here did not control votes, it did have some influence over public opinion. For example in the 1960s, by publishing articles in science journals and persuading science editors of major newspapers to write on issues related to

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<sup>329</sup> Matthew Meselson, interview with author.

chemical warfare, Matthew Meselson was able to draw public attention to the problem of America's poorly thought out CBW policies.<sup>330</sup> Once the public's attention had been engaged, Congressmen and Senators involved themselves with the issues, and soon these groups pressured Nixon to undertake a policy review of chemical weapons policy.

From the above case study it is also evident that individuals who had a significant impact on US CBW policy had pre-existing close relationships with the president or key policymakers. For example, prior to Kissinger's appointment as NSA, Matthew Meselson regularly had lunch with him in a cafeteria at Harvard while both were going through a divorce.<sup>331</sup> So when Kissinger needed advice on CBW, who else would he turn to but an old friend? The capacity to parlay one's personal relationship into influence over presidential or policymaker opinion of arms control is not limited to scientists. Even without specialized expertise in the issue area, relatives and close friends can also have a significant impact on policymaker perception of arms control treaties. For example, the mother of George H.W. Bush, Dorothy Bush, remembered the horrors of chemical weapons use from the First World War. She urged her son on several occasions to negotiate and sign a chemical convention. Arms control experts acknowledge that her advice encouraged Bush to adopt a leading role in CWC negotiations.<sup>332</sup>

Indeed, even though there exists a huge community of experts in possession of important policy-relevant information about chemical weapons, and the theoretical literatures in international relations have focused upon such agents and avenues of influence, policy-makers appear attentive to the ideas of friends and relatives, particularly in times when they themselves perceive a need for advice. To the extent that this is the case, then an epistemic community's efforts at changing public opinion or working with scientists in other states to coordinate international policy may well be marginalized if no member of the community also has access to

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<sup>330</sup> The 1968 Dugway accident and public fears about chemical weapons transport also drew attention to the issue

<sup>331</sup> Matthew Meselson, interview with author

<sup>332</sup> Lynn Klotz, interview with author.

the ear of key policymakers. Furthermore, in terms of theorizing this phenomenon, personal relationships are an accidental, historically contingent occurrence. How can anyone predict when and between whom such a relationship will develop? If Meselson and Kissinger weren't both going through a divorce at the same time, would US CW policy have turned out vastly differently? Would the US have signed the CWC if Dorothy Bush didn't remember the horrors of chemical warfare in the First World War? While such counterfactuals are impossible to answer, the findings of the role of such contingencies here at the least points to a requirement for a degree of modesty in expectations of the predictive capacity of our social scientific theories.

These cautions, however, do not indicate a need for pessimism for the utility of the study of epistemic communities. Instead of thinking of relationships between policymakers and close advisors as exclusive and closed to outside persuasion, the epistemic community should think of the relationship as an opportunity to affect one of the chief influences on the policymaker, and one who is likely to be sympathetic to the objectives pursued by the rest of the community. Having the ear of someone who has the ear of important policymakers represents an enormous opportunity to exert influence.

This appears to coincide with arguments made by Matthew Evangelista. As mentioned in Chapter 2, Evangelista argues that personal relationships with high-level Soviet policymakers allowed transnational nuclear experts to exert significant influence over nuclear policy in the USSR. It appears from this case study that personal relationships with high ranking American policymakers are an equally important source of influence for scientists, no small finding insofar as the literature has generally made a distinction on the likely importance of these mechanisms between the open democratic polities such as the U.S. and more closed political systems. This argument may have significant implications for Evangelista's theory, and therefore will be explored further in the conclusion.

In addition, even though the role of personal relationships between advisors and policy makers is a largely contingent phenomena, which is difficult to predict, the fact that these relationships can result in dramatic changes to policy shows us that US defense policy is *not* perpetually, unbendingly determined by the coercive anarchic state system, an eternally influential military-industrial complex, or a Senate that is unyieldingly averse to multilateralism. That is, against the expectations of more structural explanations, agency can matter. If we accept that accidents such as friendships can result in policy changes, then suddenly we as researchers are confronted with an enormous possibility for change to US arms control policy.

#### **Chapter 4 – CASE STUDY #2 – BIOLOGICAL WEAPONS CONTROL: 1965-2006**

The present chapter will examine the relationship between industry and scientific communities and biological weapons control between 1965 and the present day. This chapter will be organized in a similar fashion as the last: beginning with the history of the interactions between American scientists and issues related to biological arms control, then proceeding to discuss the US pharmaceutical industry's relationship to biological arms control. The chapter will end with answers to some of the theoretical questions posed in Chapter 2. Although this chapter will make note of some particularly divergent contrasts between this case and the last, a rigorous and more systematic comparison between decisive features of the two cases will take place in the next chapter.

#### **The Sciences and Biological Arms Control: 1965 to 1972**

It is another accident of history that biological weapons have been closely associated with chemical weapons since the 1920s. The two classes of weapons have very few technical features in common. They require vastly different equipment and processes to create, they produce different effects in their victims, and they require different defences. However, the two have been inextricably linked since negotiators working on the Geneva Protocol began to fear the possibility that a state could harness the destructive capacity of the 1918 flu epidemic for use in future wars. Thus, though no state had the ability to produce or disseminate biological weapons, the following statement was added to the final text of the 1925 Geneva Protocol: “[The] High Contracting Parties, so far as they are not already Parties to Treaties prohibiting such use, accept this prohibition [against the use of asphyxiating, poisonous or other gases], agree to extend this

prohibition to the use of bacteriological methods of warfare, and agree to be bound as between themselves according to the terms of this declaration.”<sup>334</sup>

Despite this agreement, in the interwar period, several states including Canada, the UK, and the US began research into biological weapons. The vast majority of research into these weapons took place under a veil of secrecy in Army labs centred around Fort Detrick in Maryland. By the mid-1960s, the US Army Chemical Corps had developed two lethal bacteria, three incapacitating agents, and 2 bacterial toxins<sup>335</sup> and was confident that it had acquired enough of a BW capability to deter an attack in kind from the Soviet Union.<sup>336</sup>

Though most research into BW was classified government work, some scientists in academia assisted Fort Detrick in its defensive efforts. Between 1955 and 1963, Johns Hopkins University received over \$1 million from Fort Detrick for research then described as “studies of actual or potential injuries or illnesses, studies on diseases of potential BW significance, and evaluation of certain clinical and immunological responses to certain toxoids and vaccines.”<sup>337</sup> As was the case in related projects at Stanford University, Brooklyn College, the University of Maryland and the Midwest Research Institute, all of the research produced under the Detrick-funded program at Johns Hopkins was either classified or never published in the open literature. Unclassified CBW research took place at the University of Chicago, MIT, the University of Michigan, Ohio State University, the University of Minnesota, and the University of Texas. In the mid-1960s, the Army and Air Force funded controversial programs at the University of

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<sup>334</sup> Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare, (Geneva: Conference for the Supervision of the International Trade in Arms and Ammunition, 1925).

<sup>335</sup> The lethal agents were anthrax and tularemia bacteria; the non-lethal agents were brucellosis, Q fever, and Venezuelan Equine Encephalitis (VEE), and the toxins were botulinum toxin and *Staphylococcus* enterotoxin B (SEB).

<sup>336</sup> Jonathan B. Tucker, “A Farewell to Germs: The US Renunciation of Biological and Toxin Warfare, 1969-70,” International Security, 27, no. 1 (Summer 2002): 110-112.

<sup>337</sup> Elinor Langer, “Chemical and Biological Warfare (I): The Research Program,” Science, 155, (13 January 1967): 178.

Pennsylvania, New York University, and the Stanford Research Institute for the development of biological weapon delivery systems.<sup>338</sup>

In addition to this type of scientific assistance, Fort Detrick consulted regularly with the National Academy of Sciences and the American Society for Microbiology (ASM). In addition to sponsoring cooperative advisory groups that met to solve particular scientific problems, the NAS supported post-doctoral research programs at Fort Detrick, which were designed to bring new talent into the field of BW research. After the Second World War, the ASM maintained a permanent advisory committee at Fort Detrick. In 1967, the ASM's membership voted overwhelmingly to maintain its standing advisory committee at the US Army Biological Laboratories even though it faced criticism for maintaining a research relationship with the Army during the Vietnam War.<sup>339</sup> The ASM continues to maintain a close relationship with Fort Detrick; indeed 21 of the ASM's 91 past presidents have worked for Fort Detrick.<sup>340</sup>

The beginning of the end of the American BW program came as a result of biological weapons' long association with chemical weapons. As discussed in the last chapter, the late 1960s saw several incidents that heightened public fear and distrust of US chemical weapons programs, and compelled the Nixon administration to undertake a review of its CBW policies. As the reader will recall, these events included the incident at Skull Valley, revelations about unsafe CW transportation and destruction plans, and the effects of herbicide and tear gas use in Vietnam. It is interesting to note that none of these incidents involved biological weapons, however BW policy was to be included in the review anyway.

Since chemical and biological weapons were tied so closely together, many of the actors responsible for the 1969 review and modification of US BW policy were the same as those

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<sup>338</sup> *Ibid.*, 179.

<sup>339</sup> E. Staten Wynne, "Vietnam," *Science*, 158 (15 December 1967): 1393.

<sup>340</sup> Kenneth I. Berns, Ronald M. Atlas, Gail Cassell, and Janet Shoemaker, "Preventing the Misuse of Microorganisms: The Role of the American Society for Microbiology in Protecting Against Biological Weapons," *Critical Reviews in Microbiology*, 24, no. 3 (1998): 273.

involved in changes to CW policy. Recall from the last chapter that Nixon's NSA Henry Kissinger asked for assistance from his old friend Matthew Meselson with the preparation of a PSAC report on the benefits and drawbacks of CBW usage. Though Meselson's public argument against biological weapons was the same as his argument against chemical weapons – that developing an inexpensive weapon like BW could lead to the proliferation of these weapons to unfriendly states that couldn't otherwise afford a weapon of mass destruction – at heart he dreaded what would become of humanity should these weapons be developed further. According to Meselson,

It was clear where [the field of microbiology] was going. Sooner or later we'd know enough about biology that we could manipulate absolutely any process, including cognition, including heredity, including behaviour, and life and death of course. Now I've always had this feeling – so we're talking about emotions here really – that I try to explain in the following way: Except for insects and skunks I guess, the main way that vertebrates and certainly mammals engage in combat, when they do (they very often try to avoid it) is essentially with blows and bites. And somehow I think that's hardwired. Even a missile is like a blow. A sword is like a bite or a blow. A bullet is like a blow, even though it's gotten pretty much out of hand with nuclear blows. Now we're talking about a totally new dimension. Not one that attacks the external human, but works on the inside. It changes what it means to be human. A sword, or a club, or a bullet or a missile means you're not there anymore. Or something gets cut off. But changing it, changing your mind, changing what it means to be human: to me that's just.... Maybe our species could go that way, and maybe that's ridiculous. Maybe we'd never go that way. I don't know. But it seemed that this was about the worst possible direction the human species could go. To enter this whole domain should be taboo. I can't make this into a rational argument. It just seemed to me to be totally inhuman. In a sense you have to regard it as less valour, to alter another's mind. One group would have to look at the other as less than human.<sup>341</sup>

As detailed in the last chapter, at Kissinger's request, Meselson collaborated with the President's Science Advisory Committee to produce a report on scientific matters related to chemical and biological weapons. Other members of the committee included Presidential Science Advisor Lee DuBridge, Dean of the NYU School of Medicine Ivan Bennett, Harvard chemistry professor

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<sup>341</sup> Matthew Meselson, interview with author, 18 October 2005.

Paul Doty, and IBM Physicist Richard Garwin. The PSAC report concluded that biological weapons possessed far less military utility than chemical weapons. Not only were they doomed to be less reliable and predictable in the field, they had a shorter shelf life, and they possessed the unfortunate capacity to mutate into an uncontrollable strain.<sup>342</sup> The PSAC report recommended the renunciation of the US BW program, but also favoured the maintenance of a defensive research program. A review paper written by the Pentagon's civilian Office of Systems Analysis (OSA) reached similar conclusions.

Not all review reports were as critical of the biological weapons program as the PSAC report. A military options paper published for the review by the Joint Chiefs of Staff and Ronald Spiers, the assistant secretary of state for political-military affairs, concluded that "biological weapons were reliable and controllable in the field, and that existing US biological warfare capabilities should be maintained.... Little or no mention was made of the military drawbacks of biological weapons."<sup>343</sup>

Defense Secretary and National Security Council (NSC) principal Melvin Laird observed the radically different conclusions offered by the military options paper and ordered it to be withdrawn from the review process, then transferred responsibility for the military options review to the civilian Office of International Security Affairs (ISA) within his own Office of the Secretary of Defense. The ISA perceived itself to be inadequately staffed for the assignment, and with permission from its authors, borrowed heavily from the PSAC report. Not surprisingly the ISA's new military options paper offered conclusions identical to those offered by the PSAC report. Defense Secretary Laird reviewed the papers and was convinced by their arguments against biological weapons, though he also supported the modernization of US chemical stockpiles. While his position coincided with that advocated by PSAC, the State Department, and

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<sup>342</sup> Tucker, 119.

<sup>343</sup> *Ibid.*, 120.

OSA, the Joint Chiefs and the Pentagon advocated the retention of biological warfare capabilities.

The NSC and the President considered the options offered by the policy review between 30 October and 17 November 1969. On the 18<sup>th</sup> of November, the NSC met to discuss options, with the Chairman of the Joint Chiefs advocating the retention of BW capacity, and all civilian NSC members advocating their elimination. Nixon's decision was reportedly greatly influenced by the arguments against BW offered in the PSAC report, particularly their slow effects and susceptibility to weather changes.<sup>344</sup> In addition, recent tests had revealed the destructive capacity of biological weapons. Even though they were difficult to control, their use by enemy states could still result in the death of thousands or even millions of American civilians in uncontrolled epidemics. As argued by Meselson in the PSAC report, discontinuing offensive research into biological weapons would discourage other states from dabbling in BW themselves.<sup>345</sup> The final element in Nixon's decision against biological weapons was his desire to regain some of the public approval lost as a result of his CW policies in Vietnam. As mentioned in the last chapter, the 1969 CBW review did not result in the immediate discontinuation of herbicide and tear gas usage in Vietnam, as the public had wished.<sup>346</sup> Perhaps eliminating an entire class of despised weapons, which had limited tactical utility anyway, might deflect attention away from that decision.<sup>347</sup>

So it was that on 25 November, Nixon traveled to Fort Detrick to announce that:

The United States of America will renounce the use of any form of deadly biological weapons that either kill or incapacitate. Our bacteriological programs in the future will be confined to research in biological defense, on techniques of immunization, and on measures of controlling and preventing the spread of disease. I have ordered the Defense Department to make

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<sup>344</sup> Matthew Meselson, interview with author.

<sup>345</sup> Mark Wheelis & Malcolm Dando, "Back to Bioweapons?" Bulletin of the Atomic Scientists, 59, no 1 (January/February 2003): 45.

<sup>346</sup> Rodney McElroy, "The Geneva Protocol of 1925," in The Politics of Arms Control Treaty Ratification, eds. Michael Krepon & Dan Caldwell (New York: St. Martin's Press, 1991), 154-155.

<sup>347</sup> Tucker, 128.

recommendations about the disposal of existing stockpiles of bacteriological weapons.... The United States positively shall associate itself with the principles of the Draft Convention prohibiting the use of biological weapons of warfare presented by the United Kingdom and the 18-Nation Disarmament Conference on August 26, 1969.... The United States, as of today, now indicates its support of this initiative and we hope that other nations will follow suit. Mankind already carries in its own hands too many seeds of its own destruction. By the examples we have set today, we hope to contribute to an atmosphere of peace and understanding between all nations.<sup>348</sup>

Though the pronouncement seemed decisive, newly unemployed BW scientists searched frantically for loopholes that would allow them to continue their research. Toxins, which could be considered either chemical weapons or biological weapons, seemed to present them with an opportunity to continue offensive research. Although toxins were produced by living organisms, they themselves are non-living chemicals. Nixon and his advisers were of two minds regarding the toxin issue: on the one hand, as noted by Presidential Science Adviser Lee DuBridge and the Joint Chiefs, technically toxins were chemical compounds, not living organisms, and some could be produced by chemical means. On the other hand, according to arguments made by ACDA and the State Department, most toxin weapons would need to be produced by bacteria in fermentation facilities similar to those needed to produce living biological weapons. The similarities between the two weapons could undermine the gains in public approval Nixon had won thanks to the unilateral BW renunciation. On 31 December 1969, Nixon ordered another interagency review of the problem to decide what US policy should be towards toxin weapons

To help resolve the issue, Kissinger once again turned to Matthew Meselson in early January 1970. Meselson submitted a position paper called "What Policy for Toxins?" to the NSC detailing the pros and cons of toxin weapons. Meselson argued that toxin weapons provided few benefits over existing varieties of chemical weapons. For certain, gram for gram some toxin weapons were more lethal than chemical weapons, which would allow for the size of chemical

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<sup>348</sup> Quoted in Andrew Hamilton, "CBW: Nixon Initiative on Treaty Anticipates Congressional Critics," *Science*, 166 (5 December 1969): 1249.

warheads to be reduced from about six pounds to almost nothing. However, that difference would count for little in the battlefield if the artillery shells used to deliver toxin warheads weighed a hundred pounds. Certainly the more poisonous toxin warheads would increase a bomb's radius of destruction, but this could prove detrimental in situations that required any sort of precise targeting. Furthermore, unlike persistent nerve agents such as VX, toxin weapons could be neutralized by exposure to sunlight, and as organic chemicals toxin weapons were in danger of burning up, or 'flashing,' when used in artillery projectiles. In addition, Meselson argued, toxins could not work through the skin, which meant that defending against them was a simple matter of putting on a gas mask. Finally, Meselson argued that if the biological weapons research and production facilities were completely shut down, instead of just being converted to toxin research and production, the President would achieve a boost in public approval and international prestige, which could be parlayed into leverage over negotiations for the forthcoming biological weapons convention. At least it would be more difficult to convince other states to renounce biological and toxin weapons if the United States continued to produce these grey-area weapons.<sup>349</sup> According to Meselson,<sup>350</sup> the argument Nixon found most compelling was that allowing toxin weapon development to continue would undermine the president's credibility. In his position paper, Meselson quoted an article in the *Washington Post* by Steve Rosenfeld, who asked "How can the president renounce plague only to embrace botulism?"<sup>351</sup>

Thus, it wasn't so much the systemic imperatives of structural realism, or the influence of powerful lobby groups that persuaded Nixon to change BW policy, but rather concern for credibility, both among the voting public and internationally, which mattered most to Nixon.

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<sup>349</sup> At first Meselson was reluctant to include a political argument in his otherwise strictly scientific paper, as doing so might affect his credibility as a scientist. However, he overcame these doubts by quoting the political arguments made by other authors.

<sup>350</sup> Who himself obtained this information from Kissinger

<sup>351</sup> After all, most of the symptoms of disease experienced during a bacterial or viral infection are produced by toxins created by the multiplying microorganisms. Thus, the effects of these weapons are virtually identical. Matthew Meselson, interview with author.

Public image is of little concern to realism, but as demonstrated in Chapter 2, the preservation of an actor's identity as a respected member of society can be an important determinant of behaviour according to the constructivist approach. Meselson made a compelling normative argument to Nixon, contending that discontinuing BW research would set a good example and would reinforce America's (and Nixon's) identity as a respected world leader, which could counteract the negative publicity generated by the United States' policies in Vietnam. Furthermore, by defining continued toxin research production as hypocritical behaviour unworthy of a respectable world leader, Meselson was able to persuade Nixon to change his policy by playing on his desire to forge an identity as a 'man of peace.'

On 14 February 1970, Nixon announced that the United States would renounce "offensive preparations for and the use of toxins as a method of warfare [and would] confine its military programs for toxins, whether produced by bacteriological or any other biological method or by chemical synthesis, to research for defensive purposes only, such as to improve techniques of immunization and medical therapy."<sup>352</sup> In response,<sup>353</sup> Meselson wrote a letter to Nixon, telling him that "Your decision.... goes far toward preventing mankind from turning his growing understanding of fundamental life-processes against himself... The wisdom of your course is apparent today. Generations from now, it may be seen as a crucial choice in the life of our species."<sup>354</sup>

The ASM fully supported Nixon's actions. On the 14<sup>th</sup> of February, the ASM announced that:

The Council of the Society [for Microbiology] affirms support of President Nixon's action on November 25, 1969, and February 14, 1970, to end our involvement in production and use of biological weapons. Because of our concern for humanitarian application of microbiological science, we urge that

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<sup>352</sup> Quoted in Tucker, 138.

<sup>353</sup> And probably recognizing Nixon's desire to be admired as a man of peace

<sup>354</sup> Quoted in Tucker, 139.

all nations convert existing offensive biological warfare facilities to peaceful uses.<sup>355</sup>

Initially, then the microbiology community appeared to be on board with the US government's renunciation of biological weapons including their production and offensive research

### **The Development of the BWC**

As hinted at above, the creation of a treaty to prohibit the use, production, and stockpiling of biological weapons separately from chemical weapons was first proposed by the UK and the 18-Nation Disarmament Committee on 26 August 1969. On 25 November 1969 the US formally committed itself to the creation of such a treaty. Initially however, the Soviets adamantly refused to consider a treaty that did not include chemical weapons. After all, at the time the USSR possessed an extensive secret BW research and development program, the full scale of which would only become apparent after the Cold War, while the US relied heavily on chemical agents in overseas missions. Why would the Soviets choose to eliminate a class of weapons in which they possessed a relative advantage, while allowing the US to retain the weapons in which they possessed an advantage? However, quite unexpectedly, on 30 March 1971, the Soviet Union stopped insisting that chemical weapons be included in the new regime. Negotiations over the BWC proceeded quickly, and on 28 September the treaty was concluded. On 10 April 1972, the treaty was opened for signatures, and on 16 December 1974 the US Senate unanimously gave its advice and consent for ratification of the treaty.

Despite the Soviet Union's earlier concession on the matter of chemical weapons, the US did not push its luck by arguing for strict verification procedures to be included in the BW regime. Some have argued that a major reason for the Soviet Union to have supported the new

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<sup>355</sup> Kenneth I. Berns, Ronald M. Atlas, Gail Cassell, and Janet Shoemaker, "Preventing the Misuse of Microorganisms: The Role of the American Society for Microbiology in Protecting Against Biological Weapons," *Critical Reviews in Microbiology*, 24, no. 3 (1998): 274.

BWC was that it could not prevent the USSR from continuing to develop and stockpile biological weapons without a verification regime. Indeed it was only after the Soviet Union signed the BWC that it began to invest heavily in its massive biological weapons program *Biopreparat*.<sup>356</sup> The treaty's lack of verification procedures was soon recognized as a major weakness, and at subsequent BWC review conferences states parties endeavoured to correct this failing with the introduction of voluntary confidence building measures (CBMs) and later with discussions about the establishment of a mandatory inspection regime.<sup>357</sup>

The Biological Weapons Convention contains another feature that has since hampered negotiations over strengthening the convention. Article I of the BWC prohibits the development, production, stockpiling, and acquisition of "microbial or other biological agents, or toxins whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes."<sup>358</sup> However, this Article implicitly allows states to conduct BW research for defensive purposes. Furthermore the BWC offers "no guidance or criteria ... as to what separates offensive and defensive BW research, so long as such activities do not in some way cross over into 'development' or production."<sup>359</sup> This failure to define precisely what sort of projects are prohibited and which are permitted has allowed some states, including the US, to maintain extensive BW research programs.<sup>360</sup>

Indeed some authors, such as Milton Leitenberg, suggest that the United States has already crossed the line into offensive BW research. Leitenberg argues that in the late 1990s a

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<sup>356</sup> Jeanne Guillemin, Biological Weapons: From the Invention of State-Sponsored Programs to Contemporary Bioterrorism, (New York: Columbia University Press, 2005): 138.

<sup>357</sup> These efforts will be discussed at greater length later in this chapter.

<sup>358</sup> United Nations, Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction. (Geneva: Committee of the Conference on Disarmament, 1972), Article I.

<sup>359</sup> Milton Leitenberg, "Biological Weapons in the Twentieth Century: A Review and Analysis," Critical Reviews in Microbiology, 27, no. 4 (2001): 295.

<sup>360</sup> Susan Wright, "Biowar Treaty in Danger," Bulletin of the Atomic Scientists, 47, no. 7 (September 1991): 36-40

classified Central Intelligence Agency (CIA) project code named 'Clear Vision' "involved the fabrication and testing of a model of a Soviet BW bomblet."<sup>361</sup>

Leitenberg describes several other R&D projects undertaken by the US government that appear to be more offensive than defensive, including projects to improve the storage, stabilization, weaponization, and dispersal of biological agents. Indeed the highly virulent, vaccine resistant, static resistant strain of anthrax used in the 2001 bioterror incidents is widely known to be a type developed in US biodefense labs.<sup>362</sup> Leitenberg argues that if any other "country was carrying out such a project, it would be considered *prima facie* evidence of the existence of an offensive BW program in that country."<sup>363</sup> Even though these programs have resulted in the development of super-virulent strains of microorganisms and the creation of dispersal methods that can spread tiny particles of microorganisms faster and with less susceptibility to atmospheric conditions, their developers can still argue that this research is strictly intended to replicate what the enemies of the US can produce, so as to develop better defenses against advances in BW research. In BW research apparently, the best defense is often a good offense.<sup>364</sup> Mary Elizabeth Hoinkes, general counsel for ACDA between 1994 and 1999 summarizes the problem in this manner: "You see a room full of people manufacturing bombs, and they say: 'I'm only doing this for defensive purposes and I have no intention of ever doing it for real because my heart is pure.'"<sup>365</sup> But how would another state interpret such actions?

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<sup>361</sup> Milton, Leitenberg, Assessing the Biological Weapons and Bioterrorism Threat, (Carlisle, Pennsylvania: US Army War College, 2005), 69.

<sup>362</sup> Project Bacchus, was undertaken by the Pentagon's Defense Threat Reduction Agency resulted in the creation of a fully functional bioweapons production facility in Nevada, made entirely of commercially available parts and materials. The program was designed to assess the ease with which bioweapons could be made by non-state actors. Apparently, the White House was not fully informed about the project. Under Project Jefferson, the Pentagon's Defense Intelligence Agency conducted research into the implantation of genes from the food poisoning causing organism *Bacillus cereus* into Anthrax bacteria, following the example of research conducted in Russia. "Sidebar: On the Wrong Side of the Line?" Bulletin of the Atomic Scientists, 57, no. 6 (November/December 2001): 19.

<sup>363</sup> Leitenberg, Assessing the Biological Weapons and Bioterrorism Threat, 70.

<sup>364</sup> Eileen Choffnes, "Bioweapons: New Labs, More Terror?" Bulletin of the Atomic Scientists, 58, no. 5. (September/October 2002): 29-34.

<sup>365</sup> "Sidebar: On the Wrong Side of the Line?" 21.

This continuing research into defensive and offensive biological weapons is a key difference between BW and CW. While governments such as the US continue to develop secret new strains of biological weapons and novel methods to combat them, chemical weapons are a 'mature' technology. Chemical weapons as we know them were originally developed between the 1930s and 1960s. Since that time there have been no major breakthroughs in chemical agents or in methods to defend against them. Even binary weapons weren't a particularly innovative idea, as their precursor components combined to make well-known existing chemical agents such as Sarin and VX. Furthermore, the chemical formulas for chemical weapons are obtainable from public sources.<sup>366</sup> Therefore, while Pentagon scientists would have much to lose from the exposure of new BW research that could occur during international inspections for the BWC verification protocol, they would be less concerned about losing CW secrets. As we will see later in this chapter, this is a major reason that the Pentagon chose not to support the BWC verification protocol.

By continuing to develop BW technology and demonstrating concern for the loss of technological advantage that would result from the exposure of secret research, the Pentagon appears to follow a strikingly realist logic in this case, perceiving other states as competitors and continuing to conduct research into biological weapons, despite normative and legal arguments against this. This suggests that in this case national security concerns have been important determinants of the Pentagon's reaction to the BWC verification protocol.

In defense of the BWC's authors though, it *is* next to impossible to distinguish the processes and equipment used for peaceful microbiology work from those used to produce biological weapons, because so many of these procedures and materials are what is known as

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<sup>366</sup> For example, the chemical formula for Sarin (O-Isopropyl methylphosphonofluoridate) is  $C_4H_{10}FO_2P$ .

'dual use' or 'dual capable.'<sup>367</sup> The fermentation equipment, storage facilities, containment and biosafety equipment, and culture media used to produce bacterial weapons are very similar if not identical to those used to produce a variety of harmless products including pharmaceuticals, vaccines, some baby food, and beer. Not even the presence of virulent strains of deadly bacteria represents a clear indication of malicious intent, as legitimate vaccine testing would also require the use of these microorganisms. On a purely technical basis, it is virtually impossible to distinguish between legitimate and illegitimate BW research. Differentiating between an acceptable defensive program and a prohibited offensive program would essentially be a matter of assessing a state's intent, which is nearly impossible to objectively prove or disprove.

This is another key difference between chemical and biological weapons. While albeit crude but dangerous biological weapons can be produced using materials and hardware necessary for legitimate vaccine production and testing, chemical weapons production requires distinct precursor chemicals and facilities, which are relatively easy to track. The State Department is correct to argue that

in chemical manufacturing, although the precursors have legitimate application, the economics of their production dictates making them in a limited number of facilities. Such facilities, because of the toxicity and corrosiveness of the precursors, have recognizable infrastructure requirements.... [However, almost] any facility that does biological work of any magnitude possesses the capability, under some parameters, of being diverted to biological weapons work. Trying to catalog them all would be tantamount to impossible."<sup>368</sup>

Thus while it is possible to create an inspection regime for chemical weapons that is largely capable of distinguishing between legitimate and illegitimate research and production on a

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<sup>367</sup> That is to say they could be used for either biological weapons or for peaceful purposes. Lynn C. Klotz, "Implementing the Biological Weapons Convention Protocol in the United States," *BioPharm*, 13, no. 8 (August 2000): 46.

<sup>368</sup> Ambassador Donald Mahley, "Biological Weapons Convention," (Statement by the United States to the Ad Hoc Group of Biological Weapons Convention States Parties, Geneva, Switzerland, 25 July 2001).

purely technical basis, so far no one has been able to develop a procedure that can do the same for biological weapons.

While this points to the strength of the technical explanation for the different outcomes in the CW and BW cases, it should be noted that the CWC, indeed any verification regime, could not be guaranteed of finding all clandestine chemical weapons projects, and thus our inquiry cannot rest with those explanations. Small CW production facilities using dual-use materials and precursor chemicals several chemical reactions removed from restricted chemical weapons can still conceivably fly under the CWC inspection regime's radar. Despite this possibility, many states, including the US, still support the CWC.

No amount of international inspection could generate complete confidence [among CWC member states] that [the CWC was] in fact being adhered to. By continuing to negotiate for a CWC, governments were therefore declaring that a worthwhile convention might nevertheless be attainable: that somewhere along the continuum ranging from 0 to 100 per cent confidence in compliance, an acceptable balance of benefit over risk could perhaps be struck.<sup>369</sup>

In short, political assessments of what are acceptable levels of potential violating activity matter, and the variation in state policies on arms control agreements demonstrate that it is not at all obvious that states would or would not automatically want the extra protection a given verification regime can offer.

States parties began to recognize the BWC's flaws soon after its creation, and at subsequent pentennial review conferences began to negotiate measures to correct these failings. "The Second Review Conference in 1986 saw the beginning of pressure to see some kind of verification procedure elaborated for the BWC. This led to an agreement on five politically, but not legally binding 'confidence building measures (CBMs).'"<sup>370</sup> These measures included 1) the declaration of all high containment facilities in the state; 2) the declaration of all national

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<sup>369</sup> Robinson, Stock & Sutherland, 716.

<sup>370</sup> Leitenberg, "Biological Weapons in the Twentieth Century," 297.

biological defense research and development programs; 3) the declaration of any unusual outbreaks of disease; 4) the official encouragement of the publication of results of research efforts in areas related to BW development; and 5) the encouragement of international contacts and conferences in areas related to BW. Three more CBMs were added at the Third Review Conference in 1991, including 1) the declaration of legislation related to the BWC; 2) the declaration of past activities in offensive/defensive biological research and development; and 3) the declaration of human vaccine production facilities.<sup>371</sup> These CBMs were said to have been somewhat helpful, but since they were non-binding, few of the states parties fulfilled their obligations under the measures. For example, in 1987 only 13 states submitted the information requested under the measures. In 1990, this number increased to only 36.

“The revelation of a major, clandestine Soviet biological weapons program in the early 1990s shocked the international community into action.”<sup>372</sup> At the Third Review Conference in September of 1991, the states parties decided to develop a compulsory verification protocol to correct the treaty’s failings. In 1992, they directed a group of government experts in verification, named VEREX, to develop a list of possible verification procedures. VEREX submitted a list of 21 possible procedures to the Fourth Review Conference in September of 1994. At the Fourth Review, the states parties directed a new Ad Hoc Group (AHG) of experts to use VEREX’s report to draft a proposal to strengthen the Convention with the addition of a legally binding verification instrument.<sup>373</sup> The AHG met several times between 1995 and 2001 to negotiate a draft text containing four major elements of a verification protocol, including mandatory declarations of dual-capable facilities and activities, routine clarification and random visits, short-notice investigations of alleged use or of suspicious facilities, and measures to promote the

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<sup>371</sup> *Ibid.*, 297.

<sup>372</sup> Oliver Meier, “Bioweapons: Neither Trust Nor Verify, Says US,” *Bulletin of the Atomic Scientists*, 57, no. 6 (November/ December 2001): 19.

<sup>373</sup> Graham S. Pearson, “The Protocol to Strengthen the BTWC: An Integrated Regime,” *Politics and the Life Sciences*, 17, no. 2 (September 1998): 189.

international exchange of information on new developments in biotechnology, as called for in Article X of the original treaty. In 1997, the AHG “began using a rolling text – a draft of the protocol – as the basis for the negotiations.” In the summer of 2000, the Chairman of the AHG, Tibor Toth of Hungary

switched the groups’ negotiating procedures, shifting the focus away from sessions led by Friends of the Chair, who [were] delegates appointed by the chair to take the lead on specific matters. Instead, for the first time, he held bilateral consultations directly with delegations throughout the session to explore ways to resolve remaining principal disputes....<sup>374</sup>

In March of 2001 Toth, finally released a “chairman’s text” draft protocol which proposed compromised solutions to many of the negotiating parties’ outstanding issues.<sup>375</sup>

However, even before the First Review Conference in 1980, radical changes took place in the field of microbiology that had lasting effects on both the biosciences and the biotech/pharmaceutical industry. These changes had a significant effect on how these groups perceived the Biological Weapons Convention and the proposed verification protocol.

### **The Biotech Revolution and What Followed**

In 1972, Stanford microbiologist Paul Berg developed a process to use ‘restriction enzymes’ to split and recombine sections of deoxyribonucleic acid (DNA) between different organisms. In 1973, Stanley Cohen and Annie Chang of Stanford University and Herbert Boyer of UCSF used Berg’s techniques to ‘splice’ sections of DNA between viruses and a non-pathogenic strain of *Escherichia coli* bacteria called K-12, thus creating recombinant DNA microorganisms possessing properties of both parent cells.<sup>376</sup>

The scientific community immediately recognized that both positive and negative outcomes could result from the creation of gene splicing technology. “[Some] of the molecular

<sup>374</sup> “Ad Hoc Group Inches Forward,” Arms Control Today News Briefs, (September 2000): 1.

<sup>375</sup> Seth Brugger, “Toth Issues Draft BWC Protocol, Reactions in Geneva Mixed,” Arms Control Today (May 2001): 1.

<sup>376</sup> “Recombinant DNA” Science, 197, no. 4305 (19 August 1977): 721.

biologists... became concerned lest the new technique be misused. In particular, some feared that unusual pathogenic forms of K-12 might be created."<sup>377</sup> In 1974, Berg and ten colleagues published a letter in *Science*<sup>378</sup> speculating on the dangers of recombinant DNA research, and calling on the world's microbiologists to agree to a year-long voluntary moratorium on three kinds of recombinant research that presented a particular hazard to human health. In the same letter, Berg called on the National Institutes of Health (NIH) to enact biosafety regulations on the new research techniques, and proposed an international scientific meeting to discuss ways to protect humanity from the misuse of gene splicing techniques. Thus arose the 1975 Asilomar Conference.<sup>379</sup>

"It says much for the moral authority of Berg's group that, as far as is known, the moratorium has been observed worldwide," said a reporter for *Science* covering the conference.<sup>380</sup> Between the 22<sup>nd</sup> and 27<sup>th</sup> of February, 1975, delegates from 54 countries debated the potential dangers of genetic manipulation and evaluated procedures to ensure such research would be conducted in a safe fashion.<sup>381</sup> The conferees eventually decided that genetic manipulation experiments ought to be ranked in order of potential risk to public health, then categorized into four broad biosafety classes. According to this system, low risk experiments would be subjected to physical containment procedures similar to those then used to contain cancer viruses, while high risk experiments, involving deadly human pathogens such as Lassa fever and plague, would demand much more extensive biosafety procedures, such as requiring employees to shower after leaving the lab, and the use of negatively pressurized laboratories and

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<sup>377</sup> *Ibid.*, 721.

<sup>378</sup> Paul Berg, *et al.*, "Potential Biohazards of Recombinant DNA Molecules," *Science*, 185 (26 July 1974): 332.

<sup>379</sup> Leitenberg, "Biological Weapons in the Twentieth Century," 337.

<sup>380</sup> Nicholas Wade, "Genetics: Conference Sets Strict Controls to Replace Moratorium," *Science*, 187 (14 March 1975): 932.

<sup>381</sup> The conference was named after the Asilomar Conference Center in Pacific Grove, California, where the conference took place.

positive pressure lab suits. A vote on the last day of the conference revealed that all but 5 of the hundreds of attendees supported the new biosafety system.

The day after the Asilomar Conference concluded, the NIH gathered together prominent scientists to form the Recombinant DNA Advisory Committee (RAC). The RAC adopted the Conference's guidelines as interim biosafety rules for federally funded laboratories. The RAC refined the Asilomar Conference rules, and published the new guidelines in June of 1976. What is interesting about this process is that even though

Congress, amidst calls from several interest groups for more stringent limitations, considered a number of different approaches for legislating controls over recombinant DNA... no such bills were ever enacted, and the NIH guidelines never acquired the force of law. Even so, they became a *de facto* international standard. The process proved quite effective at capturing university research, which was largely dependent on federal funding. It was less comprehensive at capturing privately funded research, although other federal agencies dealing with the products of privately funded research, such as the Food and Drug Administration (FDA), required adherence to the guidelines for activities that fell under their jurisdiction. For example, the FDA stated that it would reject products developed in violation of the guidelines.<sup>382</sup>

It was not for lack of trying that Congress did not transform the NIH guidelines into laws. In 1977, Senator Edward Kennedy (D-MA) and Representative Paul G. Rogers (D-FL) introduced bills calling for restrictions on recombinant DNA research, and calling such work "potentially devastating to the health and safety and the American people."<sup>383</sup> Scientists such as Stanley Cohen and Brandeis microbiologist and ASM officer Harlyn O. Halvorson feared such laws could prove stifling for the fledgling science, and undertook a massive effort to lobby Congress to drop the bills. In the end, the microbiologists were able to convince Senator Kennedy and Adlai Stevenson, chairman of the Subcommittee on Health and Scientific Research, that the risk

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<sup>382</sup> Leitenberg, "Biological Weapons in the Twentieth Century," 338.

<sup>383</sup> Quoted in Barbara J. Culliton, "Recombinant DNA Bills Derailed: Congress Still Trying to Pass a Law," *Science*, 199 (20 January 1978): 274.

posed by DNA research “was not only hypothetical but seemed ... to be very, very small.”

Consequently, the bills requiring legal restrictions on recombinant research were withdrawn.<sup>384</sup>

In the early 1980s, some of the restrictions on DNA research recommended at the Asilomar Conference had been relaxed, as fears of the dangers of gene splicing were shown to be overblown. According to NIH committee member William Gartland, “Since the rules went into effect [in 1976], only four violations have been cited, and none of them were really a threat to public health.”<sup>385</sup> On 9 September 1981, an NIH committee announced it would eliminate all penalties for violations of federal biosafety guidelines and would transfer responsibility for the review and approval of 97 percent of all recombinant DNA from the RAC to local Institutional Biosafety Committees in industry<sup>386</sup> and academia.<sup>387</sup> The only experiments to require federal review would be those for which containment levels were not clearly specified, which would require NIH approval on a case-by-case basis.<sup>388</sup>

The significance of the Asilomar process to the development of the field of microbiology cannot be underestimated. The creation of voluntary guidelines that were nevertheless followed by every researcher in government, academia, and industry, established a precedent for the way legislators and microbiologists regarded the regulation of research in microbiology. The Asilomar process demonstrated that microbiologists themselves were capable of creating and adhering to flexible, sensible rules governing their own work. This precedent caused the field of microbiology to regard the creation of new laws to restrict or regulate DNA research as potentially disastrously stifling. As we will soon see, it is likely that this norm of self-regulation made a significant portion of the microbiology field wary of how a BWC verification protocol

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<sup>384</sup> *Ibid.*, 276-277.

<sup>385</sup> Marjorie Sun, “NIH Plan Relaxes Recombinant DNA Rules,” *Science*, 213 (25 September 1981): 1482.

<sup>386</sup> Recent investigations suggest that the IBCs have done a poor job of maintaining biosecurity in many institutions. Martin Enserink, “Activist Throws a Bright Light on Institutes’ Biosafety Panels,” *Science*, 305 (6 August 2004): 768-769.

<sup>387</sup> Leitenberg, “Biological Weapons in the Twentieth Century,” 338.

<sup>388</sup> “Federal Review of DNA Research to Shrink,” *Science*, 210 (10 October 1980): 169.

could affect their research, and compelled them to support the creation of voluntary 'codes of ethics' over the strengthening of the BWC. Thus while it might be tempting to attribute the microbiology field's preference for self-regulation to collusion with industry or a simple, selfish desire to avoid costly government regulation, the above discussion reveals that their motivation is actually more complicated. Since Paul Berg's first request for forbearance in recombinant DNA research pending the creation of new biosafety regulations, the microbiology community has effectively and conscientiously enforced its own safety regulations. The introduction of new regulations by any other body is not seen as necessary or desirable.

Besides engendering a longstanding preference for self-regulation over government restrictions, the biotech revolution had a second effect on the field of microbiology. As already noted by Susan Wright and David Wallace, the developments of the early 1970s caused the field of microbiology to become commercialized and therefore preoccupied with the protection of trade secrets.<sup>389</sup> Pharmaceutical manufacturers were quick to realize the new technology's potential for profit. Inserting specific human genes into bacteria could convert microorganisms into tiny factories where such valuable products as insulin, interferon, and human growth hormone could be produced quickly and inexpensively. Pharmaceutical companies soon began to collaborate with scientists in academia for the creation of genetically-engineered bacteria capable of producing these organic compounds. The research process was time-consuming and expensive; many newly formed biotech firms folded after a few years because they had not been able to pinpoint or transfer the genes necessary to produce desired products in a timely fashion.<sup>390</sup> Biotech companies feared the loss of trade secrets about new breakthroughs to rival

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<sup>389</sup> Susan Wright & David A. Wallace, "Varieties of Secrets and Secret Varieties: The Case of Biotechnology," *Politics and the Life Sciences*, 49, no. 1 (March 2000): 45.

<sup>390</sup> Marjorie Sun, "Biotech: Is the Glamour Gone?" *Science*, 211 (16 January 1981): 262; Colin Norman & Eliot Marshall, "Boom and Bust in Biotechnology," *Science*, 216 (4 June 1982): 1076; Colin Norman, "Another Biotechnology Company Bites the Dust," *Science*, 217 (10 September 1982): 1016.

firms. The burgeoning biotech field soon grew to become rather cutthroat, as rival companies raced to be the first to create and patent useful cell lines.<sup>391</sup>

This concern for trade secrets soon migrated to the bioscientists participating in commercial research efforts, who began to employ tactics to protect their work from competitors' prying eyes. Microbiologists began to delay the publication of new findings until after their developments could be patented, a process that could take several months. Microbiology conference presenters withheld information on new findings, "presumably with an eye to applying for patents on new processes. There [were even] charges that some authors of reports [were] deliberately failing to cite relevant work of others in hopes of claiming a patent on some new biological process or product."<sup>392</sup>

Many scientists bemoaned the changes to the field of microbiology engendered by its increasingly close relationship with industry.<sup>393</sup> In a letter to Senator Gaylord Nelson of Wisconsin, Nobel Laureate Joshua Lederberg warned, "The possibility of profit ... will be a distorting influence on open communication and on the pursuit of basic scholarship."<sup>394</sup> Nicholas Wade warned that "the commercialization of biotechnology has produced new stresses and strains in the fabric of academic life."<sup>395</sup> In an address to the University of Pennsylvania, Stanford President Donald Kennedy lamented that "Scientists who once shared prepublication freely and exchanged cell lines without hesitation are now much more reluctant to do so.... [The] fragile network of informal communication that characterizes every especially active field is liable to rupture."<sup>396</sup>

It is interesting to note the contrast between this new preoccupation with trade secrets, and scientists' previous views towards scientific secrecy. In 1969, the AAAS' Committee on

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<sup>391</sup> Constance Holden, "Second Gene Splicer to go Public," *Science*, 211 (2 January 1981): 37.

<sup>392</sup> John T. Edsall, "Two Aspects of Scientific Responsibility," *Science*, 212 (3 April 1981): 12.

<sup>393</sup> Philip H. Abelson, "Differing Values in Academia and Industry," *Science*, 217 (17 September 1982): 1.

<sup>394</sup> Quoted in *Ibid.*, 12.

<sup>395</sup> Nicholas Wade, "Biologists Need Code on Commercial Behaviour," *Science*, 211 (9 January 1981): 149

<sup>396</sup> Quoted in *Ibid.*, 149.

Science in the Promotion of Human Welfare prepared a report arguing that government demands for scientific secrecy for national security reasons constituted an “intolerable burden” that would delay scientific discovery and prove detrimental to humanity as a whole. “When restrictions on disclosure interfere with the core scientific process, the price is paid not by the scientific community alone but by the whole society.”<sup>397</sup> Between 1969 and the early 1980’s, there have clearly been significant changes in the way the field of microbiology views secrecy in science.

In 2000, Susan Wright and David Wallace argued that

the emergence of strong norms of secrecy in the civilian sector is having a significant impact on the further elaboration of the Biological Weapons Convention, and particularly on the efforts now under way to strengthen the convention by negotiating a legally binding protocol with compliance and verification provisions.<sup>398</sup>

As we will soon see, its close relationship with industry compelled the microbiology field to withhold its support for the BWC verification regime, as such an intrusive regime could expose trade secrets to international scrutiny and compromise employer profits. Instead, the microbiology field lobbied for the creation of voluntary codes of conduct and the expansion of government-financed biodefense efforts, neither of which stood to compromise the parochial interests of their employers or contradicted the long-standing norm of self-regulation in the microbiology field. Though the biosciences have legitimate reasons to prefer self-regulation to the imposition of new, potentially costly, government regulations, at this point it may be useful to remind ourselves of significant differences between the actions of the biosciences and those of the epistemic community observed in the last chapter. This community supported the creation of the CWC and assisted with its drafting even though it too could result in inspections that could hamper their research. On moral grounds this other community also refused to accept lucrative SDI contracts, which seems to indicate that this community was not united by material self-

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<sup>397</sup> Committee on Science in the Promotion of Human Welfare, “Secrecy and Dissemination in Science and Technology,” *Science*, 163 (21 February 1969): 787.

<sup>398</sup> Wright & Wallace, 54.

interests. Thus, before even beginning the discussion of how the biosciences influenced the BWC protocol itself, it appears that there are significant differences in motivation between the microbiology community, and the one that influenced CW policy.

## **The US Microbiology Community & Its Effects on US Policy Towards the BWC**

### **Verification Protocol**

The above arguments should not be interpreted as arguing that the views of all biologists are determined simply by commercial interests, and that none are concerned with the problem of arms control. Nothing could be further from the truth. As we saw in the last chapter, physicians, forestry specialists and even microbiologists successfully lobbied to change US policy towards a number of issues related to arms control.<sup>399</sup> Furthermore, microbiologists were active participants in all attempts to create a verification regime for the BWC from the Review Conferences, to the VEREX exercise, to the Ad Hoc Group's work. For example, US microbiologists participating in a 1995 workshop to develop the AHG's proposals included Matthew Meselson, Barbara Hatch Rosenberg, James Le Duc, and David R. Franz.

In the later years of the Clinton administration, science advice played a crucial, if belated role in helping the president determine America's interests and policies in regards to defending against bioterrorism. In 1998, Bill Clinton is said to have read *The Cobra Event*, a thriller about bioterrorism by Richard Preston.<sup>400</sup> Clinton was supposedly so disturbed by the book that he summoned Joshua Lederberg, a Nobel prize winning geneticist and Defense Advanced Research Projects Agency (DARPA) adviser, to further explain the issue of bioterrorism to him. In January of 1999, Lederberg invited a panel of experts in terrorism and biological weapons to the White House for a conference on bioterrorism. Said President Clinton, "I was so relieved that Dr.

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<sup>399</sup> In 1957, Matthew Meselson and colleague Frank Stahl discovered DNA's replication mechanism, so he too was at the forefront of recombinant DNA research.

<sup>400</sup> Richard Preston, *The Cobra Event* (New York: Random House, 1998).

Lederberg ... brought a distinguished panel of experts together to discuss this bioterrorism threat, because I then had experts to cite on my concern and nobody thought I was just reading too many novels late at night."<sup>401</sup> This conference led to many new presidential initiatives to fund biodefense research, cooperate with Russia to prevent scientists from assisting terrorists and unfriendly governments, increase the federal budget for chemical and biological preparedness, prevent cyber terrorism, and increase the FBI's capacity to detect bioterrorists before they attack. Clinton's new awareness of the dangers of biological warfare also compelled him to announce that the US "must strengthen [the BWC] with 'a strong system of inspections to detect and prevent cheating. This is a major priority.'"<sup>402</sup> In short, scientists appear to have acted as authoritative sources of advice on bioterrorism, helping Clinton decide how the threat ought to be understood and how the United States could best defend itself from bioterrorism, both key sources of influence according to the epistemic communities literature.

However, there were to be limits to influence wielded by this scientific community, as Clinton's new efforts to strengthen the BWC were hampered by the acrimonious political climate, which had settled on Washington following the Monica Lewinsky scandal and failed impeachment imbroglio in 1998. Republican Senators became less willing to cooperate with the White House over multilateral arms control measures. Even Senators who had previously supported nuclear arms control measures such as Pete Domenici (R-NM) and Richard (R-IN) Lugar caused the ratification of the Comprehensive Test Ban Treaty (CTBT) to fail by voting strictly on party lines.<sup>403</sup>

Similar to the role they played in negotiations over the CWC, science-based NGOs had a great impact on discussions over the BWC's verification protocol. In 1989, the FAS created a

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<sup>401</sup> William Jefferson Clinton, "Keeping America Secure for the 21<sup>st</sup> Century," (remarks delivered at the National Academy of Sciences in Washington, DC., 30 March 1999).

<sup>402</sup> Quoted in Graham S. Pearson, "The Protocol to Strengthen the BTWC: An Integrated Regime," Politics and the Life Sciences, 17, no. 2 (September 1998): 190.

<sup>403</sup> Daryl Kimball, "CTBT in Crisis: How the US Senate Rejected CTBT Ratification," Disarmament Diplomacy, 40 (September-October 1999).

Working Group on Biological Weapons, whose membership included microbiologists, legal scholars, physicians, and political scientists. In the early 1990s, the FAS Working Group conducted trial inspections to test possible verification procedures. To assist in the creation of an effective verification protocol, the Working Group cooperated with agencies experienced in conducting verification visits in biotech facilities, such as the FDA and United Nations Special Commission (UNSCOM). The Working Group coordinated with negotiating teams from other states, testified on the importance of the draft protocol in Congress, published almost fifty papers on technical issues related to BW verification, and hosted seminars and workshops for negotiating parties in Geneva.<sup>404</sup> As we will see in the section on industry, the FAS Working Group on Biological and Toxin Weapons Verification was instrumental at incorporating pharmaceutical industry demands into US draft proposals for the verification protocol.

Other organizations such as SIPRI, the Project on Strengthening the Biological and Toxin Weapons Convention at the Department of Peace Studies at the University of Bradford, the International Committee for the Red Cross (ICRC), the International Network of Engineers and Scientists Against Proliferation (INESAP), and the Pugwash Conferences on Science and World Affairs prepared reports on verification matters for the Review Conferences, informed the public as to developments in negotiations, participated as invited participants in workshops, hosted conferences, and cooperated with officials in the Clinton administration in the formulation of US policy.<sup>405</sup> Some NGOs suggested they could assist with efforts at increasing transparency by volunteering to provide an informal international network to monitor potentially suspicious

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<sup>404</sup> Barbara Hatch Rosenberg, "Hearing on the Biological Weapons Convention Protocol: Status and Implications," Testimony Before the Subcommittee on National Security, Veterans' Affairs and International Relations, House Committee on Government Reform, (Washington, DC: United States House of Representatives, 5 June 2001).

<sup>405</sup> Barbara Hatch Rosenberg, interview with author, 9 November 2005.

government biotech activities.<sup>406</sup> Despite these concerted efforts, as Barbara Hatch Rosenberg<sup>407</sup> laments, “All of this came to nothing.”

However, not all microbiologists have supported the creation of a verification regime for the BWC. A large proportion of American microbiologists, including the ASM itself, have adopted a position in regards to the BWC that is consistent with their long-standing preference for self-regulation and more in line with the position adopted by their employers in industry. Instead of supporting the improvement of the biological regime – as other scientists did for the CWC – these microbiologists expressed concern that the proposed protocol could expose trade secrets to international scrutiny, and would result in the creation of repressive government regulations on their work. Similarly, in part on behalf of scientists working at Ft. Detrick, the Joint Chiefs of Staff (JCS) warned that the verification protocol could compromise new developments in government biodefense research. Instead of supporting the BWC, a large portion of the American microbiology community has lent its support to the creation of a voluntary code of conduct for microbiologists and increased government spending on biodefense. As such, their behaviour appears to accord more with what is expected of a profit-maximizing interest group than an epistemic community, which is expected to pursue international policy coordination. However, as will be highlighted later in this chapter, it may also be the case that the scientists who chose to promote voluntary codes of conduct over the verification protocol may not be motivated simply by venal interests, but may instead be acting in a manner consistent with their long-standing preference for self-regulation. Insofar as they did not possess national policy coordination they may have instead been united by normative concerns for the preservation of self-regulation.

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<sup>406</sup> Oliver Meier, “Civil Society and the Biological Weapons Convention: Creating Transparency Under Duress,” *INESAP Bulletin Online*, 19 (March 2002).

<sup>407</sup> Formerly the chair of the FAS Working Group. Barbara Hatch Rosenberg, interview with author.

Though the ASM emphatically disapproves of biological weapons, this microbiology society has also lobbied to water down laws that could infringe on their research activities. For example, the 1989 Biological Weapons Anti-Terrorism Act sought to criminalize the possession of deadly biological agents “of a type or in a quantity that under the circumstances has no apparent justification for prophylactic, protective, or other peaceful purposes.”<sup>408</sup> The original draft of the law allowed federal authorities to seize any biological agents unless their owners could prove they had a legitimate reason to possess them. However, the American Society for Microbiology lobbied the Senate Judiciary Committee to introduce an amendment to switch the burden of proof to investigators. “As enacted, the law [now] requires the government to obtain a warrant... before conducting a seizure.... In any prosecution under this act, the government must prove beyond any reasonable doubt that an individual intended to use the biological agents for a non-peaceful purpose.”<sup>409</sup>

Likewise, in 1997 the Centers for Disease Control (CDC) was tasked with the development of regulations requiring facilities that shipped potentially dangerous biological agents to register with the federal government. “The ASM helped the CDC arrive at regulations that would not unduly constrain legitimate scientific research and medical activities. Based in part on an e-mail survey of 11,000 members, the ASM worked to develop a list of select agents that focused on those with the highest potential for use as biological weapons.”<sup>410</sup> As representatives of the ASM argued,

the ASM offered advice in the development of these regulations that was consistent with ensuring continuance of essential biomedical research and diagnostic activities. In the final regulations, the list of restricted agents is limited so as not to unduly restrict legitimate biomedical research. [Certified clinical laboratories] that intend to use and transfer select agents only for

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<sup>408</sup> Biological Weapons Anti-Terrorism Act, Public Law 101-298. (Washington, D.C.: Congress of the United States of America, 22 May 1990); enacted in the US Code as 18 USC, sections 175-178.

<sup>409</sup> Gerald L. Epstein, “Controlling Biological Warfare Threats: Resolving Potential Tensions Among the Research Community, Industry, and the National Security Community,” Critical Reviews in Microbiology, 27, no. 4 (2001): 322.

<sup>410</sup> *Ibid.*, 324.

diagnostic, reference, verification, or proficiency testing purposes are exempt from the requirements of the regulations. Thus, essential medical diagnostic practices can proceed unimpaired.<sup>411</sup>

The ASM has lent its expertise to discussions over the BWC's verification protocol as well. In 1993, the ASM Council sent a message of encouragement to negotiators in Geneva, and reaffirmed its support for the end of offensive biological weapons research. In 1994, the ASM's Public and Scientific Affairs Board (PSAB) convened a task force comprised of ASM members from academia, industry and government to

assist the US government in developing scientifically sound approaches to biological arms control that would seek scientifically sound ways of enhancing global security by limiting the likelihood of the misuse of microorganisms as biological weapons.... The task force has struggled with the issue of how to help ensure compliance with the BWC while protecting incentives for advancing biomedical research.... Perhaps the most critical questions under current discussion are how can one recognize a biological weapons facility, how can one detect an unusual outbreak of disease, and can an inspection regime be developed that has a high probability of detecting illicit activity and a negligible probability of negatively impacting biomedical research and the private biotechnology/pharmaceutical sector.<sup>412</sup>

The ASM Task Force advised the US government and the negotiating parties in Geneva of the many technical problems associated with creating a 'scientifically sound' verification protocol, especially the difficulties associated with distinguishing legitimate research from that prohibited by the BWC. The ASM concluded that

detecting offensive biological weapons development activities is complex and should be based on scientific principles that would permit differentiation of legitimate biomedical activities from those activities related to biological warfare.... A system of verification that does not enable differentiation of legitimate activities and natural occurrences from offensive biological weapons development would be ineffective and would produce a false sense of world security.<sup>413</sup>

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<sup>411</sup> Berns, *et al.*, 280.

<sup>412</sup> *Ibid.*, 276-277.

<sup>413</sup> *Ibid.*, 275.

As we will see, this argument is very similar to one offered by chief US BWC negotiator Donald Mahley for the US's eventual rejection of the verification protocol.

The ASM Task Force presented the US negotiating team with six "scientific principles" to consider when evaluating a verification regime. The first suggests that suspicious outbreaks of disease ought to be compared with natural outbreaks; the second asks that inspections to confirm compliance be conducted only with adequate cause; the third suggests that further transparency measures be enacted, and the sixth principle argues that lists of prohibited organisms and equipment cannot form the basis of a verification protocol.<sup>414</sup> The third and fourth principles, respectively, requested that "proprietary information must be protected [and] incentives for scientific discovery must not be removed."<sup>415</sup> This last principle should be understood as implying that a new protocol should not reduce financial incentives for the development of new biotech or pharmaceutical products. It implicitly calls on US negotiators not to develop new regulations that would reduce industry profits, or agree to share advanced knowledge of new developments in gene splicing with less developed states, as had been promised under Article X of the BWC, without providing compensation to the developers of these new techniques. Together these two principles demonstrate a desire to maintain the prevailing regulatory environment and protect the incomes of scientists and industry, which directly contributed to the ASM's ambivalence towards the verification protocol.

The American scientific community retained this ambivalence even in the face of a clear BW threat. Consider this excerpt from a November 2001 letter to the editor of *Science* by Brian Heap, then vice president of the UK National Academy of Science:

As the Royal Society emphasized in a report last year, the international scientific community has a crucial role to play in tackling the threat from biological weapons, and it is essential that this challenge be met directly on many fronts. Scientists need to support policy-makers in negotiations to secure

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<sup>414</sup> Due to the problem of dual-capacity explained above. *Ibid.*, 276.

<sup>415</sup> *Ibid.*, 276

an effective international instrument banning the development, production, and use of biological weapons. This could be achieved almost immediately at the Fifth Review Conference of the 1972 Biological Weapons Convention.... It is vital that all parties to the BWC, including the United States, find a way forward together to reach a positive outcome.... The Chemical Weapons Convention, now in its fourth year of full implementation, demonstrates that international instruments can be put into practice. The key to introducing this system was the involvement of the chemicals industry worldwide in the negotiation of the CWC from the mid-1980s onward. Likewise, full cooperation with the biotechnology and pharmaceutical industries is essential to any verification system for an international instrument banning biological weapons. Scientists can play their part in implementing such an instrument by providing the tools for diagnosis and detection through which compliance can be monitored.... Scientists in industry and academe have expertise that must be engaged in finding the best protection against biological weapons, and concerns about security or commercial confidentiality should not override a concerted effort by the scientific community. An immediate task for scientists is to analyze the global spate of anthrax attacks.... The anthrax attacks have demonstrated that the use of biological weapons is no longer a theoretical threat. Coming as they have after 11 September, the world now seems a much more dangerous place. Scientists can and must help to address this fear by working closely with policy-makers to reduce the threat from biological weapons.<sup>416</sup>

Now consider the reply to this letter from Rodney Nichols, then president and Chief Executive Officer of the NAS, written after the failure of the Fifth Review Conference:

It is one thing to say you are 'against biological weapons,' but it is another to recognize how difficult is the process of inspection and verification at reasonably high levels of reliability.... So what is the answer? At least four efforts need to be sustained. First, international 'norms' are a baseline. Although words do not deter everyone, it is extremely important to underscore over and over again the abhorrence all peace-loving people have about biological weapons. Second, occasionally it might be necessary to use force, such as in the present war in Afghanistan. Only force can work in the extreme cases. Third, we need a surge of effort by the NIH, academic health centers, and industry on vaccines and drugs against biological weapons. And fourth, more research and development should be devoted to improving ways of defending against biological weapons and verifying, if feasible, the terms of any treaty.... Generalities about making treaties and warnings about the biological weapons threat are not enough. Hard work on the bully pulpit, military action when essential, biomedical research on therapy and R&D on inspection, verification and defense – these are the four keys to eliminating ... the threat and shoring up the foundations of freedom.<sup>417</sup>

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<sup>416</sup> Sir Brian Heap, "Scientists Against Biological Weapons," *Science*, 294 (16 November 2001): 1417.

<sup>417</sup> Rodney W. Nichols, "Allaying the Threat of Biological Weapons," *Science*, 295 (22 February 2002): 1464. 160

The American scientific community responded to pressure from the international scientific community to not allow industry concerns for intellectual property rights to prevent it from supporting the BWC by arguing that further research into verification is necessary. Conspicuous by its absence is anything in this letter to indicate the NAS' support for a BWC verification regime, even in principle.

This second letter also indicates the support of the US scientific community for biodefense R&D projects as a means to defend against the threat of biological weapons. The US government decided to engage in a massive biodefense R&D effort after the autumn 2001 anthrax attacks reinforced fears regarding the availability and effectiveness of existing vaccines and pharmaceuticals, and demonstrated a need for improved detection devices, defensive clothing, and decontamination chemicals. Unlike the verification protocol, biodefense projects do not entail the creation of a costly regulatory regime, or compromise trade secrets and therefore industry profits. The new biodefense projects developed after 2001 will be discussed in greater detail in the section on industry.

The autumn 2001 anthrax attacks also demonstrated a requirement for improved laboratory safety. For two years after the incident, the White House considered establishing compulsory federal regulations on laboratory security. In 2003, the NAS issued a report recommending the establishment of voluntary biosecurity regulations. In March 2004, secretary of the Department of Health and Human Services (HHS) Tommy Thompson announced that the new regulations would indeed be voluntary, to the evident relief of scientists. Under the plan, the NIH would create a 25-member panel called the National Science Advisory Board for Biosecurity, which would "be charged with identifying types of research that might be misused, developing guidelines for local oversight bodies to monitor such research, and proposing procedures for communicating science at meetings and in publications. The board will not

review individual research proposals, nor will it oversee classified research.”<sup>418</sup> According to Anthony Fauci, head of the National Institute of Allergy and Infectious Diseases (NIAID) and one of the plan’s developers, “The goal is not to regulate... [A] code of conduct needs to be developed for scientists throughout the world, and the new biosecurity board ... could be the one to craft it.”<sup>419</sup> Accordingly, on 12 April 2004, the White House Office of Science and Technology Policy hosted a workshop for approximately 100 scientists to discuss what should be included in the 2005 edition of *Biosafety in Microbial and BioMedical Laboratories* (BMBL), the standard manual of biosafety guidelines. The participants indicated that the guidelines ought to be flexible, and should balance “concerns of biosecurity [against] the impact on research.”<sup>420</sup>

The American Society for Microbiology appears to have taken up the call for the creation of a new, international code of conduct for microbiologists. The proponents of such voluntary guidelines argue that by reinforcing international norms against biological weapons development, these codes will remind scientists of the hazards and immorality of offensive biological weapons work, and allow the international microbiology community to monitor the activities of its own members in the absence of any formal mechanisms for doing so. The ASM first developed a code of conduct in 1988 and updated it in 2000 and 2005. The new code includes three articles discouraging microbiologists from participating in offensive biological weapons work:

- (1) ASM members aspire to use their knowledge and skills for the advancement of human welfare;
- (2) ASM members strive to increase the competence and prestige of the profession and practice of microbiology by responsible action and by sharing the results of their research through academic and commercial endeavors or public service; and
- (3) ASM members are obligated to discourage any use of microbiology contrary to the welfare of humankind including the use of microbes as biological weapons. Bioterrorism violates the fundamental principles upon which the Society was founded and is abhorrent to the ASM and its members. ASM members will call to the

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<sup>418</sup> Jennifer Couzin, “US Agencies Unveil Plan for Biosecurity Peer Review,” *Science*, 303 (12 March 2004): 1595.

<sup>419</sup> *Ibid.*, 1595.

<sup>420</sup> David Malakoff, “Writing the Biosecurity Bible,” *Science*, 304 (16 April 2004): 373.

attention of the public or the appropriate authorities misuses of microbiology or of information derived from microbiology.<sup>421</sup>

In addition, the ASM has updated some of its publication policies to reflect microbiologists' increasing concern that some of their work might be used to develop biological weapons:

Following the 2001 incidents, there was a heightened sense that scientists and their journals should exercise voluntary efforts to review experimental data that might have potential destructive application. The ASM has sought to achieve a proper balance between valid security measures and the need to pursue scientific research and the publication and sharing of results.... The ASM has worked with the National Academy of Sciences and other scientific organizations and publishers to discuss appropriate policies regarding the review and publication of manuscripts dealing with research that could present public safety issues and identifying sensitive information and policies to screen information in a manner that will not interfere with or jeopardize research. The ASM Publications Board review process seeks to determine if an article contains details of methods or materials that might be misused or might pose a threat to public health or safety. The ASM Publications Board will not publish papers that violate the ASM Code of Ethics or that violate other widely accepted guidelines for research such as the Recombinant DNA guidelines for research involving recombinant DNA.<sup>422</sup>

Though such codes of ethics can dissuade scientists from engaging in offensive BW research, few experts outside of government believe that these guidelines alone can defend against the threat of biological weapons attacks. Barbara Hatch Rosenberg argues that a few scientists can always be convinced to participate in offensive BW work out a sense of patriotic duty.<sup>423</sup> Alan Pearson argues that such codes of conduct ignore the funding context in which scientists operate. Scientists engage in research, nefarious or otherwise, because industry or government provides them with funds to conduct that research. If no institutions funded questionable BW work, scientists wouldn't conduct this research. According to Dr. Pearson:

None of the discussions on ethics consider this. And [the codes of ethics] set it up that scientists don't have a way to evaluate what they're doing because they're not encouraged to see larger context in which they sit. [We] end up

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<sup>421</sup>"2005 ASM Presentation," (remarks delivered at the 2005 Biological Weapons Convention Meeting, Geneva, Switzerland, 16 June 2005).

<sup>422</sup> *Ibid.*

<sup>423</sup> Barbara Hatch Rosenberg, interview with author.

with conflict because everyone's telling scientists 'You'd better do the right thing,' but not giving them the tools to determine what the right thing might be. But there's lots of consequences if they do the bad thing. So there's conflict between scientists, the community, and security. And this conflict is artificial because of the way the problem has been constructed. [We need] to give to scientists the tools to understand how what they're doing fits into a larger context, and they won't see this conflict. They won't be the 'other,' the person who needs to be watched.<sup>424</sup>

Even though relying on such codes of conduct is a flawed and insufficient way of defending against the threat of biological weapons use, it has become a mainstay of current US policy towards the problem because it does not involve the creation of new regulations that could hamper industry profits or biomedical research. The US government, in this case, is thus behaving in a way expected by the interest groups or even Military-Industrial Complex literature, responding to the interests of a powerful lobby groups by adopting policies that protect their interests. From the evidence above, it is already apparent that the biotech and pharmaceutical industry had a significant effect on the bioscience community's reaction to the prospect of new regulations, and on US reaction to the BWC. As such it behooves us to more closely consider the role this industry has played in determining US BW policy.

### **The Pharmaceutical and Biotech Industry and Its Effects on US BW Arms Control Policy**

Unlike the chemical industry, the US biotech and pharmaceutical industry has never maintained longstanding, highly profitable contracts for the research and production of weapons with the US government. During the Second World War, Secretary of War Henry Stimson appointed George Merck of Merck Pharmaceuticals as the head of the Army and Navy's War Research Service (WRS), which conducted offensive and defensive biological weapons research and development. The WRS established research contracts with universities and private institutes, and made several contracts with private companies for the acquisition of supplies. During the war the

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<sup>424</sup> Alan Pearson, interview with author, 19 October 2005.

Electromaster Corporation of Detroit was awarded a contract for \$4.3 million to produce shell casings for anthrax bombs, and Unexcelled Manufacturing Company of Cranbury, New Jersey produced high explosives for use in the same bombs. However, the testing and production of biological agents took place in government-run facilities at Camp Detrick and Vigo County, Indiana, respectively.

As the war progressed, the military assumed greater control of the biological weapons program, and civilian advisors such as George Merck were relegated to minor consultative roles.<sup>425</sup> When the war ended, the Army cancelled almost 600 research and production contracts, and private industry's involvement in BW research and production was sharply curtailed, though such activities continued at Army-run facilities.

The pharmaceutical and biotech industry may have lamented the loss of these contracts, but it was growing increasingly clear that greater profits would soon arise from new developments in molecular genetics. Starting with Watson and Crick's discovery of DNA in 1953, microbiologists were rapidly developing their understanding of the molecular basis of heredity. The 1950s and 1960s saw further discoveries into how DNA replicates and how it directs cells to produce proteins. As mentioned in the previous section, in 1972 Paul Berg discovered a process to cut and recombine sections of DNA, and in 1973, Stanley Cohen and Annie Chang first introduced viral DNA into a bacterial cell, thus producing the world's first recombinant organism.

Private industry immediately recognized the potential for profit offered by the new technology. If genes could be inserted into bacteria that would direct them to produce such important hormones or enzymes as insulin or interferon, these bacteria could be transformed into tiny, inexpensive organic chemical factories, thus eliminating the medical community's dependence on animal sources of these products. Established pharmaceutical manufacturers such

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<sup>425</sup> Guillemin, 72.

as Hoffmann-La Roche, Upjohn, Pfizer, G.D. Searle, Eli Lilly, Smith Kline and French, Merck, and Miles Laboratories<sup>426</sup> launched genetic research programs,<sup>427</sup> and new biotech companies such as Genentech, Biogen, Genex and Cetus Corporation were incorporated to pioneer research into this potentially highly profitable field. These smaller corporations established lucrative consultative relationships with academic scientists at the forefront of the new technology. For example, Stanley Cohen worked as a consultant for Cetus, and Herbert Boyer worked for Genentech.

Thanks to the advances made by American microbiologists, the US biotech industry took a commanding lead over its competitors in Japan, West Germany, the UK, Switzerland, and France. According to the Office of Technology Assessment (OTA) from 1984 "American dominance of the fledgling industry is so extensive... that US companies hold an edge in virtually every area, from basic research to the ability to attract high risk capital."<sup>428</sup>

Investors were eager to capitalize on this new field. Twenty minutes after Genentech went public at 10:45 am on 14 October 1980,

the price per share had soared from an initial \$35 to the giddy height of \$89. Genentech was expected to be the hottest issue to hit Wall Street in some time, but the explosion in its price was the most striking that many brokers had ever seen. When the day closed, with the price at \$71.25 a share, the first gene splicing company to go public had established for itself a market valuation of \$529 million, or some 8 percent of the value of Du Pont.<sup>429</sup>

However, the biotech boom did not last. In April of 1982, Southern Biotech, a Tampa, Florida company that produced alpha interferon "ran out of cash, and could not meet its payroll."<sup>430</sup> Financial analysts feared that other companies that – like Southern Biotech – had raised funds "on the basis of little more than grand promises," would soon face similar cash-flow

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<sup>426</sup> General Electric also conducted recombinant DNA research. Nicholas Wade, "Guidelines Extended But EPA Balks," *Science*, 194 (11 October 1976): 304.

<sup>427</sup> Nicholas Wade, "Gene-Splicing: As Grass-Roots Level a Hundred Flowers Bloom," *Science*, 195 (January 1977): 558.

<sup>428</sup> Colin Norman, "America Dominates Biotechnology," *Science*, 223 (3 February 1984): 463.

<sup>429</sup> Nicholas Wade, "Gene Splicing Company Wows Wall Street," *Science*, 210 (31 October 1980): 506.

<sup>430</sup> Colin Norman & Eliot Marshall, "Boom and Bust in Biotechnology," *Science*, 216 (4 June 1982): 1076.

problems.<sup>431</sup> Southern Biotech's problems were blamed in part on the regulatory problems it had encountered.<sup>432</sup> In particular, "Although the company was churning out substantial quantities of alpha interferon until the end of [1981], it did not gain approval from the Food and Drug Administration to ship the material for clinical trials"<sup>433</sup> until after other companies had developed technology that allowed them to produce a more pure variety of interferon. This served to eliminate the market for Southern Biotech's less pure interferon, and made its stockpiles waiting for FDA approval virtually worthless.

Because recombinant DNA research was time consuming and costly, and there were no guarantees that one's competitors wouldn't make a breakthrough and bring a similar or superior drug to market first, developing new medicines based on biotechnology was a high-risk enterprise.<sup>434</sup> Studies conducted in the 1970s indicated that it took on average eight years and \$54 million to bring a new pharmaceutical to the market. The Food and Drug Administration's requirements for lengthy testing procedures, involving two trials conducted in the US, were often blamed for this so-called 'drug lag.'<sup>435</sup> The Editor of *Science*, Philip Abelson argued that while

governments in other countries such as Japan worked closely with industry to foster innovations and exports, the United States adopted a hostile attitude toward business, subjecting it to thousands of costly regulations.... The cost of federal regulations... has been estimated as high as \$100 billion a year and it is increasing. The higher cost fosters inflation at home and inability to compete abroad.<sup>436</sup>

Starting in the late 1970s, the US government initiated a concerted effort to foster the development of the biotech industry. As discussed by Susan Wright and David Wallace, a major component of this effort involved the modification of patent laws to provide greater rewards for

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<sup>431</sup> *Ibid.*, 1976.

<sup>432</sup> Along with general stockmarket malaise and poor business decisions

<sup>433</sup> *Ibid.*, 1080.

<sup>434</sup> Marjorie Sun, "Biotech: Is Its Glamour Gone?" *Science*, 262 (16 January 1981): 262.

<sup>435</sup> Louis Lasagna, "The Development and Regulation of New Medicines," *Science*, 200 (26 May 1978): 871. In the 1990's the drug lag would extend to 10-12 years, at a cost of \$360 million per drug. It now supposedly costs \$800 million, with a wait time of 15 years in some cases.

<sup>436</sup> Philip H. Abelson, "The Federal Government and Innovation," *Science*, 201 (11 August 1978): 487.

the development of new products and protect proprietary information from unwarranted use.<sup>437</sup>

In January of 1977, Betsy Ancker-Johnson, assistant secretary for science and technology at the Department of Commerce, announced that the Patent and Trademark Office would

give accelerated processing to patent applications involving gene splicing, 'in view of the exceptional importance of recombinant DNA and the desirability of prompt disclosure of developments in the field.'... The announcement [also allowed] firms to avoid disclosure of proprietary information if it would prejudice their foreign patent rights.... [which] in effect [would exempt] industry from the disclosure provisions of the NIH guidelines.<sup>438</sup>

As discussed at some length by Wright and Wallace, in 1979 the US Supreme Court agreed to hear two cases regarding the applicability of patent law to living organisms.<sup>439</sup> "One [was] a claim by [pharmaceutical manufacturer] Upjohn for patenting a strain of bacteria that produces the antibiotic lynomycin. The other [was] an application by General Electric on behalf of the oil-slick-digesting *Pseudomonas* bacterium developed by Ananda Chakrabarty."<sup>440</sup> In both cases, the Patent Office had denied

those parts of the claim that sought to patent the bacterium itself, as distinct from the process in which was it used.... The thrust of the Patent Office's position [was] that patent law [didn't] specifically say that life forms are patentable. The statute provides: 'whoever invents or discovers a new and useful process, machine, manufacture or composition of matter or any new and useful improvement thereof, may obtain a patent therefore....'<sup>441</sup>

In response, the Court of Customs and Patents argued that existing patent law could not be interpreted as implying that certain things could not be patented just because they are alive. In a 5-4 decision, the Supreme Court determined on 16 June 1980 that live, human-made microorganisms could be patented. The biotech industry stood to benefit greatly from the verdict: "The Supreme Court's decision... is likely to provide a helpful boost to the fledgling

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<sup>437</sup> Wright & Wallace, 47-49.

<sup>438</sup> Wade, "Gene Splicing," 559.

<sup>439</sup> Wright & Wallace, 47-48.

<sup>440</sup> Nicholas Wade, "Supreme Court to Say if Life is Patentable," *Science*, 206 (9 November 1979): 664.

<sup>441</sup> However, at the time plant varieties could be patented, thanks to Congressional legislation enacted in 1930 and 1970, which specifically excluded bacteria and fungi. *Ibid.*, 664; Nicholas Wade, "Supreme Court Hears Argument on Patenting Life Forms," *Science*, 208 (4 April 1980): 31.

genetic engineering industry. The boost is mostly psychological, however, because most companies will still rely on secrecy to protect their proprietary information.”<sup>442</sup>

Throughout the 1980s and 1990s, the pharmaceutical and biotech industry was very successful at lobbying government to extend patent protection to processes used to make genetically engineered organisms, and at preventing changes to domestic and international patent law that would decrease the life-span of patents.<sup>443</sup> However, these changes to patent law did not reduce the biotech industry’s fears of losing trade secrets to competitors. Small companies feared that their competitors would use their patented products without offering remuneration, with the expectation that smaller firms would not have the resources to mount a sufficient legal defence of their rights.<sup>444</sup> Thus, even though the US government altered patent law to better protect proprietary information, the biotech industry continues to be preoccupied with the defence of its trade secrets from competitors both foreign and domestic.

Though most in government supported the favours granted to the developing industry, a few politicians sought to enact legislation that would subject the biotech industry to new regulations. In 1980, Senator Adlai Stevenson introduced a bill – which later failed – requiring companies to inform government of their recombinant DNA activities.<sup>445</sup> Likewise, in the autumn of 1984 a Cabinet-level working group headed by the White House Office of Science and Technology Policy released a report intended to “forge a comprehensive and coherent regulatory framework concerning the biotechnology industry,” which until that time was subject only to the voluntary regulations enacted by the NIH. The plan allocated responsibility for regulating research in the growing industry to four agencies: the EPA, the NIH, the FDA, and the

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<sup>442</sup> Nicholas Wade, “Court Says lab-Made Life Can be Patented,” *Science*, 208 (27 June 1980): 1445.

<sup>443</sup> Richard Stone, “Biotech Industry Wins Concessions on GATT,” *Science*, 265 (30 September 1994): 1999; Jocelyn Kaiser, “Biotech Industry Heads Off Patent Threat,” *Science*, 273 (13 September 1996): 1483.

<sup>444</sup> Jeffrey L. Fox, “Gene Splicers Square Off in Patent Courts,” *Science*, 224 (17 May 1984): 584.

<sup>445</sup> Nicholas Wade, “Control of Commercial Gene Splicing,” *Science*, 207 (15 February 1980): 745.

Department of Agriculture (USDA). Biotech companies were “anxious” that the new policy would “inhibit the industry with unnecessary regulation.”<sup>446</sup>

Federal officials responded to these concerns by expressing a desire “not to undermine the nation’s international preeminence in biotechnology.”<sup>447</sup> According to James B. Wyngaarden, then director of the NIH, “Biotechnology is coming to fruition. [If the federal government is not careful] we can create a chilling effect and drive the industry abroad.”<sup>448</sup> Likewise the deputy assistant administrator at the EPA, Donald Clay, announced that his agency “is looking to regulate with a light hand.”<sup>449</sup> The policy released under this plan on 31 December 1984 established review committees at the EPA, the USDA, and FDA, while the NIH’s RAC would maintain responsibility for reviewing gene-splicing experiments related to biomedical research. Companies would voluntarily submit proposals to the four committees, and no new laws or penalties would be imposed on the biotech industry.<sup>450</sup>

Similarly, though the EPA once intended to establish federal rules to govern the release of genetically engineered microorganisms into the environment, the OMB stifled the publication of these rules in 1989, evidently because they would be too burdensome for industry.<sup>451</sup> However, in order to avoid the unwelcome possibility that state legislatures would enact a patchwork of contradictory regulations, the biotech industry, as led by the Industrial Biotechnology Association, pleaded with the federal government to develop a single system of regulations.<sup>452</sup>

In response to industry’s requests, the White House published a 28-page document defining the responsibility of federal agencies for the regulation of biotech products. The new

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<sup>446</sup> Marjorie Sun, “Biotechnology’s Regulatory Tangle,” *Science*, 225 (17 August 1984): 697.

<sup>447</sup> *Ibid.*, 697.

<sup>448</sup> Quoted in *Ibid.*, 697.

<sup>449</sup> Quoted in *Ibid.*, 697.

<sup>450</sup> Marjorie Sun, “Regulatory Structure for Biotechnology Proposed,” *Science*, 227 (18 January 1985): 274.

<sup>451</sup> Mark Crawford, “Biotechnology Rules Wither in OMB,” *Science*, 243 (3 February 1989): 602.

<sup>452</sup> *Ibid.*, 546.

rules simplified the biotech regulatory process by forbidding the creation of special rules for bioengineered products. The new rules overrode existing regulations for biotech products employed by the USDA, EPA, NIH, and FDA, which had all developed special rules for genetically engineered products. The biotech industry was extremely satisfied with the new regulations. "In a word, we'll take it," remarked Richard Godown, President of the Industrial Biotechnology Association.<sup>453</sup>

Indeed the fostering of the risky but profitable biotech industry soon became a national priority for the US government. In March of 1990, the President's Council on Competitiveness announced its intention to ensure that the US remained the world leader in biotechnology. The Council developed 15 recommendations that would help the biotech industry grow from a \$2 billion per year industry, to \$50 billion per year. "The council basically [endorsed] the free market route to fostering biotechnology R&D and advises the Administration to oppose the creation of any new regulatory agencies or bodies to oversee biotechnology."<sup>454</sup>

### **The Pharmaceutical Industry's Reaction to the BWC's Verification Protocol**

It is not difficult to imagine how this privileged industry would react to the possibility of the imposition of new, potentially costly, regulations under the proposed BWC verification protocol, nor how the US government would react to any-developments that might inhibit this industry's growth. Nevertheless, PhRMA has participated in negotiations over the protocol as far back as the Third Review Conference in 1991, when the whole idea of verification was introduced.<sup>455</sup> Throughout the latter half of the 1990s PhRMA representatives participated in a "working group with expert knowledge about the technical ins and outs of biological warfare arms-control issues [who met] on a regular basis to evaluate some of the ingredients needed in a

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<sup>453</sup> David P. Hamilton, "New Biotech Rules," *Science*, 255 (February 1992): 911.

<sup>454</sup> Constance Holden, "Biotech: Rx for a Healthy Future," *Science*, 251 (8 March 1991): 1183.

<sup>455</sup> Alan Goldhammer, interview with author, 11 October 2005.

compliance protocol.”<sup>456</sup> The NSC chaired this group, and its participants included representatives of federal agencies, academics, and representatives from the Biotechnology Industry Organization (BIO) and PhRMA. “Although the meetings [were] said to have been cordial and business-like, they [did] not mark significant progress.”<sup>457</sup> PhRMA also participated in a working group with the FAS, which worked to create proposals that would balance effectiveness with acceptability to industry. In addition, PhRMA itself maintained a Biological Weapons Convention Subcommittee, which helped determine PhRMA policy towards the Convention.

The pharmaceutical industry’s initial wary willingness to consider inspections did not last, however, thanks to a 1994 trilateral confidence building exercise between the US, the UK, and Russia. This exercise allowed inspectors from each state to visit facilities in each other’s countries that they suspected might be involved in biological weapons research or production. Along with sites operated by the Army, the Russians chose to inspect a former BW facility in Vigo County, Indiana, now operated by Pfizer. This facility, the reader will recall, was originally used to produce anthrax weapons during the Second World War, but had since been sold to Pfizer and converted to commercial purposes. Nevertheless, the Russian inspectors believed that the facility might be an undercover government BW plant. The State Department called Pfizer’s management to inform them that they would soon be visited by Russian inspectors. The facility’s manager and Pfizer’s CEO protested the suddenness and potential intrusiveness of the move, and questioned whether Pfizer was obliged to fulfill the State Department’s obligations under the trilateral agreement. In response, the State Department threatened to have Pfizer’s CEO arrested. In sum, these so-called “‘ voluntary visits’ ... by Russian scientists to US pharmaceutical industry facilities proved so intrusive and defamatory to Pfizer... that the entire trilateral project

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<sup>456</sup> Jeffrey L. Fox, “US Officials Clash with Industry Executives Over BWC,” *Nature Biotechnology*, 16 (June 1998): 506.

<sup>457</sup> *Ibid.*, 506.

subsequently dropped into oblivion.”<sup>458</sup> The Pfizer incident generated a lot of bitterness towards the BWC in the pharmaceutical industry.<sup>459</sup> Following this incident, the pharmaceutical industry grew less willing to compromise over the new regime. Even though industry efforts to test and refine verification procedures – as the chemical industry had undertaken in 1989 – could have resulted in the creation of an effective but unintrusive verification protocol, the pharmaceutical industry never again allowed international inspectors to visit its US facilities. Had this situation been handled differently, it is at least conceivable that these initial inspections of biotech firms might have resulted in later willingness on the part of industry to allow their facilities to be used for the testing and drafting of regulations for the BWC verification protocol, just as mock inspections of chemical firms resulted in the creation of effective CWC regulations that offered enough protection for trade secrets to secure widespread chemical industry support for the CWC. At the very least, a less confrontational outcome might have allowed PhRMA’s member companies to later regard the prospect of international inspections, possibly coordinated by the State Department, with less loathing.

Instead, PhRMA made it very clear to US BWC negotiators that it would not support a verification protocol that did not protect its interests. In a 1995 letter to the State Department, PhRMA and BIO insisted that “any implementation of a declaration and verification protocol under the BWC must protect proprietary information for the pharmaceutical and biotechnology industries where the US is the undisputed world leader.”<sup>460</sup>

During the Fourth Review Conference in 1996, PhRMA proposed a list of four conditions that a new protocol had to meet in order to gain its approval: 1) no routine inspections; 2) on-site inspections had to be limited to investigations of non-compliance; 3) a so-called ‘green light’ filter, requiring a consenting vote from at least three quarters of the members

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<sup>458</sup> Fox, 506.

<sup>459</sup> Lynn Klotz, interview with author, 16 November 2005.

<sup>460</sup> Quoted in Wright & Wallace, 53.

of an Executive Council to proceed with an investigation of suspected non-compliance,<sup>461</sup> and 4) the private facilities to be inspected retained the right to make the final determination of what sensitive materials and equipment could be shielded from inspectors in order to protect proprietary information.<sup>462</sup>

Although the US officially supported the changes recommended by the VEREX group in 1992 and Fourth Review Conference in 1996, throughout his first term Clinton remained largely passive on the issue,<sup>463</sup> and did not provide strong leadership towards the protocol's successful conclusion. Furthermore, throughout the 1990s there was wide disagreement among government agencies whether the new protocol would protect US national interests,<sup>464</sup> with the White House and NSC generally in favour of the measure, and Commerce, the Pentagon, and elements of State retaining doubts about the protocol's efficacy and the detrimental effects it would have on industry and US biodefense efforts. The State Department position during the late 1990s is particularly interesting insofar as its position of opposition during the Bush Administration cannot solely be attributed to an attempt by Bush appointees at State to stay in favor with the executive as might be easy to assume.

Nevertheless, as mentioned in the previous section, in 1998 the Clinton Administration took a sudden interest in matters related to biological warfare, and in particular the completion of negotiations over the BWC's verification protocol by the end of the year.<sup>465</sup> At the time, "arms control experts and industry representatives [admitted] to being puzzled over the Clinton administration's sudden surge of interest in fortifying the BWC."<sup>466</sup> In March of 1998, NSC Director Sandy Berger and Commerce Department Secretary William Daly

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<sup>461</sup> Green light filters differed from red light filters, which had been proposed by other states parties, in that they required a  $\frac{3}{4}$  vote to *proceed* with an inspection, while a red light filter required a  $\frac{3}{4}$  vote to *stop* an inspection.

<sup>462</sup> Wright & Wallace., 53.

<sup>463</sup> Eliot Marshall, "Uncertainty on Bioweapons Treaty," *Science*, 291 (23 March 2001): 2288.

<sup>464</sup> Barbara Hatch Rosenberg, interview with author.

<sup>465</sup> Fox, 506.

<sup>466</sup> *Ibid*, 506.

hastily summoned more than a dozen biotechnology and pharmaceutical industry leaders from such companies as Eli Lilly, Johnson & Johnson, OraVax, and Novo Nordisk to a White House meeting, primarily to discuss ... BWC compliance issues.... For such high-level federal officials to engage their industry counterparts [represented] a significant escalation of these BWC negotiations at the domestic level as well as an important shift in momentum.... Catapulting the internal negotiations from the working group to the CEO level ... moved the discussions away from those with immediate hands-on expertise, and also markedly [raised] the political stakes of the discussion....<sup>467</sup>

The Clinton administration was quite willing to incorporate the interests of industry into its new policies. According to Wright and Wallace,

The effects of industry pressure on the US position were evident in a brief White House statement issued in January 1998 that adopted a 'green light filter' for investigations of noncompliance. In addition, the White House paper dropped any requirement for routine inspections, proposing only 'voluntary' visits where access as well as the visit itself would be controlled by the visited party.<sup>468</sup>

Apparently in response to a letter from PhRMA chairman Sidney Laurel to NSA Sandy Berger, in which Laurel voiced industry's persistent concerns that any "voluntary visit [would] truly be voluntary,"<sup>469</sup> and could result in the losses to proprietary information and industry reputation, the US changed its negotiating position in Geneva. "A United States working paper ... [from] July 1998 appeared designed to meet PhRMA's concerns halfway. The paper proposed that clarification visits would be undertaken only after stringent efforts to address issues other ways, and only under conditions that allowed the visited party to protect proprietary information...."<sup>470</sup>

The pharmaceutical industry was somewhat taken aback by the Clinton administration's sudden interest in the verification protocol, and soon developed a list of concerns about the

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<sup>467</sup> *Ibid.*, 506.

<sup>468</sup> Wright & Wallace, 54.

<sup>469</sup> *Ibid.*, 54.

<sup>470</sup> *Ibid.*, 54.

proposed new regime. In addition to the demands related above, PhRMA had significant concerns about removing samples from a facility for testing off-site.

Sampling from the seed, bump, or production vessel contents, condensate collections vessels, outsides of vessels, piping and flanges, various valves, filters and sample lines, benches, sinks, floors, and walls could possibly yield significant IP. Alternatively, a naturally occurring microorganism that has no bearing on the activity of the plant might be recovered, yielding, in essence, a false positive.<sup>471</sup>

As mentioned above, PhRMA demanded that inspections take place under conditions of 'managed access,' "which, simply stated, allows for the negotiation between the inspection team and the states party/industrial site team to find the means to satisfactorily answer the questions posed by the inspecting team."<sup>472</sup> The pharmaceutical industry worried that inspectors could gain access to sensitive information, and thus requested access to the credentials of BWC inspectors to see whether they had a stake in another company. No doubt in reference to the 1994 Pfizer incident, PhRMA argued that it was not right that a state could force inspections on a private facility, when it was the state, not the managers of a commercial facility, that had signed and ratified the treaty. Some pharmaceutical industry representatives asked whether being forced to submit to an international inspection violated their Fourth Amendment rights against unreasonable search and seizure.<sup>473</sup> PhRMA also expressed concern that the information used by the US government for its annual CBM reports on dual-capable facilities was frequently incorrect or out of date. Therefore, PhRMA suggested that industry make its own annual declarations.

The pharmaceutical industry was particularly averse to non-challenge or routine inspections. Besides the harm that could befall the inspected company's reputation, PhRMA maintained that such inspections would be unlikely to detect illicit activity, since biological

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<sup>471</sup> William Muth, "The Role of the Pharmaceutical and Biotech Industries in Strengthening the Biological Disarmament Regime," Politics and the Life Sciences, (March 1999): 93.

<sup>472</sup> *Ibid.*, 93

<sup>473</sup> It should be noted that individuals, not corporations, possess this right. Lynn Klotz, interview with author.

weapons research is easy to disguise or conceal. PhRMA officials also argued that these inspections could result in the loss of confidential information. Further, PhRMA contended that non-challenge inspections would be costly for the facilities that had to prepare for such visits, and they diverted resources away from the investigation of suspicious activities. Pharmaceutical industry representatives also expressed a concern that their employees might unknowingly incriminate themselves or their employers during inspections by accidentally saying or doing something suspicious.

The FAS Working Group on Biological and Toxin Weapons Verification worked with PhRMA to address these concerns, and create a proposal for the US delegation that would be effective at catching violators and protected the interests of the pharmaceutical industry. FAS negotiators demonstrated that many of the above concerns were misplaced. For example, the pharmaceutical industry need not have worried so much about the loss of reputation that could accompany a non-challenge visit. Avoiding this outcome was simply a matter of putting the right spin on it: a facility subjected to an inspection could follow the chemical industry's lead and put out a banner welcoming the inspecting team, thus demonstrating the company's commitment to global arms control.<sup>474</sup>

Likewise, the FAS argued that the pharmaceutical industry should not have been so concerned about the cost and inconvenience of non-challenge inspections, considering the FDA could already conduct similarly intrusive inspections on a more frequent basis. Furthermore, it was standard practice for many companies to maintain a team of employees who were familiar with government inspection practices, and knew how to guide inspectors around relevant portions of a facility without incriminating their company or revealing trade secrets. In the summer of 2000, the FAS was able to convince PhRMA to accept the necessity for non-

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<sup>474</sup> Lynn Klotz, interview with author.

challenge inspections, provided the requirement for managed access was retained and every reasonable effort was made to provide alternate means to satisfy the concerns of inspectors.<sup>475</sup>

Interestingly - from the perspective of analyzing an underappreciated dynamic in the role of epistemic communities - the FAS negotiators made many concessions to industry concerns as well. Though the 'gold standard' of testing would require samples to be taken from numerous locations inside a facility and tested in an outside lab, the negotiating team conceded PhRMA's point about the opportunities this could present for the loss of intellectual property. The compromised solution reached by the two parties required all testing to be done *in situ*, and no cultures or any samples could be removed from the facility. This solution was not perfect, however testing procedures involving antibodies and immunoassays had reached a sufficient state of development that reliable on-site testing of many agents was quite possible.<sup>476</sup> Furthermore, the FAS negotiators conceded PhRMA's point that industry should have access to inspectors' credentials to ensure that they were not affiliated with competing corporations.<sup>477</sup>

The FAS also agreed with PhRMA that site managers ought to "have the right to make managed access decisions during on-site activities," consistent with the Fourth Amendment. The FAS conceded that facility owners ought to "participate in the preparation and review of US declarations that involve their facilities," and that "the biopharmaceutical industry ... should assist the government in developing criteria for evaluating nominated inspectors."<sup>478</sup> The FAS agreed that all participants involved in inspections be subject to confidentiality agreements, and that the US ought to use the same definition of 'confidential information' in the protocol and supporting legislation that industry used itself.<sup>479</sup>

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<sup>475</sup> PhRMA/FAS, "A Joint Paper and Press Release," *The ASA Newsletter*, 78 (2000): 1.

<sup>476</sup> An immunoassay is a biochemical test that measures the level of a substance in a sample using the reaction of an antibody to its antigen.

<sup>477</sup> Lynn Klotz, interview with author.

<sup>478</sup> Lynn C. Klotz, Marie I. Chevrier, John J. Dingerdissen, Lynn Pritchard, *et al*, "Implementing the Biological Weapons Convention Protocol in the United States," *Biopharm*, 13, no. 8 (August 2000): 47-48.

<sup>479</sup> *Ibid.*, 47-49.

Together the two organizations came up with a proposal for the US negotiating team that would bring industry on board with the BWC negotiations.<sup>480</sup> By involving itself in these negotiations, the pharmaceutical industry wished to demonstrate that “the willingness of the US pharmaceutical industry to cooperate with [the proposed protocol was] now clear, provided that the United States [agreed] to include specific safeguards for industry in legislation to implement the protocol.”<sup>481</sup>

Though the adoption of these requirements allowed the US to satisfy the concerns of its pharmaceutical industry,

in the Geneva Ad Hoc Group Negotiations, the US position was opposed by all its Western European Allies, and as the US kept pushing for the continued dilution of provisions, the other Western nations compromised their positions in order to convince the US to come along.... As the negotiating text of the Verification Protocol got weaker, should a text ever have been approved and submitted to the US Senate, it would have faced the anticipated argument that it offered no benefits, and Senate opposition would be expected on this ground, as well as protection of US pharmaceutical interests, and so on.<sup>482</sup>

In this instance the United States government found itself in a position similar to that predicted by the two-level games literature, forced to balance between competing domestic and international pressures to weaken the verification protocol and accept it, respectively. Just as predicted in the two-level games literature the pharmaceutical industry’s distrust of inspection regimes contributed to a small ‘win set’ for the US – a small number of possible negotiating solutions that would be acceptable to relevant domestic constituents, in this case, the biotech and pharmaceutical industry. However, in this instance, the US government was forced to not only balance between competing domestic and international pressures, but also between competing interests at the domestic level, a further complication not anticipated in the two-level games literature. The US government found itself in the uncomfortable position of having to create a

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<sup>480</sup> *Ibid.*, 48.

<sup>481</sup> PhRMA/FAS, 1.

<sup>482</sup> Leitenberg, “Biological Weapons in the Twentieth Century,” 298.

policy that ideally would satisfy the interests of the international community – which wanted it to accept an unweakened version of the verification protocol, the Pentagon – which didn't want any regime that could compromise its biodefense research, the biotech and pharmaceutical industry – which wanted a regime that would offer protection for trade secrets, but would prefer no inspection regime at all, and the Senate – which would only ratify a regime that stood a good chance of catching most violators. Though the US made an attempt to accommodate these competing interests, ultimately the 'win set' was impossibly small. The US was unable to create a regime that would satisfy all concerned actors. As predicted in Putnam's model, in the end US domestic concerns trumped international pressure to accept the new protocol, while its attempts to accommodate domestic actor interests caused the international community to question American commitment to biological arms control.

In 2000 Ambassador Don Mahley, the head of the US delegation to the BWC negotiations, began to express fears that the now weakened protocol would provide a false sense of reassurance, in addition to the dangers it could pose to biodefense research and the pharmaceutical industry. According to Ambassador Mahley, the new protocol provided no reliable mechanism to catch violators, and on the other hand offered many opportunities for violators to avoid being scrutinized in a manner intrusive enough to find solid evidence of a biological weapons program, but still pass inspection. For example, Ambassador Mahley argued that the right to 'managed access,' for which the pharmaceutical industry had fought so hard, would give facility managers in offending states an opportunity to clean up or hide incriminating evidence. This potential for 'false negatives' would make it difficult to later indict violating states for failing to adhere to the BWC.

Therefore, in 2000 Ambassador Mahley

began to speak publicly and to diplomatic colleagues in Geneva, expressing his personal opinion that it would be desirable to scrap the existing AHG mandate. He argued that the entire effort was a misguided affair and that the US government

should go to the November 2001 Fifth Review Conference and ask for a new negotiating mandate for the Protocol based on entirely different negotiating principles.<sup>483</sup>

Furthermore, when the Chairman of the Ad Hoc Group released his draft protocol for the verification regime on 30 March 2001, it was clear that he had not included all of the provisions requested by industry in the final text of the verification protocol. Indeed, the draft protocol seemed to impose a disproportionate burden on US industry, as it required declarations of high containment facilities capable of large scale vaccine production – as were present in large numbers in the US – but not smaller facilities, even though biological weapons could be produced in these facilities too. In testimony before the House Subcommittee on National Security on Veterans' Affairs and International Relations, Gillian Woollett, PhRMA's Associate Vice President for Biologics and Biotechnology argued that

Our industry supports simple declarations of relevant activities, in order to promote transparency and build confidence that their facilities engage in legitimate enterprises. However, triggers for declarations under the protocol must be precisely analyzed and defined so as to encompass only those private industry facilities of greatest relevance to the detection and deterrence of biological weapons. Declaration formats must be simple and without a requirement for disclosure of any confidential business information. The information's use must be apparent in impeding biological weapons creation. Unfortunately, these caveats are not met in the current Ad Hoc Group Chairman's text.... The global pharmaceutical, biotechnology and chemical industries have tried to participate actively to reduce the threat of biological warfare. We have offered our expert assistance to help speed the development of a compliance protocol to the BWC that is technically feasible and scientifically sound; one that will fully protect the legitimate rights and confidential business information of our companies, and which enables them to continue to lead the world in discovering and developing solutions in areas beneficial to society. Working globally with our respective governments and international negotiators, our companies believe that our industry can help strengthen the BWC and reduce this serious threat to people around the world. Unfortunately, the Ad Hoc Group Chairman's text as proposed strongly suggests that our input to date has fallen on deaf ears.<sup>484</sup>

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<sup>483</sup> *Ibid.*, 298.

<sup>484</sup> Woollett, 2-3.

The last nail in the coffin for the BWC verification protocol was the election of George W. Bush and the coming to power of his top foreign-policy officials, whose antipathy towards multilateralism was already well-known. As scholars at the Stockholm International Peace Research Institute presciently argued in early 2001, "the election of a US President whose administration is highly skeptical of arms control will not facilitate compromise, especially in the area of verification, unless the text is weakened beyond usefulness."<sup>485</sup> Bush appointed to his cabinet several individuals affiliated with the conservative think tank 'the Project for the New American Century' (PNAC), which argued in favour of unilateral defense over true multilateral efforts. According to PNAC director Robert Kagan, "Americans prefer to act with the sanction and support of other countries if they can. But they're strong enough to act alone if they must."<sup>486</sup> This preference for unilateralism was reflected in Bush's biological weapons policies, aptly characterized as follows by one observer:

Since summer 2001... the Bush administration's radical and new approach towards multilateral regimes has become clearer.... [Many] in the US government now see proliferation of weapons of mass destruction as inevitable. There is a general belief that arms control can do little, if anything, to stop the spread of biological and chemical weapons. According to this view, prevention through multilateral regimes is not possible. Thus, the main task is to manage the consequences of the spread of biological weapons by political and military means. The US increasingly seeks technological and military responses to a threat it perceives to be real, rather than to work on political answers to the problem of bioweapon proliferation.<sup>487</sup>

Bush himself aptly summarized his administration's viewpoint on multilateralism in his 2004 State of the Union Address, when he argued that, "there is a difference ... between leading a coalition of many nations, and submitting to the objections of a few. America will never seek a permission slip to defend the security of our country."<sup>488</sup>

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<sup>485</sup> Zanders, *et al.* 531.

<sup>486</sup> Robert Kagan, "Multilateralism, American Style," *The Washington Post*, (13 September 2002).

<sup>487</sup> Oliver Meier, "The US Rejection of Bioweapons Verification, and Implications for Future Negotiations," *International Network of Scientists and Engineers Against Proliferation (INESAP) Bulletin Online*, 21 (January 2003).

<sup>488</sup> George W. Bush, "State of the Union Address, 2004," *The White House*, (20 January 2004).

Soon after Bush assumed office, "Ambassador Mahley chaired an interagency review of US policy on a BWC Verification Protocol. The outcome was predictable."<sup>489</sup> It is alleged that the Ambassador structured the review in such a way that none of the participating agencies would approve of the Protocol.<sup>490</sup> It soon became clear to international observers that "The United States [was] primarily evaluating the Protocol against new national standards and not against the Protocol mandate that it not only agreed to but was instrumental in drawing up...."<sup>491</sup>

In the spring of 2001, press reports circulated that the verification protocol had failed the new administration's review, yet many negotiating parties were still surprised at the vehemence with which the US rebuffed the protocol. As related in the introduction, on 25 July 2001 the US delegation rejected the AHG's provisional text outright, and refused to negotiate on its basis ever again.<sup>492</sup> The State Department issued a briefing outlining its reasons for the rejection:

The protocol which was proposed adds nothing new to our verification capabilities. And it was the unanimous view in the United States government that there were significant risks to US national interests and that is why we could not support the protocol. Implementation of such a protocol would have caused problems... for our biological defense programs, would have risked intellectual property problems for our pharmaceutical and biotech industries and risked the loss of integrity and utility to our very rigorous multilateral export control regimes.<sup>493</sup>

Arms control experts such as Graham Pearson and Barbara Hatch Rosenberg argued against all of these assertions, but to no avail. In response to US fears that the Protocol could cause problems for its biological defense research, these experts demonstrated that Article 13 of the Protocol specifically stated that "nothing in this Protocol shall be interpreted as impeding the right of any State Party to conduct research into... means of protection against ... biological

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<sup>489</sup> Leitenberg, "Biological Weapons in the Twentieth Century," 298.

<sup>490</sup> Barbara Hatch Rosenberg, interview with author.

<sup>491</sup> Graham S. Pearson, "The US Rejection of the Protocol at the Eleventh Hour Damages International Security Against Biological Weapons," *The CBW Conventions Bulletin*, 53 (September 2001): 6.

<sup>492</sup> Leitenberg, "Biological Weapons in the Twentieth Century," 298.

<sup>493</sup> Pearson, 6.

weapons, for purposes not prohibited under the Convention.”<sup>494</sup> In response to the argument that the regime would have harmed multilateral export control regimes, Pearson and Rosenberg pointed to Article 7 of the treaty, which served to reinforce existing export control regimes because it required states parties to amend or establish legislation to regulate the transfer of controlled agents and equipment.<sup>495</sup> Pearson and Rosenberg argued that despite its weaknesses – themselves largely a product of US capitulations to industry complaints, and a “lack of US trials for on-site procedures”<sup>496</sup> – the different elements of the new Protocol “would together provide information, pieces of the jigsaw that together [would] build a consistent picture – or raise questions... which other states parties will seek to clarify....”<sup>497</sup>

Finally, in response to the argument that the verification protocol would have exposed pharmaceutical industry trade secrets, Pearson and Rosenberg argued that the new protocol provided stronger protection for intellectual property than the CWC.

The chairman’s text [contained] more safeguards for confidential information and is less intrusive than the Chemical Weapons Convention.... Unlike the CWC, the protocol text [did] not require routine visits, it [allowed] no sampling and analysis in non-challenge visits, and it [gave] control of access to the host country. No confidential business information is required in declarations.... The [text exempted] many defense facilities and most pharmaceutical industries from declaration.... In addition, the text contains all the protections for confidential information that were developed for the CWC.<sup>498</sup>

Under the terms of the protocol fewer than seven inspections of private American facilities would be visited per year, a number far less than that carried out by the FDA.<sup>499</sup> It was clear, however, that the Bush Administration had already made up its mind, and would not be persuaded by this line of reasoning. Thus, despite significant technical difficulties associated

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<sup>494</sup> *Ibid.*, 7.

<sup>495</sup> Barbara Hatch Rosenberg, “Allergic Reaction: Washington’s Response to the BWC Protocol,” Arms Control Today, (July/August 2001): 7-8.

<sup>496</sup> *Ibid.*, 4.

<sup>497</sup> Pearson, 6.

<sup>498</sup> Rosenberg, 5.

<sup>499</sup> *Ibid.*, 6.

with detecting biological weapons production and differentiating it from legitimate research, it was technically possible for a regime to have been created that adequately satisfied the interests of domestic industry and provided increased confidence to participating states that their fellows were adhering to treaty obligations.

Ambassador Mahley argued that States Parties should 'think outside the box' and try to come up with other solutions to the problems of verification,<sup>500</sup> though he himself was unable to provide much advice where this solution might lie. On 19 November 2001, Under Secretary of State for Arms Control and International Security Affairs John Bolton "reiterated the US opposition to the composite text and formally presented alternative proposals for mechanisms to implement specific articles of the BWC" at the BWC Review Conference in Geneva.<sup>501</sup> The American plan called for member states to implement domestic legislation "criminalizing treaty-prohibited activities.... The US package would also expand the UN secretary-general's mandate to investigate suspected biological weapons use by allowing the secretary-general to examine suspicious disease outbreaks."<sup>502</sup> The plan also called for states to support "World Health Organization (WHO) efforts to monitor and respond to global disease."<sup>503</sup> The proposed plan would "make it easier to extradite criminals involved in biological weapons crimes."<sup>504</sup> The American plan also called for stricter biosafety regulations, and a scientists' code of conduct. Finally, the proposed plan requested member-states to "'sensitize scientists to the risks of genetic engineering' and to 'explore national oversight of high-risk experiments.'"<sup>505</sup> Perhaps the most significant difference between the American plan and the failed verification protocol was its

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<sup>500</sup> Rebecca Whitehair & Seth Brugger, "BWC Protocol Talks in Geneva Collapse Following US Rejection," Arms Control Today, (September 2001): 1-2.

<sup>501</sup> Jean Pascal Zanders, John Hart & Frida Kuhlau, "Chemical and Biological Weapon Developments and Arms Control," in SIPRI Yearbook 2002: Armaments, Disarmament & International Security (Oxford: Oxford University Press, 2002), 674.

<sup>502</sup> Seth Brugger, "US Presents Alternatives to BWC Protocol at Review Conference," Arms Control Today, (December 2001): 1-2.

<sup>503</sup> *Ibid.*, 1-2.

<sup>504</sup> *Ibid.*, 1-2.

<sup>505</sup> *Ibid.*, 1-2.

“legal status. The [verification] protocol would [have been] legally binding, while the [Bush] administration simply plans to incorporate its ideas in the review conference’s final document, which [would] be politically binding but [would] not have the force of international law.”<sup>506</sup>

The US had “difficulty obtaining support for its proposals at the review conference.... Most of the delegations at the conference would [have liked] to conclude a multilaterally agreed, legally binding measure that would enhance compliance with the convention.”<sup>507</sup> Other delegates felt that “if the US proposals were agreed to at the conference, then it would be difficult for other countries to pressure Washington to accept other ideas.”<sup>508</sup>

The anthrax terror attacks in the autumn of 2001 did not help matters either. The US government’s reaction to these attacks was one of near panic. When it was revealed that the anthrax came from American sources, suspicions grew between FBI investigators and microbiologists working in the US Army Medical Research Institute for Infectious Diseases (USAMRIID) laboratories, where the strain of anthrax used in the attacks is believed to have originated. Though no arrests of scientists were made in connection to these attacks, the FBI conducted an intensive investigation of one USAMRIID scientist, Steven Hatfill, who reacted by accusing the FBI of harassing him.<sup>509</sup> This episode might have provided the perfect crisis to spur substantial American support for the BWC verification protocol. However, even though the attacks demonstrated to many observers – including Sir Brian Heap<sup>510</sup> -- that biological weapons were no longer an imaginary threat, but rather required cooperative multilateral efforts to prevent their future use, in the US BWC proponents were unable to capitalize on them in this manner.

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<sup>506</sup> *Ibid.*, 1-2.

<sup>507</sup> *Ibid.*, 1-2.

<sup>508</sup> *Ibid.*, 1-2.

<sup>509</sup> Debora MacKenzie, “The Insider,” *New Scientist*, (9 February 2002): 88.

<sup>510</sup> Recall the open letter by Sir Brian Heap, vice president of the UK National Academy of Science, to American scientists regarding the anthrax attacks from the discussion on how microbiologists have affected biological arms control, pg. 155.

Rather, the Bush administration sought to incorporate the BW attacks into its agenda for preemptive military action against perceived threats in the Middle East.

Since 2001, virtually all efforts to establish a verification protocol have been discontinued. Individuals who worked hard to create a meaningful and agreeable regime are disheartened, and the FAS Working Group on Biological and Toxin Weapons Verification – the NGO group most involved in negotiating a proposal that would be amenable to industry – has disbanded, with many of its members joining the Scientists Working Group at the Center for Arms Control and Non-Proliferation in Washington, DC. Though this Working Group works “to prevent the development and use of biological and chemical weapons [by developing] analyses, reports, recommendations and briefings on technical and policy issues for Congress, the public, and the international community,”<sup>511</sup> even it too no longer fights for a verification protocol.

A group of 87 states-parties to the BWC agreed at a December 2005 meeting to encourage voluntary codes of conduct for scientists.

The meeting, the last before the treaty’s Sixth Review Conference in late 2006, concludes a work program focused primarily on strengthening the BWC through national measures.... One US State Department official [explained] that although the meetings have been useful in encouraging discussion among national experts, a decision has not been made [in the US] on whether to back a new series of meetings following the upcoming conference.<sup>512</sup>

Thus, the biotech and pharmaceutical industries will get the arms control regime they wanted, and the US government will retain its aversion to strengthening the BWC for the foreseeable future.

The biotech and pharmaceutical industry continues to influence US BW policy, but since 2001 its focus has shifted towards the profitable area of biodefense. In May of 2004, the Senate unanimously passed Project BioShield, a 10-year, \$5.6 billion plan to develop and stockpile vaccines and drugs to protect Americans against biological

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<sup>511</sup> Center for Arms Control and Non-Proliferation, “Biological and Chemical Weapons,” <<http://www.armscontrolcenter.org/cbw/>>, downloaded 25 February 2006.

<sup>512</sup> Michael Nguyen, “States Agree to Pursue Bio Codes of Ethics,” *Arms Control Today*, (January/February 2006): 1-2.

attacks.... BioShield is designed to give financial reassurances to small biotech and pharmaceutical companies that are nervous about investing in products – from anthrax vaccines to ‘dirty bomb’ drugs – with a limited market. It guarantees that any company that develops a successful new product for these threats will find a willing buyer in the federal government.<sup>513</sup>

Project BioShield also offered to allow drugs that had not yet completed the FDA review process to be used in the event of an emergency. The pharmaceutical industry applauded the move, though it pressured the President to offer them protection from legal liability in the event of a failure of their unlicensed products. Critics argued that the project was doomed to failure without a corresponding enhancement to the nation’s public health structures, which would be directly involved both in tracking and containing a biological weapons attack and in administering stockpiled vaccines and drugs.<sup>514</sup> The above outcomes correspond closely to those predicted in the Military-Industrial Complex literature, in which government is depicted as eager to implement policies that promote the parochial interests of powerful defense industries.

### **More Questions and Answers**

Having described the relationship between scientific communities, the pharmaceutical industry, and US biological weapons policy, it is once again possible to answer more of the questions posed in Chapter 2. As before, the questions will be written in bold and the answers will follow. A more in-depth comparison of two cases and the theoretical implications of this comparison will follow in Chapter 5:

The discussion of two-level games in the second chapter presented several questions relevant to the influence exerted by the biosciences and the biotech and pharmaceutical industry on government. **How was a coalition of domestic actors able to ‘decrease the size of the win-set’ and persuade the US to stop participating in negotiations over strengthening the**

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<sup>513</sup> David Malakoff, “BioShield Heads to President’s Desk,” *Science*, 304 (28 May 2004): 1225.

<sup>514</sup> Thomas May & Ross Silverman, “Bioterrorism Defense Priorities,” *Science*, 301 (4 July 2003): 17.

**BWC? Who were the relevant domestic actors in this case, and why they were more influential than other potential constituents? Why did the pharmaceutical industry disapprove of the BWC verification regime?**

There were many domestic actors involved in the US decision to stop negotiating over the creation of a verification protocol, each of which opposed it for their own reasons. The Defense Department opposed the new regime because inspections of its facilities could result in the exposure of secret research and allegations that the US was conducting research of an offensive nature.<sup>515</sup> Given the existence of several Pentagon biodefense research projects that could be interpreted as offensive in intent, this was indeed a legitimate fear.<sup>516</sup> The pharmaceutical and biotech industry and Commerce Department opposed the regime because, as we saw, the verification measures entailed in such a protocol had the potential to expose trade secrets to international scrutiny. Furthermore, since the 1994 incident at Pfizer, the pharmaceutical industry did not trust government inspectors to respect the wishes of facility managers during investigations. Finally, the State Department opposed the regime because it had been weakened so much that even the head of the US BWC delegation doubted that it would be effective at catching violators of the treaty. Certainly, other actors including scientific NGOs such as the FAS, DARPA adviser Joshua Lederberg, and President Bill Clinton fought for the implementation of the verification protocol, but their efforts ultimately failed to garner support from industry or dissenting government agencies.

Bill Clinton did little to promote the verification protocol until the last three years of his presidency. When he finally did announce his strong support for the new regime many actors inside and outside of government, such as DOD and PhRMA, had long since decided that such a regime was not in their best interests. Clinton's efforts to garner support were met with some

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<sup>515</sup> Seth Brugger, "International Reaction to Secret US Bio-Weapons Research Muted," Arms Control Today, (October 2001): 1-2

<sup>516</sup> Zanders, Hart & Kuhlau, 666, 678.

surprise on the part of the pharmaceutical industry, though it agreed to negotiate with FAS representatives to develop a US proposal that would adequately meet their interests, because the industry would have to accept any decision on the matter made by the US government. This development is a significant one, insofar as it suggests that the pharmaceutical lobby recognized that the US government was not simply the servant of powerful industry, as depicted in the Military- Industrial Complex literature, but also an important actor, capable of defining national interests in ways that do not correspond to the interests of industry. As such, it may have been possible for the US to have agreed to a verification regime that defied industry interests, and the failure of the BWC verification regime was not a foregone conclusion. By agreeing to participate in such negotiations, the pharmaceutical industry acted in a similar manner to the chemical industry when it began a concerted effort to influence the terms of the CWC in the 1980s. However, unlike the chemical industry, PhRMA member companies did not volunteer their facilities for the testing of possible verification measures, largely due to the experiences of Pfizer in 1994. Had the pharmaceutical industry allowed some of its facilities to be used to develop and test verification procedures, the protocol's drafters could have created a set of procedures that would be effective at catching illicit BW programs, and could offer protection for trade secrets, despite significant technical differences between chemical and biological weapons. Industry officials participating in such tests might have been persuaded that the BWC inspectors posed no real threat to public image or trade secrets, and the procedures to be adopted under the BWC posed little danger to industry. Another significant difference between the two cases is that unlike CWC negotiators, the Ad Hoc Group failed to add some of the modifications suggested by PhRMA to the draft proposal. In consequence, the pharmaceutical industry was never convinced that the new protocol would offer adequate protections for its interests, and did not become a leader in the fight for the new regime as the chemical industry had been less than a

decade earlier.

Instead, pharmaceutical industry and Pentagon concerns about the loss of secrets convinced US negotiators in Geneva to push for the continued dilution of the treaty. Western European states parties reluctantly assented to the weakening of the treaty in hopes that the requested changes would convince the US to approve the draft protocol. In this manner, the US government sought to balance between competing interests at the domestic and international levels, as it is often forced to do in the two-level games model. However, all these efforts at appeasement served to do was convince the head of the US delegation that the treaty would fail to catch violators, and would actually make it more difficult to indict offending states by giving them multiple opportunities to maneuver through a number of loopholes.<sup>517</sup>

Soon after Bush was elected, Ambassador Mahley conducted an interagency review of US policy towards the regime, which failed to meet the stringent criteria for effectiveness demanded of it by the Ambassador. The Bush Administration, already known to possess a strong antipathy towards multilateralism, readily accepted the conclusions offered by the review.<sup>518</sup> Had a different president been elected, or had Clinton begun to exert leadership a few years earlier, the outcome could have been different. A different president could have refused to conduct an interagency review or argued that some of the criteria expected by the review were far too stringent for any verification regime to meet. Though continued presidential support for the protocol could have resulted in the successful negotiation and signing of a new regime, it would not have necessarily resulted in pharmaceutical industry support for such a regime. And, as we saw in the last chapter, influential Senators would likely have refused to ratify the new protocol if they believed that such a regime would prove costly to a valuable component of US industry.

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<sup>517</sup> Rosenberg, 4.

<sup>518</sup> *Ibid.*, 3-4.

Though the Clinton administration and its supporters in NGOs made a valiant if brief effort at creating consensus over the BWC, in 1998 the political climate was not conducive to such accomplishments. The Monica Lewinsky scandal and subsequent failed impeachment imbroglio discouraged the Republican controlled Senate from cooperating with Clinton over multilateral arms control treaties. Ultimately, the Clinton administration could not convince the protocol's influential detractors that such a regime would provide adequate protection for their own activities before the election of George W. Bush made such compromises unnecessary.

While we have thus gained significant explanatory leverage on the failure of the BWC protocol from propositions from the interest group and two level games approaches, what remains to be considered is the role played by scientific communities in the formulation of American biological weapons policy. To explore the influence of scientists, we will again turn to the questions suggested by the epistemic communities literature highlighted in Chapter Two:

**Were there other influential actors besides business interest groups, such as scientific communities? What was the composition of these scientific communities? How did these scientists seek to influence government? What is the source of these groups' influence? Like business, do they pursue the assumed goal of profit maximization, or something else? Were these scientific communities successful at achieving their goals? Was this community an epistemic community? What are the implications of the increasing commercialization of science in areas such as microbiology?**

As we saw, scientific communities played a major role in the decisions made by the US government. Some groups, composed of biologists and specialists from all areas of the sciences, pursued the creation of the BWC, its extension to include toxins, and the strengthening of the regime with the addition of a verification protocol. These scientists exerted their influence by

participating in interagency policy reviews, participating in official negotiations in Geneva, preparing reports, and negotiating with industry representatives. Their influence was a product of their recognized expertise in matters related to BW and, in the case of Matthew Meselson and Joshua Lederberg, the personal relationships they maintained with influential policy makers.<sup>519</sup> The goal these scientists appear to have pursued was the protection of the US and the world from the dehumanizing effects of biological warfare. At first these scientists were extremely effective at convincing the Nixon administration to abandon its offensive BW programs and pursue multilateral BW arms control instead. They were also successful at drafting a consensual verification protocol, and at incorporating industry demands into US proposals for the protocol. Some microbiologists have continued to advocate the goal of biological arms control, though their influence has diminished with the increasing prominence of another group of biologists advocating contradictory policies.

Following the biotech revolution, a group of microbiologists – this one composed mostly of microbiologists and led by the ASM – arose and began to advocate other goals related to biological weapons. These microbiologists mainly lobbied to minimize government regulation of their work and later to increase spending on biodefense. These microbiologists were certainly concerned about the threat posed by biological weapons, but lobbied for policies that would have a minimal negative impact on their own research activities, or on those of their employers in industry. While supportive of the intent of the BWC, these microbiologists insisted that the new protocol should be based on scientifically sound principles, and could promise a high probability of detecting illicit activity and a negligible probability of negatively impacting biomedical research and the pharmaceutical sector. To achieve these goals, members of this group have addressed negotiations in Geneva, lobbied Senate committees, and participated in interagency

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<sup>519</sup> As will be discussed further in Chapter 5, the personal relationship between Lederberg and Clinton, which allowed for Lederberg to clarify America's interests and best possible course of action is reminiscent of the relationship developed between international nuclear experts and Soviet policymakers, and resulted in similar outcomes.

reviews. These scientists have had a significant impact on policy, both because the US government has relied on their expertise to develop legislation – such as the 1996 CDC shipping regulations – and because of their affiliation with the powerful pharmaceutical industry. These scientists' efforts have been largely successful: not only has the US government sought to minimize the impact of new regulations on biotech researchers and industry, it has made their preferred form of BW regulation – the voluntary scientist's code of ethics – the major feature of US BW arms control policy.<sup>520</sup>

Clearly, there are significant differences between the groups of scientists identified in this chapter and the cross-disciplinary epistemic community that pursued chemical arms control identified in the last chapter. While the scientific community identified in the last chapter was largely united in its pursuit of certain policies over others, in this case there is a significant split between the scientists who pursued the verification protocol, and those who pursued self-regulation. In addition, while both groups of microbiologists used their expertise to coordinate international policy, one group assisted with the creation of the BWC and later the verification protocol, and the other laboured to protect its own work from costly or intrusive regulations, consistent with its preference for self-regulation originally developed during the Asilomar process. These different and contradictory goals force us to consider whether the two groups of microbiologists observed in this case ought to be considered an epistemic community.

According to Haas, epistemic communities are also supposed to possess shared causal knowledge and shared notions of validity, which will contribute to shared normative beliefs and a shared policy enterprise. It is evident that these two communities of scientists do not possess a single shared policy enterprise, though it is not likely that this is due to differing causal knowledge or notions of validity. Recall from the last chapter that it was suggested that specialists from all areas of the sciences can be said to possess these two qualities, based on their

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<sup>520</sup> Alan Pearson, interview with author.

shared respect for the scientific method. Without further supporting evidence, it would not be fair to argue that one group was less committed to the scientific enterprise than the other. Rather it simply appears to be the case that these two communities of scientists possess different normative and principled beliefs about what policies America ought to adopt: while one has made the strengthening of the BW regime through the creation of a verification protocol a priority, the other argues that such a regime must be based on sound principles that would allow it to protect legitimate biomedical research. Though the first scientific community endeavoured to craft a verification protocol that satisfied the concerns of all interested parties, both foreign and domestic, ultimately it was unsuccessful. The other community has been much more successful at convincing the US government to minimize new regulations.<sup>521</sup> Because this community lacks the shared normative beliefs necessary to unite and motivate its members to advocate a single policy enterprise, it should not be classified as a single epistemic community. Rather the groups of scientists observed in this case ought to be described simply as competing scientific communities – which likely share notions of causality and validity, but do not share normative or principled beliefs, or therefore a single policy enterprise

It seems that this schism between microbiologists who continue to pursue arms control and those who pursue the minimization of regulation is a major effect of the biotech revolution and subsequent commercialization process that the microbiology community experienced in the late 1970s. As we will see in the next chapter, if both of these groups decide to lobby government on behalf of their respective causes, the effectiveness of one or both of these efforts may be compromised.

While the findings up to now explain the position of science and industry and demonstrate their influence, what still remains puzzling is why the position advocated by the

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<sup>521</sup> Why this latter group has been more influential over US policy is an important question, and will be returned to in the conclusion

biosciences and adopted by the U.S. wasn't shared by other states, particularly in states with prominent and influential biotech and pharmaceutical industries such as Great Britain. Did these other states support the BWC over the objections of scientific communities and industry? Or, did science and industry in other states perceive the protocol differently? If so, why? As we will see in the conclusion, these questions merit further study.

In Chapter 2, the discussion of neoliberal institutionalism presented a number of questions regarding the effectiveness of the BWC verification protocol. These were: **How did the verification regime reach such a state of apparent ineffectiveness? In terms of the pursuit of biological disarmament, how 'effective' was it to discontinue the entire process of cooperating to improve a regime that is known to be flawed? And why didn't other states express similar concerns for effectiveness?**

The effectiveness of the proposed verification protocol is a troublesome issue, and one that may be impossible to resolve. For certain the US managed to weaken the verification protocol by incorporating into its proposals the changes – such as managed access – negotiated between the FAS Working Group and PhRMA. Western European states reluctantly accepted these changes in order to convince the already doubtful United States that the new protocol would not harm its defensive BW research or the interests of its pharmaceutical industry.

However, the ineffectiveness of the verification protocol may have deeper roots than these compromises. After all, Ambassador Mahley refused to continue negotiating on the basis of the draft protocol. Surely if the problem lay in the compromises that the US had requested an amenable solution could still be found. However, Ambassador Mahley denied this possibility, and has not offered any solutions to the problems of the verification regime. Nor, for that matter, have any of the arms control experts interviewed for this dissertation. If it is impossible to

develop a verification protocol that can distinguish between legitimate and illegitimate biological weapons work – as it appears to be at this time – then states must decide what would be more effective at combating the threat of biological weapons use: an inherently flawed and ineffective protocol that could create a false sense of security, or having no such protocol at all.

The drafters of the BWC verification protocol were aware of its limitations, but argued it still had value:

The true value of the protocol was expected to be the increased transparency it would bring to worldwide biodefense and biotech activities. Frequent routine visits, coupled with the possibility of an intrusive investigation to resolve specific suspicions, were thought to be a significant deterrent to all but the most determined proliferators. No verification measure could ever absolutely guarantee the detection of all covert biowarfare activity, but the protocol was seen by all close US allies as a modest improvement in short-term security whose value would increase in time.<sup>522</sup>

Ironically, some states suspected to have conducted illegitimate weapons research and not known for their commitment to multilateral arms control, such as Iran and China, have indicated their support for the protocol and criticized the US for failing to support it. For example, in the summer of 2001 Iranian delegates reacted to the United States' rejection by noting that

At the peak of satisfaction for the creation of a new cooperative atmosphere and momentum, all of the sudden we face a totally unjustified statement, with its main message that even the Protocol concept is questioned and there is no necessity to work on the protocol for the BWC.... [In] spite of the fact that the US has been fully involved in all stages of negotiation, in many cases [it] created obstacles to consensus....<sup>523</sup>

During the Fifth Review Conference, Chinese delegate Sha Zukang argued that

The Chinese delegation has always maintained that the conclusion of a balanced and effective protocol through multilateral negotiations is the only feasible way to comprehensively strengthen the effectiveness of the Convention. We are glad to note that the overwhelming majority of states parties still stand for maintaining the existing mechanism and mandate of the ad hoc group and support continued negotiations within the multilateral

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<sup>522</sup> Wheelis & Dando, 42.

<sup>523</sup> Quoted in Graham S. Pearson, "Report From Geneva: Strengthening the Biological and Toxin Weapons Convention," *The CBW Conventions Bulletin*, 53 (September 2001): 20.

framework in order to formulate measures for strengthening the effectiveness of the Convention.<sup>524</sup>

It is certainly possible that these states were more than happy to let the U.S. take the fall for an outcome they were not displeased with, thus focusing the blame for the failure of the BTWC on the US.

European Union states argued that, despite the failings of the protocol, the successful conclusion of the BWC negotiations “would send a positive signal demonstrating the international community's commitment to strengthening the multilateral disarmament and non-proliferation regime.”<sup>525</sup> However, it is interesting to note that these other negotiating parties to the BWC did not continue with discussions over the verification protocol without the United States.

It [seemed] clear from the way in which the [final sessions to discuss the work of the Ad Hoc Group in July 2001] developed that many of the states parties in Geneva had not developed a clear strategy as to how to proceed if the US were indeed to reject the protocol. Consequently, when that rejection came ... it apparently caught delegations on the hop without political guidance as to whether the other states parties would be better off with a protocol without United States participation....<sup>526</sup>

There are other recent instances of multilateral efforts to develop international institutions – for example the International Criminal Court, the Kyoto Protocol, and the International Campaign to Ban Landmines – in which the international community continued to work together towards the development of new regimes even after the US chose to not participate these negotiations or indicated it would not accept the final outcome. Unlike these regimes, however, other negotiating parties to the BWC such as the European Union states would not follow through on their supposed commitment to the BW regime despite non-participation of the U.S. in the

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<sup>524</sup> Quoted in “China and the BWC,” *NTI: Working for a Safer World*, <<http://www.nti.org/db/china/bwcoreg.htm>>, 13 May 2006.

<sup>525</sup> Jenni Rissanen, “BWC Update: US Jeopardises BWC Protocol,” *Disarmament Diplomacy*, 57 (May 2001): 1.

<sup>526</sup> Pearson, “Report from Geneva,” 22.

regime, as they have in regards to these other issues. Oliver Meier suggests that EU states were unwilling to continue negotiating without the support of the US. He says that EU states

did not consider the 'Kyoto option' – going ahead without the United States – to be plausible. In fact, the Europeans were deeply divided. The Netherlands and Sweden, long-time proponents of the protocol, argued for a stronger EU role. Others, like Germany and Britain, caved in to US pressure to accept failure. Some non-aligned countries had long ago distanced themselves from the protocol, which they considered a Western enterprise.... Privately, some European diplomats argued that 'doing a Kyoto' was not an option because some non-aligned states would reopen negotiations on export controls and other issues. And the EU did not have the stomach to go into these debates without the Americans by their side.<sup>527</sup>

Effectiveness of the biological weapons regime was a major concern for US negotiators.

Their belief that the proposed regime would be ineffective at distinguishing illegal offensive biological weapons programs from legitimate defensive programs was a major reason that the US rejected this regime. However, the US government's rejection of the BWC's proposed verification regime in the name of effectiveness may counterintuitively result in the decreased effectiveness of the BW regime. How this may occur will be discussed in the concluding chapter.

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<sup>527</sup> Meier, 4.

## **Chapter 5 – CONCLUSION**

This chapter will draw together the threads of the discussions developed in the two case studies and the theory chapter, and attempt to weave them together to form a cohesive set of arguments. It will begin by performing a comparison of the actions of scientists and industry – as related at some length in the case studies – in order to demonstrate how these groups' actions contributed to different outcomes for the chemical and biological weapons regimes. It will proceed to discuss the implications of these differences for current understandings of the Military Industrial Complex and epistemic communities. Following that, this chapter will highlight the other major findings offered by the case studies, and will conclude with suggestions for further research.

### **The effects of scientific communities on US chemical and biological weapons policy, and their implications for epistemic communities**

As we saw in Chapter 3, the epistemic community that materialized in the late 1960s in response to varied concerns about the conduct of the Vietnam War and chemical weapons safety had a great effect on US CW policy until the mid-1980s, when its influence suddenly declined during discussions over binary modernization plans. As we saw in Chapter 4, a community of microbiologists also had a significant impact on US biological weapons policy during the late 1960s and early 1970s. However, this community split into two factions following the biotech revolution in 1976. The smaller part of this scientific community continued to strive towards the creation of a stronger BW regime, but the larger part adopted a new set of goals to reflect this burgeoning science's increasingly close affiliation with industry and a long-standing preference for self-regulation. Instead of arms control, a large portion of the microbiology field – including its professional organization, the American Society of Microbiologists – now pursued the establishment of federal regulations and programs that were as favourable as possible for biotech research in both academia and industry. It lobbied for federal funding for biodefense

projects, and the establishment of voluntary regulations and codes of conduct over mandatory rules enforced with legal penalties. This latter group of microbiologists has been more successful at obtaining its goals than the former.

As argued in Chapter 3, the chemical scientific community functioned as an epistemic community. Epistemic communities are usually expected to: "As demands for ... information [arose], networks or communities of specialists capable of producing and providing the information [emerged and proliferated]. The members of a prevailing community [became] strong actors at the national and transnational level as decision makers [solicited] their information and [delegated] responsibility to them."<sup>528</sup> Indeed many aspects of this community's behaviour followed the logic predicted in the epistemic communities literature: it shared causal beliefs, a policy enterprise, notions of validity, and principled beliefs. Its influence was greatest in times of uncertainty and crisis, particularly when existing understandings of the issues were shown to be faulty and it was apparent that new policies based on scientifically sound data were necessary. However the candidates for an epistemic community identified in Chapter 4 did not share principled beliefs, nor a single policy enterprise, and therefore do not meet the minimum criteria to be classified as an epistemic community. As demonstrated in Chapter 4, the schism between the two communities is likely due to many microbiologists having chosen the minimization of regulation and the pursuit of lucrative biodefense contracts as priorities over arms control treaties that could prove to be a burden to their own research and the profits of their employers in industry.

Haas briefly acknowledges the possibility that scientific communities might follow contradictory goals: "That scientists...have a common faith in the scientific method does not guarantee their solidarity, nor does it make them immune to pressures from the institutions in which they work or from political consideration."<sup>529</sup> In the fourth chapter it is evident that while

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<sup>528</sup> Peter Haas, "Introduction: Epistemic Communities and International Policy Coordination," *International Organization*, 46, no. 1 (Winter 1992): 4.

<sup>529</sup> *Ibid.*, 11.

one community of bioscientists pursued the creation of an effective arms control regime, the other sought to avoid the creation of costly government regulations, consistent both with its long-standing preference for self-regulation and with the parochial interests of its employers in industry. These communities' pursuit of contradictory goals had a significant impact on the success of their policy enterprises.

As Haas and Emanuel Adler argue, "one of the factors affecting how long an epistemic community remains influential is the degree of consensus among community members.... When an epistemic community loses its consensus, its authority is diminished and decision makers tend to pay less attention to its advice."<sup>530</sup> Haas explains that "in cases in which scientific evidence is ambiguous and the experts themselves are split into contending factions, issues have tended to be resolved less on their technical merits than on their political ones."<sup>531</sup> As we saw in Chapter 4, the scientific community that promoted codes of ethics, and the minimization of regulations on research and industry was often successful at achieving its goals, while the community that worked towards a verification regime failed, for numerous reasons. Perhaps the success of the former group and the failure of the latter was in part due to the reason set forth by Haas: that in the absence of a united epistemic community offering consistent advice on how the Biological Weapons Convention's verification protocol ought to be understood and dealt with, policymakers allowed other political matters to influence their decision – for example, what would be best for industry or the Pentagon's biodefense projects. Thus, disunity among scientific communities diminishes the influence they exert over policy. If two groups of scientists offer contradictory advice to government, they will be unable to resolve the uncertainty that usually gives epistemic communities an opportunity to influence policymakers' understandings of an

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<sup>530</sup> Emanuel Adler & Peter M. Haas, "Conclusion: Epistemic Communities, World Order, and the Creation of a Reflective Research Program," *International Organization*, 46, no. 1 (Winter 1992): 385.

<sup>531</sup> Haas, 11.

issue, and policymakers will look to other actors instead of quarrelling experts to help them decide the matter.

However, the microbiology community does not bear primary responsibility for the failure of the BWC verification protocol. Many influential actors such as the Pentagon, the State Department, the President, and the biotech and pharmaceutical industry disapproved of the verification regime for their own reasons and endeavoured to either weaken the terms of the treaty or have it rejected entirely. Had the microbiology community not been split in two by regulatory and commercial developments that followed the biotech revolution, its members *might* have been able to cooperate to convince policymakers to adopt the verification protocol, especially if a greater number of prominent scientists with access to the president or his close advisers were able to parlay this access into influence over policy changes. Indeed, this might have made a real difference if these scientists were able to bring the issue of biological weapons verification to the attention of Bill Clinton earlier in his presidency.

However, as we have seen at some length, the success of these scientists is very much dependent on the willingness of the president or prominent policymakers to attend to their advice. Bill Clinton did not demonstrate much willingness to listen to scientists on matters related to biological weapons until 1998. A concerted effort on the part of the entire microbiology community to convince Clinton or science adviser Jack Gibbons of the importance and immediacy of the issue might have led to a different outcome. However, US support for the BWC would also depend on a number of related developments – for example, a crisis demonstrating the flaws of existing policy and concerted support from industry.

It now remains for us to consider the null hypothesis from Chapter 1 – that there is no causal relationship between the actions of American scientists and US chemical and biological weapons policy, and in particular the failure of the BWC verification protocol and success of the

CWC. There was once a strong relationship between the actions of scientists and CBW policy in the 1960s and 1970s, though this relationship appears to have dissipated in the 1980s, for a variety of reasons in both cases. Therefore, enough evidence exists for us to reject the null hypothesis in earlier years, and the effects of these efforts importantly were felt as the background that made the CWC possible, though as proximate causes the role of scientists faded in the CW case over time and does not appear to have been decisive in the case of BW.

### **The effects of industry on US chemical and biological weapons policy and their implications for the Military-Industrial Complex approach**

As amply demonstrated in the case studies, both the chemical and biotech/pharmaceutical industries had a great effect on US CBW policy, and in particular on later negotiations over the CWC and the verification protocol for the BWC. Just as with the scientific communities, one of the industries examined in the case studies followed the behaviour predicted of defence industries in most rationalist theories in IR, while the other did not. Both sought to advance their own financial well-being, but in radically different ways. An important counter-intuitive finding is that the industry that had an established military profile ended up supporting the disarmament regime, while the industry without a previous long-standing relationship with the military ended up as an impediment to a new arms control regime in the form of a verification protocol for the BTWC.

In accordance with the close and privileged relationship it had developed with the US government since the profitability of the biotech sector was first recognized in the late 1970s, the biotech/pharmaceutical industry sought to include clauses to protect proprietary information in US proposals for the verification protocol. However, several of these demands would also likely decrease the protocol's capacity to catch violators. European negotiating parties accepted the weakened version of the protocol in hopes that doing so would convince the US to accept the

verification protocol. However, precisely the opposite occurred: the changes demanded by industry contributed to the chief negotiator's doubts that the treaty would be effective. Other elements of the US government were averse to the protocol for their own reasons: the Defense Department believed that an inspection protocol could compromise its own defensive BW research, and George W. Bush and his key foreign policy advisors possessed a general antipathy towards multilateralism as reliable means to enhance U.S. security. These shared doubts led to the predictable failure of the protocol in Ambassador Mahley's 2001 review.

However, even though the biotech and pharmaceutical industry's efforts did little to assist with the establishment of a verification protocol, it does not deserve to receive most of the blame for its failure, as some observers suggest.<sup>532</sup> Indeed, this is a significant finding of this dissertation insofar as it would be easy to surmise that the multi-billion dollar US biotech and pharmaceutical industry decisively sunk the prospects for US support for a viable verification protocol, and thus played a decisive role in dooming the protocol itself. Without dismissing the role of the biotech and pharmaceutical industry, my findings are that the many powerful elements in the US government discussed above had their own reasons for disliking the BWC verification protocol, and also made major contributions to its eventual failure. This conclusion is bolstered by the fact that the Bush administration has hardly been reticent in opposing multilateral initiatives even when there is a powerful scientific consensus in favour of it, as evidenced by its position in regards to the Kyoto Protocol among others.

The biotech and pharmaceutical industry behaved exactly as would be predicted by any number of interest-based theories that consider how domestic actors influence arms control regimes. In order to protect its profits, this industry used its influence over government to forestall the implementation of a treaty that would require the implementation of costly

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<sup>532</sup> Graham S. Pearson, "The US rejection of the Protocol at the Eleventh Hour Damages International Security Against Biological Weapons," *The CBW Conventions Bulletin*, 53 (September 2001): 6.

regulations. To reiterate a point made in Chapter 2, Milner's 2-level games approach tells us that industry should be expected to "oppose policies entailed by international cooperation that detract from [the goal of profit maximization.]"<sup>533</sup> Likewise the Military-Industrial Complex literature predicts that industry will collude with Congress and the Pentagon towards the creation of highly profitable defense contracts, and will do so with apparently little regard for the possibility that these contracts may be costly, poorly planned, and could contribute to arms races. A Military-Industrial Complex industry would never accept regulations that could harm its profits without protesting to government.

This insight helps us identify an interesting and important development: although it hasn't contributed to the production of offensive biological weapons since the Second World War, the biotech/pharmaceutical industry is fast becoming a Military-Industrial Complex industry. Not only does it act in the manner typical of a MIC industry, the biotech and pharmaceutical industry is growing increasingly militarized. Biodefense research and production is becoming a profitable venture for these industries. The biotech and pharmaceutical industry now has access to Project BioShield contracts for the development and production of more effective vaccines, detection devices, and antibiotics worth \$5.6 billion. Although these contracts are not for the production of offensive biological weapons, per se, this should not preclude this industry from being considered as a part of the Military-Industrial Complex. After all a manufacturer that produces armour for vehicles would still be considered a defense industry if it doesn't produce guns as well. Project BioShield's promise to "[guarantee] that any company that develops a successful new product for [biological and nuclear] threats will find a willing buyer in the federal government,"<sup>534</sup> seems to indicate the government's tolerance of costly and

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<sup>533</sup> Helen V. Milner, *Interests, Institutions, and Information: Domestic Politics and International Relations*, (Princeton: Princeton University Press, 1997), 37.

<sup>534</sup> Edward Kennedy. Quoted in David Malakoff, "BioShield Heads to President's Desk," *Science*, 304 (28 May 2004): 1225.

potentially inefficient contracts with the pharmaceutical and biotech industry, just as it has with other defense manufacturers.

It is in this sense that we are now in a place to respond to a question that arose in Chapter 2: that describing the biotech and pharmaceutical industry as part of the MIC would require a stretch of the concept of the Military-Industrial Complex. Despite the humanitarian benefits offered by many of its products, the biotech and pharmaceutical industry is fast becoming part of the Iron Triangle, and may soon exert as much harmful 'unwarranted influence' over government policy as any other military industry – if indeed it does not already.

For reasons explored in Chapter 3, starting in the 1980s the chemical industry started to exhibit behaviours quite different to those assumed of defense industries. Unlike the pharmaceutical and biotech industry, it promoted the verification protocol among chemical industries abroad. It allowed its facilities to be used to test and refine verification procedures, which is something the pharmaceutical industry wouldn't even consider following the 1994 Pfizer incident. The chemical industry lobbied the Senate in defense of a regime that would likely prove costly to itself, while pharmaceutical industry representatives testified before Senate that, without measures to protect trade secrets, the BWC verification protocol would present an unacceptable burden to itself. Finally, the chemical industry adamantly refused to accept government contracts for the production of binary weapon precursor materials, while the biotech and pharmaceutical industries are happy to accept contracts under Project BioShield. Clearly, the US chemical industry behaved very differently from the biotech and pharmaceutical industry, and in a manner unfathomable to the MIC approach.

According to the MIC literature, a defence industry would never promote a policy that would contribute to financial losses for itself. Nor would it refuse lucrative contracts for the production of weapons. Many of the chemical industry's actions are remarkable for an industry

that was once firmly ensconced in the Military-Industrial Complex. As discussed in Chapter 3, the chemical industry's desire to improve its public image and regain control over government regulations compelled it to opt out of the Military-Industrial Complex and become an aggressive supporter of arms control, which is a possibility that is unacknowledged in most rationalist International Relations theories that consider the actions and motivations of defense industries. For example, Putnam tells us that domestic actors with a large stake in an international issue will likely occupy an extreme position in regards to that issue, but he neglects to explain what that position will be.<sup>535</sup> Milner tells us that industry should be expected to oppose regulations that will prove costly. Though rationalist theories assume that self-interest predicts actor behavior, which in the case of defence industries is always assumed to be profit-maximization, they do not tell us how industry chooses which strategy to follow to achieve profit maximization when several options (such as producing weapons or improving public image) exist, how industry chooses a strategy when the outcome of some options are uncertain, nor under what circumstances industry would choose to pursue another strategy to achieve profit maximization.

Since typical IR theories that take the interests of defense industries as invariably parochial are unable to account for the remarkable actions of the chemical industry, it is necessary to supplement this analysis with theories that problematize business interests. As discussed in Chapter 2, several US public policy theorists recognize that the interests of influential actors can vary in response to changing ideas about issue areas. Thus it may be fruitful to apply these ideas, in particular Baumgartner and Jones' theories about regulatory subsystems, to this discussion of US foreign policy.

Recall from the second chapter that Baumgartner and Jones argue that new understandings of a policy issue area, often resulting from an external shock that calls into

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<sup>535</sup> Robert Putnam, "Diplomacy and Domestic Politics: the Logic of Two-Level Games," International Organization, 42, no. 3 (Summer 1988), 445-446.

question previous understandings of an issue area, can lead to a radical change of regulatory policy in that issue area. Once new understandings become widely accepted, the regulatory systems based on them become stable and difficult to change in the absence of further external shocks.

This seems to fit well with our understanding of the history of the chemical industry, whose history of deadly mistakes in regards to Bhopal, Agent Orange, and the Love Canal inspired much public antipathy and persuaded the EPA and OSHA that this patently unsafe industry required heavy regulation. With its refusal to produce binary weapons and decision to support the CWC, the chemical industry has since sought to create a new, more favourable 'issue image' for itself, which may help overturn some of the more stifling regulations that have governed this industry since the development of its unfavourable image in the 1970s.

Since the 1960s, the pharmaceutical and biotech industry has been able to avoid negative public and Congressional attention, and the heavy regulations that can come with it. In fact, according to Baumgartner and Jones, the biotech "industry has been successful [at maintaining a positive policy environment] so far ... because of its ability to foster a ... controlled, serious, and optimistic image."<sup>536</sup> Therefore, while the pharmaceutical industry has been able to maintain a relatively supportive regulatory relationship with the public and Congress, the chemical industry has not, though it is now seeking to rectify this situation.

Although Baumgartner and Jones' theory is intended to pertain to US public policy, these two cases demonstrate that the mechanisms identified in their book can be effectively applied to the actions of the chemical and biotech/pharmaceutical industries. This is not to say that the entire chemical and biological arms control issues explored above can be understood solely with the assistance of Baumgartner and Jones. Consistent with Katzenstein's analytical eclecticism strategy, each of the IR theories explored in that chapter explain some elements of the outcomes

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<sup>536</sup> Baumgartner & Jones, 27.

observed in the two case studies. Two-level games explain how domestic actors, such as industry, can affect foreign policy. Epistemic communities explain how groups of scientists can influence US policy. Neo-liberal institutionalism explains why states seek the implementation of confidence building measures to alleviate mutual suspicions, and realism explains why powerful states, such as the US, exert so much control over the configuration of international relations. These two case studies cannot be fully understood without reference to these International Relations theories, though it is necessary to turn to studies of US public policy in order to understand why the two industries examined in the case studies reacted so differently to similar arms control regimes.

With the above in mind, we must now consider whether to reject the other null hypothesis from Chapter 1: that there is no causal relationship between the activities of the American chemical and biotech/pharmaceutical industries and US chemical and biological weapons policy, specifically in regards to the success of the CWC and subsequent failure of the BWC. Ample evidence exists that the American chemical industry had a huge effect on US CW policy and the successful signing and ratification of the CWC, while the antagonism of the American biotech and pharmaceutical industry played a small role in the failure of the BWC verification protocol, though this failure is at least as much due to Clinton's failure to provide leadership on the matter, the Pentagon's distaste for the Protocol, and lingering doubts about the effectiveness of the Protocol in the State Department. Such a thing would likely have occurred without this industry's input. It is therefore possible to reject the null hypothesis, though not so much due to the opposition of the biotech and pharmaceutical industry, as generally assumed in previous literature, but due to support of the US chemical industry.

### **Other important findings: Effectiveness and the biological weapons norm**

Chapter 4 ends with a promise to further explore the issue of effectiveness and the difficulties associated with creating a treaty that can distinguish legitimate defensive biological weapons research from a banned offensive program. As stated above, the effectiveness of the BWC protocol was a major concern for US State Department negotiators, and concerns for effectiveness became a major reason for the US to reject the negotiating process. According to Ambassador Mahley, “The draft Protocol will not improve our ability to verify BWC compliance. It will not enhance our confidence in compliance and will do little to deter those countries seeking to develop biological weapons. In our assessment, the draft Protocol would put national security and confidential business information at risk.”<sup>537</sup>

Since that time the US has adopted the position – as explained in Chapter 2 – that the Biological Weapons Convention is a normative convention: that it prevents the use and development of biological weapons by establishing a norm that biological weapons are immoral and repugnant. According to a representative of the State Department, this

normative convention is unequivocal. Strengthening [this norm] does not mean changing its language.... [Furthermore] it's not feasible to change it because [as it is presently worded] its specific intent is unambiguous, but is also flexible enough to cover changes in technology. [And] any attempts to change it will lead to requests for technology transfer.<sup>538</sup>

However, the US rejection of the verification protocol appears to belie a strong commitment to this norm. After all Article V of the original text of the Biological Weapons Convention calls on participating parties to “consult one another and to cooperate in solving any problems which may arise in relation to the objective of, or in the application of the provisions

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<sup>537</sup> Ambassador Donald Mahley, “Biological Weapons Convention,” (Statement by the United States to the Ad Hoc Group of Biological Weapons Convention States Parties, Geneva, Switzerland, 25 July 2001).

<sup>538</sup> Representative of US State Department, interview with author. 17 November 2005.

of, the Convention.”<sup>539</sup> By rejecting the process of strengthening the BWC, which is itself called for in the original text of the Convention, the US demonstrates disregard for this treaty. This rejection combined with continued secret biological weapons research that may be interpreted as offensive in intent indicates a weakening commitment to the norm against biological weapons use.

A weak commitment to this norm on the part of leading states may lead to the weakening of the norm of biological weapons non-use. Other states may perceive the US rejection of the negotiating process and continued secret BW research as indicating contempt for the BWC and the norm against biological weapons use. Taking their cue from the United States, unfriendly states may begin to realize that since the norm against biological weapons isn't respected enough to command the attention and participation of important states in discussions to reduce the threat of BW use, it may be possible to breach it without fear of reprisal or loss of respect.

Furthermore, a renewed American commitment to BW research, defensive or not, may persuade other states to begin their own research into biological weapons, thus initiating a biological arms race.<sup>540</sup> A weak norm will not provide an effective defense against the use of biological weapons.

Ambassador Mahley has clearly anticipated this criticism. He argues that,

“[The State Department] would reply to those who cry that not having this Protocol weakens the global norm against BW that there absolutely is no reason that kind of reaction need occur. It will happen only if we convince ourselves that it is happening, and we would urge others to join with us in ensuring such a reaction does not take place.”<sup>541</sup>

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<sup>539</sup> United Nations, Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, (Geneva, Switzerland: Committee of the Conference on Disarmament, 1972), Article V.

<sup>540</sup> Milton, Leitenberg, Assessing the Biological Weapons and Bioterrorism Threat, (Carlisle, Pennsylvania: US Army War College, 205), 69-75.

<sup>541</sup> Mahley.

To prevent the weakening of this norm from occurring, Ambassador Mahley indicated that the US would spearhead initiatives, both multilateral and national, to provide effective defence against biological weapons. He argues that

[if] we are to find an appropriate solution to the problem, we need to think 'outside the box.' It will require new and innovative paradigms to deal with the magnitude of biological activity that can be a threat, the explosively changing technology in the biological fields, and the varied potential objectives of a biological weapons program. We simply cannot try to patch or modify the models we have used elsewhere.<sup>542</sup>

However, in the five years since the rejection of the verification protocol these so-called paradigms have amounted to little more than further efforts to criminalize domestic BW use and possession,<sup>543</sup> the reinvigoration of existing export control programs such as the Australia Group,<sup>544</sup> and support for the ASM's voluntary code of ethics. While the implementation of further domestic laws against BW possession is no doubt a good idea, it is hardly an example of thinking 'outside the box' – as stated above, criminalization of BW possession was begun during the Clinton administration – nor does it demonstrate a willingness to combat the threat internationally.

Export controls are not are not an original idea either: the Australia Group has existed since 1985. Nor are export controls likely to be terribly effective. Since they only prohibit or monitor the export of pathogens across borders, they will have no effect on the development of indigenous strains of disease for use as biological weapons. Furthermore, since only 39 states participate in the Australia Group regime, it has no power to monitor the trade in biological agents and equipment between many suspected proliferants. Finally, many third world non-member states of the Australia Group are said to resent this regime for being discriminatory,

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<sup>542</sup> *Ibid.*

<sup>543</sup> Representative of US State Department, Interview with author.

<sup>544</sup> The Australia Group is an informal arrangement of 39 industrialized states that attempt to prevent the proliferation of chemical and biological weapons through the monitoring and control of trade in a list of chemical precursors, pathogens and certain dual-use equipment that might be used in the development of chemical or biological weapons.

because it hampers the development of their own biotech industries.<sup>545</sup> It is questionable whether such a resented regime is capable of providing the moral leadership required to reinforce the biological weapons norm, especially among the third world, non-member states that are most likely to develop BW programs.

As explained in Chapter 4, the establishment of codes of ethics for scientists is not without problems as a solution either, in that it puts the onus for ending BW development on scientists, when it is governments that establish and fund these programs. Moreover, it will always be possible to find scientists whose sense of nationalism will override their commitment to a voluntary code of ethics.<sup>546</sup> These perfunctory efforts hardly speak of a commitment to finding new ways to combat the BW threat or maintain the BWC norm.

Thus despite the US's professed commitment to the establishment of effective measures to strengthen the BWC, its rejection of the verification protocol's negotiation process, its continued secret BW research, and its failure to take substantive actions to address the BW threat internationally will likely render the international BWC norm – which according to the US is one of the only effective elements of the Convention – less effective.

### **Personal relationships & other contingencies**

Another of this study's major findings has been the significant role played by such contingent occurrences as the development of personal friendships and presidential encounters with popular novels. If Matthew Meselson hadn't been friends with Henry Kissinger during their time at Harvard, then he probably wouldn't have been able to convince Kissinger and ultimately Nixon to reevaluate US CBW policies; the history of chemical and biological weapons use and proliferation may well have turned out quite differently. Likewise, without his mother's pressure

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<sup>545</sup> Alexander Downer, "Speech," (remarks delivered at Twentieth Anniversary Plenary of the Australia Group, 18 April 2005).

<sup>546</sup> Alan Pearson, interview with author, 19 October 2005.

to sign the CWC, George H.W. Bush might not have been so compelled to do so, and this treaty would have failed. If the Cobra Event was published a few years earlier, Clinton might have had more time to bring negotiations over strengthening the BWC to fruition during his presidency.

To reiterate a point made in Chapter 3, the fact that major presidential decisions regarding CBW policy were significantly impacted by such quirks of history has several implications for the study of US arms control policy and epistemic communities. First, since personal relationships between scientists and state leaders count significantly when it comes to persuading these leaders to change their policies the activities of epistemic community members who engage in other activities appear less important by comparison. However, this does not mean that epistemic community members without direct access to policymakers do not make a valuable contribution to their policy enterprises. They can still play an important role if they can gain access to sympathetic advisers who themselves have a personal relationship with the president. As highlighted in the case studies, epistemic communities can also play an important role as negotiators of treaties, verification inspectors, and disseminators of public information.

Second, though the fact that important policy changes were made in response to largely accidental and unpredictable events may be difficult to conceptualize theoretically, it also indicates that US arms control policy is not strictly determined by universal, unwavering forces such as a coercively anarchic state system, or an infinitely powerful Military-Industrial Complex. Rather, it appears that many presidents have been open to persuasion from both insiders and outsiders, even on matters of extreme importance such as defence. And once presidents are persuaded, they are able to transform their new understanding of an issue area into new policy, often in the face of protests from other elements in government.

This brings us to the third implication of the significance of personal relationships between scientists and the president or influential advisers. Recall from Chapter 2 that Matthew

Evangelista argued that a major means for transnational nuclear experts to influence Soviet nuclear policy was through the development of personal relationships with the General Secretary of the Communist Party and other high-level Politburo members. Evangelista demonstrates that “[once] Gorbachev, Khrushchev, or even Brezhnev embraced a particular idea, he could often effect its implementation even against strong institutional resistance from the security establishment.”<sup>547</sup> The above case studies support Evangelista’s conclusion that one of the most effective ways for scientists to influence foreign policy is to develop personal relationships with political leaders.

However, Evangelista argues that it was the structure of the Soviet political system that allowed personal relationships between nuclear experts and political leaders to have such a great effect on Soviet nuclear policy. Evangelista explains that

the high centralization of the [Soviet] system and the enormous power and authority concentrated in the Politburo and in the person of the general secretary are the main characteristics that fostered the promotion of innovations – once a sympathetic leader came to power. The support of the general secretary allowed policy entrepreneurs to prevail against strong institutional opposition.<sup>548</sup>

The United States possesses a dramatically different political structure from the old Soviet Union in that all levels of government are open to influence from scientists or other advocacy groups. In such an open political system, we might expect that scientists might be able to affect policy by lobbying other elements of government. However, the above cases demonstrate that scientists are most effective when they develop personal relationships with the president or his close advisers. Do the above case studies thus contradict Evangelista’s argument that the structure of the Soviet political system was a major enabling condition for transnational advocates to exert influence over Soviet nuclear policy?

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<sup>547</sup> Adler & Haas, 378.

<sup>548</sup> Matthew Evangelista, Unarmed Forces: The Transnational Movement to End the Cold War (Ithaca: Cornell University Press, 1999), 378.

They do not if we refine the terms of the argument, because it is not the openness of the political system that matters as much as the concentration of decision-making power, especially in regards to foreign policy. And, both the Soviet and American political systems have concentrated a lot of power over foreign policy decisions in a single person, be this the president or General Secretary of the Communist Party. As we saw in the case studies, the House of Representatives exerts a lot of control over the funding of foreign policy initiatives; the advice and consent of the Senate is required for the U.S. to ratify a treaty, and both houses of Congress introduce and discuss bills related to foreign policy. These bodies can act as a check on presidential CBW initiatives.<sup>549</sup> As we have seen, Congress contributed to the abandonment of the binary modernization program when the Army was unable to meet Congressional deadlines for the production of binary weapons. In the late 1960s, pressure from Congress contributed to Nixon's decision to conduct a review of CBW policy. However, the president himself wields a tremendous amount of control over foreign and defence policy. According to Rodney's McElroy's analysis of the political maneuvering surrounding the signing and eventual ratification of the Geneva Protocol, "[a] US president – at least one neither wracked by scandal nor totally out of touch with the political environment – who uses his constitutional powers wisely and creatively can, with rare exceptions, get his most important foreign policy programs through Congress."<sup>550</sup> As demonstrated in the case studies, presidents can introduce and advocate initiatives to modernize weapons stockpiles, participate in summit negotiations, and decide whether the US will sign international treaties. Presidents can also initiate reviews of foreign and defense policies, which – as is evident in the above cases – can result in major changes to CBW policy. Clearly, the contrast between domestic structures in the US and the old Soviet political systems emphasized by Evangelista underscores the fact that both systems in fact

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<sup>549</sup> Barry M. Blechman, "The Congressional Role in US Military Policy," Political Science Quarterly, 106, no. 1 (1991): 22.

<sup>550</sup> Rodney McElroy, "The Geneva Protocol of 1925," in The Politics of Arms Control Treaty Ratification, eds. Michael Krepon & Dan Caldwell (New York: St. Martin's Press, 1991), 151.

have concentrated considerable foreign policy power in the hands of one person, and when scientists or other advocates are able to influence this individual leader, they can have a great effect on the foreign policy decisions he makes. In this way, this analysis does not *exactly* contradict Evangelista's arguments, but rather demonstrates that his ideas apply to other political systems with centralized foreign policy-making powers.<sup>551</sup>

### **The declining influence of scientific communities**

The chemical case study conducted in Chapter 3 reveals a curious trend: that of that particular scientific communities' apparent decline in influence over arms control policy. While the epistemic community identified in Chapter 2 was instrumental at developing new understandings of CW issues and new CW policies in the 1960s and 1970s, its influence over CW policy declined in the 1980s over the issue of binary modernization. Despite efforts by some members of this community to convince the US government of the binary plan's folly, they were ultimately unsuccessful.<sup>552</sup> This epistemic community has never fully recovered its former position of influence.

In Chapter 3 four possible explanations for this trend were introduced, though further study would be required to determine which, if any of them, offer the correct explanation for this decline in influence. This decline may be due to the increasing significance of other scientific issues in the 1980s, which drew the attention of activist scientists away from the older, less immediate problem of chemical weapons policy. The second possible explanation is that whereas political leaders could only obtain science advice from academic sources in the 1960s and 1970s, by the 1980s there were other sources of such advice, particularly from well-funded

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<sup>551</sup> Of course, it is patently ridiculous to describe the old Soviet and American political systems as substantially similar. Comparisons of these two systems have always concluded that they have substantial differences according to a number of significant attributes. (See for many examples, Matthew Evangelista, "Issue Area and Foreign Policy Revisited," *International Organization*, 43, no. 1 (Winter 1989): 147-157.)

<sup>552</sup> The chemical industry later resolved the issue with its refusal to produce precursor chemicals for the binary weapons.

industry lobby groups. The second case study appears to lend support to this explanation because it demonstrates how industry can divide and co-opt formerly cohesive and influential epistemic communities, then use some members to help lobby for its preferred policies.

On the other hand, this decline might be due to the receptivity of individual presidents to outside science advice. While some presidents, such as Clinton and Nixon, proved themselves to be open to influence from scientists (albeit for different reasons), others such as Reagan and George W. Bush, apparently prefer science advice from advisors who already share their viewpoints. The fact that science advice increased in prominence during the Clinton administration, only to fall again under George W. Bush seems to support this explanation. Theoretically, this suggests that sometimes rationalist international relations theories - which posit that ideas and science are mostly used to legitimize policies taken for other, more narrowly self-interested reasons<sup>553</sup> - provide good explanations, though the other cases also demonstrate that less instrumentalist treatments of ideas such as epistemic communities literature are necessary to account for outcomes.

Finally, this decline might be due to a gradual hardening of ideas about CW policy. In the 1960s the ideas that would govern US policy towards chemical weapons until 1989 were introduced, in large part due to efforts of scientists. These ideas included the contradictory understandings that the proliferation of chemical weapons had to be stopped, particularly through multilateral means, and that the US chemical stockpile ought to be maintained in working condition for deterrence purposes, at least until global chemical disarmament took place.<sup>554</sup> US policymakers adhered to these somewhat contradictory ideas into the 1980s. When scientists argued that modernizing the chemical stockpile with the purchase of binary arms was not a good idea, they were unable to convince policymakers to accept this idea because these

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<sup>553</sup> Jack Snyder, *Myths of Empire: Domestic Politics and International Ambition*, (Ithaca: Cornell University Press, 1991), 17-19.

<sup>554</sup> It wasn't so much scientists as it was the Pentagon that was responsible for this idea.

policymakers had been employing the same understanding of chemical weapons issues for over twenty years. In the absence of a crisis to demonstrate that prevailing understandings were incorrect, scientists couldn't change policymakers' longstanding ideas about CW policy.

If this explanation is the correct one, Haas' theory of epistemic communities will have been vindicated, because Haas argues that epistemic communities are most influential following a crisis or uncertainty, and after ideas become established, they are difficult to change. "New ideas and policies, once institutionalized, can gain the status of orthodoxy."<sup>555</sup> Though there was much uncertainty surrounding CW policy in the 1960s, policymakers were confident in their understanding of the issue by the 1980s, and saw no reason to change their ideas. The evidence seems to support several of these possible explanations: clearly further research is required to see which are correct.

#### **Suggestions for further research**

How would one evaluate different explanations for the decrease in influence of the communities observed in the above cases? One method would be to interview Presidents on the specific question of scientific advice. In the absence of that technique, one could attempt to determine whether there is variation *within* an administration on the role of scientific advice as compared to *across* administrations. To accomplish this task it would be necessary to study dynamics of science advice in regards to other issue areas: such as nuclear weapons arms control, nuclear energy, environmental policy, or HIV/AIDS policy. Exploring the effects of scientific communities in these issue areas will allow researchers to determine whether the decline in influence observed in this study is an isolated incident, or whether epistemic communities are declining in importance in general.

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<sup>555</sup> Adler & Haas, 384.

Certainly, the impact of the advice of scientific communities on US public and foreign policy has been studied at great length, both from an epistemic communities perspective and otherwise. Robert Gilpin studied the impact that American scientists had on US nuclear weapons policy from 1945 to when his book was published in 1962.<sup>556</sup> As mentioned above Matthew Evangelista has studied how transnational communities of scientists affected Soviet nuclear weapons policy. The impact that scientists have had on understandings of environmental problems and global resource management has been studied at great length.<sup>557</sup> Nevertheless, such analyses typically focus on the periods in which scientists had a significant impact on policy, and fail to consider the events surrounding these scientists' loss of influence over policy. Though it is undoubtedly important to study the rise of scientist influence in regards to many types of policy, the reasons for their fall may be just as interesting.

Studying cycles of influence across several other issue areas may allow researchers to gain a more precise idea of the causes for the decrease in scientific influence over US foreign policy making observed in these two cases. If science advice is ignored in other issue areas primarily when certain presidents are in power, then we will know that the president's individual receptivity to science advice matters a great deal. If science advice is disregarded when a related private industry increases in prominence and begins to lobby government on scientific matters, then the increased importance of other sources of science advice will likely be the explanation. If it is demonstrated that science advice is now ignored in other issue areas, then perhaps epistemic communities in general are losing their impact on policy. On the other hand, if scientific communities are shown to be particularly influential when these issues first arise or following crises that suggest a need for a new understanding of the issue, but are later unable to change the

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<sup>556</sup> Robert Gilpin, American Scientists and Nuclear Weapons Policy. (Princeton: Princeton University Press, 1962).

<sup>557</sup> For example, Peter M. Haas, "Do Regimes Matter? Epistemic Communities and Mediterranean Pollution Control," International Organization, 43, no. 3 (Summer 1989); M.J. Peterson, "Whalers, Cetologists, Environmentalists, and the International Management of Whaling," International Organization, 46, no. 1 (Winter 1992).

understanding of the issue that they themselves had created, then the idea of the epistemic community as it now stands will be vindicated.

Another direction suggested by this study is the application of the concepts developed above to related situations, to see if the relationships described above pertain to other countries and states, or if the US possesses some qualities that make it uniquely susceptible to this sort of influence. To answer this question, it will be necessary to find cases of negotiations over arms control in states featuring prominent scientific communities and a powerful industry that perhaps is concerned about the protection of proprietary information. Research for this dissertation suggests two potential case studies: the first being Germany from 1919 to the present day, the second being Great Britain after the Second World War. Between 1919 and 1939, Germany possessed a thriving chemical science community and chemical industry that created and produced a number of new synthetic aniline dyes. Indeed, the German chemical industry was the envy of the Western world, much as the US biotech and pharmaceutical industry is today. So, how did these scientists and businesses react to the impending creation of the Geneva Protocol? Did they seek to exert influence over the Weimar government in order to protect their interests? How did the outcome Second World War affect the actions of industry and scientific communities? Did they too seek to create new 'issue images' of themselves? Likewise, after the Second World War, Britain was a close second to the US in microbiology, and its biotech industry exhibited great promise as well. What did these communities think of chemical and biological arms control? Did industry concerns influence the EU's decision to not proceed with negotiations over establishing a verification regime for the BW after the US walked out ?

The final direction for further research suggested by this study is the examination of alternate epistemic communities and their relationship with policymakers. Recall that even though the epistemic communities literature examines whether and how epistemic communities

can promote international policy coordination, the findings of this study underscore that epistemic communities can also use their expertise, specialized knowledge and influence to prevent such goals due to different principled beliefs and policy enterprises.

Robert Gilpin recognizes the negative effects that conflicting science advice can have for US policy in his 1962 book *American Scientists and Nuclear Weapons Policy*. In this book Gilpin demonstrates that three factions of nuclear experts advocating three different goals related to disarmament and proliferation attempted to influence American nuclear policy between the late 1940s and early 1960s. None of these factions sought to misrepresent the facts about the dangers and benefits of proliferation or feasibility of arms control, but their differing pre-existing political beliefs about Western military strategy, the desirability of nuclear test ban treaties, and the motivation of the Soviet Union affected how they interpreted technical facts.<sup>558</sup> Some such as Linus Pauling therefore advocated a policy of pure arms control, others such as Hans Bethe a policy of finite containment involving both arms control and attempts to contain Soviet aggression, and some such as Edward Teller advocated a policy of infinite containment, requiring the US to maintain nuclear superiority.<sup>559</sup> Gilpin explains that the source of the problem of conflicting expertise among American nuclear scientists lay in a naïve belief that they could separate technical matters from their political beliefs,<sup>560</sup> which coloured their interpretation of objective facts.<sup>561</sup> Gilpin warns that it must be “perplexing” for politicians to have to choose between competing yet equally authoritative sources of advice, yet

choose between them he must, and the choices that have been made have had a profound and perhaps not always a beneficial consequence for American nuclear policy. For this reason, unless American political leadership learns to appreciate the nature of the problem of conflicting expertise, this problem will become an

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<sup>558</sup> Gilpin, 279.

<sup>559</sup> See for example Teller and Bethe’s different interpretations of the feasibility of seismic monitoring. *Ibid.*, 228, 235.

<sup>560</sup> *Ibid.*, 243-244.

<sup>561</sup> *Ibid.*, 262.

increasingly serious hazard to the formulations of an effective policy toward nuclear weapons and toward other products of the scientific revolution as well.<sup>562</sup>

In addition a recent study by Jeremy Youde recognizes the significant role that scientific communities that offer advice that contradicts the advice offered by mainstream scientists – which he terms Counter-Epistemic Communities – have had on South African HIV/AIDS policy.<sup>563</sup> In future research it may be fruitful to further develop these authors' theories about how conflicting expertise can affect policy. In particular, it may be interesting to examine the relationship different science groups have with policymakers that work against arms control or other types of international policy coordination, for example senators such as Jesse Helms. Is the relationship these communities have with policymakers similar to that between the president and pro-arms control epistemic communities? What is the source of their influence? How do these communities interact with other epistemic communities?

If one idea from this study stands out above all others as having potentially lasting theoretical significance, it is the challenge it presents to long-standing assumptions about the self-interested motivations of industries involved in defence. Two of the actors considered here exhibited behaviour that was inconsistent with their assumed interests, which had a major impact on the structure of international arms control regimes. However, the fact that the American microbiology community failed to act as a single unified epistemic community does not come as much of a surprise: we understand that scientists can't always share the same normative goals. What does come as a surprise is the behaviour of the American chemical industry, which eschewed quick financial gains in order to rebuild its shattered reputation.

To elaborate on an earlier point, it is remarkable that an industry would choose to behave in this manner because the self-interested motivation of corporations is one of the longest-

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<sup>562</sup> *Ibid.*, 264.

<sup>563</sup> Jeremy Youde, "The Development of A Counter-Epistemic Community: AIDS, South Africa, and International Regimes," *International Relations*, 19, no. 4 (2005), 421.

standing, safest assumptions in Political Science or Economics. After all, any business that was not primarily concerned with its own financial well-being would not be in business for long. Indeed, many of the major approaches to International Relations also rest on the assumption that businesses, and in particular businesses involved in weapons production, will always pursue the maximization of its own profits to the exclusion of any other goal. The Military- Industrial Complex literature goes so far as to suggest that a defence industry will choose a course of action that ensures its short term profits even if this means harming the state or international security. Even studies that present challenges to a strictly self-interested view of the world do not seek to dispute the assumption that businesses will always act in a self-interested manner, but rather make their cases by introducing new types of actors driven by different incentives. For example, Richard Price presents transnational civil society as a “‘third system’ of agents... as distinguished from government or profit-seeking actors.”<sup>564</sup> Price argues that recent studies of transnational civil society seek to challenge “the hegemonic pretensions of the chief theoretical contenders that privilege other agents or structures in world politics,” such as government and industry.<sup>565</sup> In common with most theoretical approaches in IR, Price presents the interests of industry as unproblematic.

In common with some studies examining the reaction of industry to US regulatory policy or the corporate governance literature, this study makes a strong case that business interests ought to be problematized. It demonstrates how an industry can choose different strategies to achieve its assumed goal of profit maximization – some that put short term profits at risk, but demonstrate a greater sensitivity to public image – under what conditions it would choose to do so, and how this can affect US foreign policy. Even though the improvement to public image pursued by the US chemical industry likely stood to increase its profits in the long-term, that it

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<sup>564</sup> Richard M. Price, “Transnational Civil Society and Advocacy in World Politics,” *World Politics*, 55, no. 4 (2003): 580.

<sup>565</sup> *Ibid.*, 581.

suddenly adopted the idea that the best way to achieve long term profitability was to improve its public image represents a major departure for an actor usually assumed to be solely interested in making a quick buck. Such a redefinition of interests may not happen often, but when it does it can have a profound impact not only on domestic policy, but also on international regimes. In this way, this study opens a door for International Relations scholars to think of the interests of weapons industries as politically interesting.

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**Table 1.0: Timeline of Major Events**

Time Period	Pre-1960s	1960s	1970s	1980s	1990s-2000s
Significant external events	<p>1925: US signs Geneva Protocol</p> <p>1959: US Army begins expansion of Chemical Corps</p>	<p>1962: <i>Silent Spring</i> released</p> <p>1968: Skull Valley incident, fears of chemical transportation plans arise</p> <p>1969: Nixon conducts CBW policy review, US commits to negotiation of a multilateral treaty on BW</p>	<p>1970: Nixon renounces toxins, EPA established</p> <p>1971: revelations about dioxin contamination in Agent Orange, OSHA established</p> <p>1972: US signs BWC, CCD begins negotiations on CWC</p> <p>1974: Senate unanimously consents to ratification of BWC</p> <p>1975: US ratifies BWC &amp; Geneva Protocol</p> <p>1977: US &amp; USSR begin bilateral negotiations over chemical disarmament</p> <p>1978: Love Canal</p>	<p>1980: Defense Science Board begins pushing for binary modernization, 1<sup>st</sup> BWC review conference</p> <p>1981: State Department makes Yellow Rain allegations</p> <p>1983: Reagan announces SDI plans, GAO criticizes binary plans, Senate allocates \$35 million for CW production facility</p> <p>1984: US demands 'anytime anywhere' inspections for CWC, Bhopal disaster, White House issues light biotech regulations w. no penalties</p> <p>1985: Pres. Review Commission concludes binary modernization is necessary</p> <p>1986: 2<sup>nd</sup> BWC review conference</p> <p>1987: USSR makes major concessions in CWC negotiations</p> <p>1989: OMB stifles new EPA regulations</p>	<p>1990: bilateral chemical disarmament treaty signed, President's Council on Competitiveness announces plans ensuring that US remains world biotech leader</p> <p>1991: 3<sup>rd</sup> BWC review conference, Army decides to not proceed w. binary production</p> <p>1992: White House issues simplified biotech regulations, VEREX begins work</p> <p>1993: US signs CWC</p> <p>1996: 4<sup>th</sup> BWC review conference, AHG begins work</p> <p>1997: US ratifies CWC</p> <p>1998: Senate enacts legislation hampering CWC inspections, Clinton reads <i>Cobra Event</i></p> <p>1999: White House conference on bioterror</p> <p>Late-1990s: CIA &amp; Pentagon conduct extensive biodefense research</p> <p>2000: US ahead of CW destruction schedule, Commerce passes regulations undermining some parts of CWC, Amb. Mahley argues BWC verification protocol will be too weak</p> <p>2001: AHG releases Chairman's text of draft protocol, anthrax attacks, US opts out of verification protocol negotiations</p> <p>2004: White House holds conference on voluntary biosafety guidelines, Senate passes project BioShield</p> <p>2005: states-parties to the BWC agree to encourage voluntary code of conduct</p> <p>2007: No state will likely meet CW destruction deadline</p>
Actions of Chemical Science Community	<p>1925: ACS does not support ratification of Geneva Protocol</p>	<p>1966: scientists criticize use of chemicals in Vietnam</p> <p>1969: scientists offer input during CBW policy review</p>	<p>1970: AAAS team visits Vietnam to assess effects of herbicide use, Nixon changes herbicide policy in response to findings, ACS supports Geneva Protocol</p>	<p>1980: Meselson &amp; Robinson lobby against binary modernization</p> <p>1984: <i>Chemical &amp; Engineering News</i> publishes special issue on Yellow Rain controversy</p> <p>1987: APS criticizes SDI</p>	

	Pre-1960s	1960s	1970s	1980s	1990s-2000s
<b>Chemical Industry</b>	1959: Operation Blue Skies leads to expanded research and funding for CW	1960-69 Chem industry produces herbicides and other chemical weapons	1970s: Chem industry criticized for its involvement in herbicide production for use in Vietnam, and for dioxin contamination of Agent Orange	1981: Chem industry considers contracts for binary modernization 1982: firms refuse contracts 1984: 7 chemical firms accept liability for dioxin contamination 1989: Akzo Chemicals volunteers its facilities to test CWC inspection procedures	1990: Pentagon threatens use of 1950 Defense Production Act 1996-97: NFIB & CMA demonstrate CWC will not harm business
<b>Bioscience Community</b>	Post-1945: ASM maintains permanent advisory committee at Fort Detrick	1950s-1960s: major discoveries in field of molecular genetics	1970: Meselson submits toxin paper to NSC 1972: Biotech revolution 1975: Asilomar Process 1976: RAC publishes new biosafety guidelines	1988: ASM issues code of conduct for microbiologists	1993-94: ASM assists with drafting list of biological agents that might be used as BW 1997: ASM assists with drafting of CDC regulations 2000: ASM code of conduct updated 2003: NAS recommends that new biosecurity regulations are voluntary 2005: ASM code of conduct updated
<b>Biotech &amp; Pharmaceutical Industry</b>	1941-1945: Electro-master & Unexcelled make shells & explosives for use in Anthrax bombs	1961: Thalidomide scare	1970s: large pharmaceutical manufacturers establish genetic research programs, 1976: Genentech founded 1978: Biogen founded	1980: Genentech goes public 1980s: US biotech & pharma industry surpass biotech & pharma in all other states, successfully lobby government for minimization of regulations 1982: Southern Biotech goes out of business	Late 1990s: BIO & PhRMA participate in NSC working group regarding verification protocol 1994: Pfizer incident 1995: BIO & PhRMA write letter to State Dept insisting that verification protocol protects its interests 1996: PhRMA presents 4 <sup>th</sup> BWC review conference with 6 conditions required for its support of a verification protocol 2000: FAS Working Group negotiates with PhRMA on creating an acceptable verification protocol 2001: PhRMA does not support Chairman's text