THE TYRANNY OF EXPERTS: ANALYTIC MISPERCEPTION AND THE RISE OF STATE-RUN BIOLOGICAL WEAPONS PROGRAMS

by

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DEDICATION

This is dedicated to my wife, Yuphin, and my son, Ben, who reminds me daily that sometimes the question is just as important as the answer.

ACKNOWLEDGEMENTS

This dissertation is, to a large degree, the culmination of over thirty-five years of study, beginning with my very first Political Science class at the University of California in 1971, taught by Peter Sperlich. A large number of professors encouraged me on the path of exploring the question, not the answer. For this I thank Fred Stripp, Ward Tabler, Leo Lowenthal, Nelson Polsby, Jack Citrin, Leonard Nathan, Richard Lazarus, and Richard Barnhart, among many, many others.

Understanding "Intelligence Analysis" both as a career as well as an academic pursuit is a central focus of this dissertation. I must acknowledge several mentors and supervisors who helped me embrace and understand the analytic process. Curt Low and Ray Firehock gave me more insight and training than I probably deserved at the time. Amy Sands, Sallie Mullen, and Gary Crocker showed me how to think and express thoughts clearly. Fred Eimer consistently challenged me to think for myself and question the "IC position." Many others within the IC must, for professional reasons, remain nameless to this study but are deserving of my thanks and appreciation.

Special acknowledgment must be given to Professor Julian Perry Robinson of the Harvard-Sussex Project for his unselfish advice and the use of his contacts to open doors for me in the "History of BW" world. His then-enigmatic tip to read the novels of John Buchan was of incalculable value to the completion of this dissertation.

Victoria Shelton at the George Mason University Library who tracked down many obscure titles across the land for me deserves special mention, but I also must thank the nameless librarians at the Library of Congress, The National Archives, The National Air and Space Museum, The National Sporting Library, and Mary Washington College, all of whom took my obscure questions as their own and helped answer them for me and steered me in other directions of research.

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LIST OF ABBREVIATIONS AND SYMBOLS

A/A – anti-aircraft

ABC Committee – Scientific advisors to the WRS

ACH – Alternative Competing Hypotheses

Agent "X" – (Canada) Botulinus Toxin

ALSOS – Not an acronym. The U.S. effort to collect Nazi scientific expertise after WWII.

AP – Associated Press

ASDIC – (Canada) the acoustic detection of submarines

AT&T – American Telephone and Telegraph

BACCHUS – Biotechnology Activity Characterization by Unconventional Signatures

BARDA – Biomedical Advanced Research and Development Authority

BRAB – (UK) Biological Research Advisory Board

BSL – Biosafety Level

BTWC – see BWC

BW – Biological Weapons, Bacteriological Weapons; Biological Warfare

BWC – The Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction; the Biological Weapons Convention

CDC – The Centers for Disease Control and Prevention

CI – Counterintelligence

CIA – The Central Intelligence Agency

COMINT – Communications Intelligence

CW – Chemical Weapons, Chemical Warfare

CWS – Chemical Warfare Service

DCI – Director of Central Intelligence

DEF Committee – Follow-on to the ABC Committee

DHS – Department of Homeland Security

DNI – Director of National Intelligence

DoD – Department of Defense

DRPC – (UK) Defence Research Policy Committee

DTRA – Defense Threat Reduction Agency

ELINT – Electronic Intelligence

E.O. – Executive Order

FBI – Federal Bureau of Investigation

FMD – Foot and Mouth Disease

FOIA – Freedom of Information Act

G-2 – U.S. Army Intelligence

GAO – Government Accountability Office

GIN – (Canada) Anthrax

GIR-1 – (Canada) Grosse Isle Rinderpest

HIJMS – (Japan) His Imperial Japanese Majesty's Ship

HSPD – Homeland Security Presidential Directive

HUMINT – Human Intelligence

IC – Intelligence Community

IMINT – Imagery Intelligence

INT – Intelligence

JCS – Joint Chiefs of Staff

LAC – (Canada) Large Area Concept

LGA – (Germany) *Luft-Gas-Angriff*, Air Gas Attack

LGV – (Germany) *Luft-Gas-Verteidigung*, Air Gas Defense

LLC – Limited Liability Company

LLNL – Lawrence Livermore National Laboratory

LSD – Lysergic acid Dyethylamide

LtCol – (USAF) Lieutenant Colonel

LTC – (U.S. Army) Lieutenant Colonel

M-1000 Committee – (Canada) Biological Weapons Research Advisory Committee

MASINT – Measurement and Signature Intelligence

MLA – Modern Language Association

mm – millimeter

MRC – (UK) Medical Research Council

MU – The University of Missouri at Columbia

N – (UK, Canada, U.S.) Anthrax

n.b. – *nota bene* (Latin, mark well)

NBACC – National Biodefense Analysis and Countermeasures Center

NBAF – National Bio- and Agro-Defense Facility

NDRC – National Defense Research Council

NIAID – National Institute of Allergy and Infectious Diseases

NMM – National Means and Methods

NRC – (Canada) National Research Council

NSC – National Security Council

NTM – National Technical Means

OC CWS – Office of the Chief, Chemical Warfare Service

OMB – Office of Management and Budget

OSINT – Open Source Intelligence

OSS – Office of Strategic Services

POW – Prisoner of War

Project PX – Japanese War Plan, "Cherry Blossoms at Night"

PX – pest bacillus-infected fleas

RAF – (UK) Royal Air Force

RDF – (Canada) codename for Radar

Revcon – Review Conference

R&D – Research and Development

SARS – Severe Acute Respiratory Syndrome

SEU – Subjective Expected Utilities

SIGINT – Signals Intelligence

SIPRI – Stockholm International Peace Research Institute

SS – (Germany) *Schutzstaffel*, Defense Detachment, the "Black Shirts"

TECHINT – Technical Intelligence

UCLA – The University of California at Los Angeles

UK – United Kingdom of Great Britain and Northern Ireland

UN – United Nations

UNSCR – United Nations Security Council Resolution

U.S. – The United States of America

USAF – United States Air Force

USAMRIID – United States Army Medical Research Institute of Infectious Diseases

USDA – United States Department of Agriculture

USSR – The Union of Soviet Socialist Republics

Wa-Prüf 9 – (Germany) *Heeres Waffenamt, Amstgruppe Prüfwesen 9*, Army Ordnance Office, Chemical Weapons Proving Ground

WBC Committee – Committee on Biological Warfare

WMD – Weapon(s) of Mass Destruction

WRS – War Research Service

WWI – World War I

WWII – World War Two

ABSTRACT

THE TYRANNY OF EXPERTS – ANALYTIC MISPERCEPTION AND THE RISE OF STATE-RUN BIOLOGICAL WEAPONS PROGRAMS

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The purpose of this study is to understand some of the factors contributing to the rise of State-run Biological Weapons (BW) programs in the early 20th century. To some extent, the factors which spurred the development of BW and other forms of Weapons of Mass Destruction in the early part of the twentieth century are still in play today. Understanding these factors may help in efforts to "roll back" nascent WMD programs. The development of BW programs was driven not by military requirements but, rather, was the result of societal fears and ignorance, including xenophobia and racism. Fear and ignorance were fostered by a reliance on unchecked government leadership, unquestioned scientific authority, and misanalysis by the respective intelligence organizations – the "tyranny of experts." The resulting build-up of a variety of so-called "weapons of mass destruction" culminated in the Cold War, the arms control rubric of "Trust, but Verify" (despite the great difficulty in monitoring any offensive BW program) and the current fear of jihadism and what is now termed the "Global War on Terrorism."

DISCLAIMER

The views expressed in this dissertation are those of the author only and do not necessarily represent the position of the U.S. Government or any of its Departments or agencies.

All sources used in this dissertation are publicly available and cleared for public release.

Chapter 1

Introduction

The purpose of this study is to understand some of the factors contributing to the rise of State-run Biological Weapons (BW) programs in the early 20th century. The study examines the programs of six different states: Germany, Japan, the United States, Canada, the United Kingdom, and the Soviet Union. Historical analysis is important because, to some extent, the factors which spurred the development of biological weapons and other forms of weapons of mass destruction (WMD) in the early part of the twentieth century are the same as those in play today. Understanding these factors may help in efforts to "roll back" nascent WMD programs.

The basic hypothesis is that the development of BW programs was driven *not* by military requirements but, rather, was the result of societal fears and ignorance, including xenophobia and racism. Fear and ignorance were fostered by a reliance on unchecked government leadership, unquestioned scientific authority, and misanalysis by the respective intelligence organizations – the "tyranny of experts." The resulting build-up of a variety of so-called "weapons of mass destruction" culminated in the Cold War, the arms control rubric of "Trust, but Verify" (despite the great difficulty in monitoring any

offensive BW program) and the current fear of jihadism and what is now termed the "Global War on Terrorism."[1]

For a democracy to be effective, it is important that the populace understands the currents and the forces that affect policy-making. This study will demonstrate some of the costs of government policy being developed without adequate review or consideration by outside experts. Misguided or unheeded policy helped foster the environments which allowed for the excesses of Nazi Germany or the Japanese Army in Manchuria. Would public awareness of scientific misadventures such as Lysenkoism or eugenics have altered policy? Possibly not. But the absence of public awareness or debate clearly ensured that policy need not be altered.

There is a second reason for the significance of this study. A prevailing belief in government circles is that intelligence – the process of using primarily clandestinely-derived information – has a paramount role in understanding the programs and actions of foreign "actors," both States and private individuals. This reliance on intelligence analysis is evident, not in the Intelligence Community's successes, but in the impact of its failures, both real and imagined. This study will show that intelligence analysis was not the driver in one country's estimate of another country's BW program in the 20th Century. This was due to a number of factors. First was the inability of intelligence agencies to collect data most useful in understanding an opposing State's program.

[1] Fred Charles Iklé, Annihilation from Within (New York: Columbia University Press, 2006).

Second was a widespread misunderstanding of the potential of intelligence. Third, particularly in the United States, was a lack of coordination between the various agencies, creating, in essence, a paralysis of analysis. Despite Intelligence Community "transformation," intelligence "failures" should be expected because of the technical and psycho-social barriers inhibiting both proficient intelligence analysis and the distribution of actionable analysis to policy-makers.

Lost in all this discussion has been any debate as to the true role and value of the Intelligence Community and intelligence analysis in answering what has been traditionally a policy question: "Whom do we trust and why?"

This question is, of course, not as simple as expressed here. There are traditional allies of the U.S., such as the United Kingdom and Canada, more transitory allies, such as the Soviet Union during World War II, and our traditional foes and the "foe du jour," whether we call it the "Evil Empire" or the "Axis of Evil" or just "them". Deciding who fits in each category is not an intelligence assessment, at least not in the ordinary definition of "intelligence assessment." Intelligence and intelligence assessments do have a role in providing some insight into a State's intent on specific issues and, to the extent that this intent may become a pattern of behavior, the Intelligence Community may provide an historical trend analysis.

But sometimes what looks like a good historical trend analysis turns out to be wrong. More importantly, the advice of so-called experts is often wrong, and sometimes terribly wrong, with horrific consequences. This is the substance of what will be examined in this study.

This study is divided into three separate parts. It begins with an evaluation of some of the factors which gave rise to State-run BW programs, beginning in the latter years of the nineteenth century and continuing through to the first days of the Cold War. These factors include both scientific developments and strategic military breakthroughs, all of which created opportunities for the development of biological weapons. But opportunities are not enough. So, unlike most surveys of BW programs, this study will focus on actions taken in *reaction* to perceived activity and actions *not* taken in response to events. That is, the study will examine a State's program through the eyes of that State's enemy because of the hypothesis that the proliferation of BW programs in the early part of the twentieth century was not the result of any actual military threat or strategic requirement but rather analytic misperceptions having little basis in reality.

The second part of the study, using the analytical model developed in the first part, examines current biodefense research and development activity in the United States. What conclusions could an "opposing" intelligence analyst draw from such activity? Would it be realistic to conclude from objective but necessarily limited observation of

these classified and unclassified programs that the United States currently possesses an offensive BW program?

Finally, the study examines the factors impacting the intelligence analyst's ability to draw conclusions based on observables, especially in the face of belief patterns established over many years and founded on non-observable events, real or perceived. This study examines the history of the growth of the U.S. Intelligence Community in the twentieth century to compare the differences between the loose structure of the pre-World War II era through the National Security Act of 1947, with the current reformation and the establishment of a Director of National Intelligence. Despite these transitions and an extraordinary improvement in the technology of intelligence collection, the challenge of the individual intelligence analyst remains fundamentally the same – an inability to keep up with the revolution around him[2], forcing a retreat to what is known and predictable. The predictability is the reliance on the knowledge and expertise of others, both in and outside of government – the tyranny of experts.

Methodology

The central part of this dissertation is a series of case studies. As stated earlier, the models will be the offensive programs of Japan, Germany, The United States, the United Kingdom, Canada, and the Soviet Union in the 1920-1948 period and the modern day biodefense program of the United States. A series of case studies was necessary because

[2] Use of seemingly gender-specific pronouns in this study is not intended to suggest any gender bias but represents all mankind.

most of the information is historical in nature and the sources for information are limited: much of the data remains classified or is missing from the open literature archives.[3] Consequently, case study models as suggested by Robert K. Yin[4] and Joe R. Feagin et al[5] are used in this dissertation, although also incorporated are approaches suggested by Leon Festinger and others[6], notably the findings of Rensis Likert and Ronald Lippett, who argued that a motivation for using social science research is derived from three elements: problem sensitivity; an image of potentiality; and a general experimental attitude toward innovation.[7] Furthering the concept of an experimental attitude toward innovation, The RAND Corporation's Techniques of Systems Analysis[8], a 1957 overview by Herman Kahn and Irwin Mann, is used to support some of the analyses used throughout the test. Statistical analyses were carried out using SPSS software, version 14. The editorial style choices were as proposed in the MLA Handbook for Writers of Research Papers.[9]

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[3] This appears to be particularly true and troubling of the Canadian archives, if the reports from two researchers are true. John Bryden, Deadly Allies - Canada's Secret War 1937-1947 (Toronto: McClelland & Stewart, Inc., 1989), William R. Callahan, The Banting Enigma -- the Assassination of Sir Frederick Banting (St. Johns: Flanker Press Ltd., 2005).

[4] Robert K. Yin, Case Study Research -- Design and Methods, Applied Social Research Methods Series, eds. Leonard Bickman and Debra J. Rog, Third ed., vol. 5, 49 vols. (Thousand Oaks: SAGE Publications, 2003).

[5] Joe R. Feagin, Anthony M. Orum and Gideon Sjoberg, eds., A Case for the Case Study (Chapel Hill: The University of North Carolina Press, 1991).

[6] P.582, Leon Festinger and Daniel Katz, eds., Research Methods in the Behavioral Sciences (New York: Holt, Rinehart & Winston, 1953).

[7] Rensis Likert and Ronald Lippitt, "The Utilization of Social Science," Research Methods in the Behavioral Sciences, eds. Leon Festinger and Daniel Katz (New York: Holt, Rinehart and Winston, 1965).

[8] Herman Kahn and Irwin Mann, Techniques of Systems Analysis (Santa Monica: the Rand Corporation, 1957).

[9] Joseph Gibaldi, MLA Handbook for Writers of Research Papers, 6th ed. (New York: The Modern Language Association of America, 2003).

Finally, the tenets of the Frankfurt School's Critical Theory and the model of Max Horkheimer's are applied: Critical Theory is only adequate if it meets three criteria: it must be explanatory, practical, and normative, all at the same time. That is, it must explain what is wrong with current social reality, identify the actions to change it, and provide both clear norms for criticism and achievable practical goals for social transformation.[10] This dissertation is intended as a Critical Theory of intelligence analysis and the rise of State-run BW programs.

Literature Review

Identifying appropriate literature for such a study is challenging. One can begin with the popular literature – fiction such as Richard Preston's The Cobra Event[11] (the book which sparked President Clinton's concern about bioterrorism) or Preston's non-fiction The Demon in the Freezer.[12] In addition, there are more journalistic books being published (seemingly daily) on biowarfare and bioterrorism – books such as Judith Miller's Germs[13] or Jeanne Guillemin's Biological Weapons.[14] The more academic SIPRI series on chemical and biological warfare studies, including Erhard Geissler's Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945[15], builds

[10] James Bohman, Critical Theory, Spring 2005, 2005, Stanford University, Available: http://plato.stanford.edu/archives/spr2005/entries/critical-theory/>, 17 July 2006 2006.
[11] Richard Preston, The Cobra Event (New York: Ballantine Books, 1997).
[12] Richard Preston, The Demon in the Freezer (New York: Random House, 2002).
[13] Judith Miller, Stephen Engleberg and William Broad, Germs: Biological Weapons and America's Secret War (New York, New York: Simon & Schuster, 2001).
[14] Jeanne Guillemin, Biological Weapons -- from the Invention of State-Sponsored Programs to Contemporary Bioterrorism, 1st ed. (New York: Columbia University Press, 2005).
[15] Erhard Geissler and John Ellis van Courtland Moon, eds., Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945, vol. 18, 18 vols. (Oxford: Oxford University Press, 1999).

a more historical framework. But in studying all these and many more books and journal studies, there is a pattern of referenced articles that form the basis for understanding the early years of BW programs anywhere in the world. This includes the original journal articles of H. Wickham Steed that appeared in The Nineteenth Century and After[16] and the writing of Theodor Rosebury, Elvin A. Kabat, and Martin H. Boldt, especially the 1947 Journal of Immunology article, "Bacterial Warfare,"[17] and Rosebury's subsequent book, Peace or Pestilence[18].

Equally important are studies of the various country programs. These would include The Technical Series: The U.S. Army in World War II[19] [20] [21], Deadly Allies[22] by John Bryden on Canada's program, Brian Balmer's Britain and Biological Warfare[23], Japan's Secret Weapon[24] by Barclay Newman, and Erhard Geissler's Biologische Waffen – Nicht in Hitlers Arsenalen[25] *(Biological Weapons – Not in Hitler's Arsenal*). Not a study in the

[16] Henry Wickham Steed, "The Future of Warfare," The Nineteenth Century and After CXVI.690 (1934).
[17] Theodor Rosebury, Elvin A. Kabat and Martin H. Boldt, "Bacterial Warfare," Journal of Immunology 56.1 (1947).
[18] Theodor Rosebury, Peace or Pestilence (New York: Whittlesey House, 1949).
[19] Leo P. Brophy and George J. B. Fisher, The Chemical Warfare Service: Organizing for War, The United States Army in World War II - the Technical Series, ed. Kent Roberts Greenfield, vol. 1, 3 vols. (Washington, D.C.: Center of Military History, U.S. Army, 1959).
[20] Leo P. Brophy, Wyndham D. Miles and Rexmond C. Cochrane, The Chemical Warfare Service: From Laboratory to Field, United States Army in World War II - the Technical Series, ed. Stetson Conn, vol. 2, 3 vols. (Washington, D.C.: Center of Military History, U.S. Army, 1959).
[21] Brooks E. Kleber and Dale Birdsell, The Chemical Warfare Service: Chemicals in Combat, United States Army in World War II - the Technical Series, ed. Stetson Conn, First ed., vol. 3, 3 vols. (Washington, D.C.: Office of the Chief of Military History, U.S. Army, 1966).
[22] Bryden, Deadly Allies - Canada's Secret War 1937-1947.
[23] Brian Balmer, Britain and Biological Warfare: Expert Advice and Science Policy, 1930-65 (Houndmills: Palgrave, 2001).
[24] Barclay Moon Newman, Japan's Secret Weapon (New York: Current Publishing Co., 1944).
[25] Erhard Geissler, Biologische Waffen -- Nicht in Hitlers Arsenalen -- Biologische Und Toxin-Kamfmittel in Deutschland Von 1915 Bis 1945, Studien Zur Friedensforschung, ed. gert Krell Horst Fischer, Gottfried Niedhart, vol. 13 (Munster: Lit Verlag, 1999).

usual sense of the word, but critically important to an understanding of the U.S. program is the letter from George Merck to the Secretary of War, now usually referred to as "*the Merck Report.*"[26] Nor should one ignore Ken Alibek's Biohazard[27] for a more contemporary understanding of the Soviet Union's program or Plague Wars[28] by Tom Mangold and Jeff Goldberg for an understanding of the political dimension of the U.S./UK efforts to dismantle the Soviet program.

Finally, since this is a study of perceptions and misperceptions as well as of biological weapons programs, one must consider some of the critical studies of perception and intelligence analysis. The essential study of perceptual stubbornness is Leon Festinger's A Theory of Cognitive Dissonance.[29] Robert Jervis analyzes misperception in an international relations context in his excellent study, Perception and Misperception.[30] Jervis' writing on the issue of deterrence theory is also of great value, both to the study of deterrence and to this dissertation. No study of the analytic process should be considered complete without examining Sherman Kent's Strategic Intelligence[31] or Richard Heuer's Psychology of Intelligence Analysis.[32]

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[26] George W. Merck, "Biological Warfare," ed. Secretary of War (Washington, D.C.: 1946), vol.
[27] Ken Alibek and Stephen Handleman, Biohazard -- the Chilling True Story of the Largest Covert Biological Weapons Program in the World -- Told from inside by the Man Who Ran It (New York, New York: Random House, 1999).
[28] Tom Mangold and Jeff Goldberg, Plague Wars: The Terrifying Reality of Biological Warfare (New York, New York: ST. Martin's Press, 1999).
[29] Leon Festinger, A Theory of Cognitive Dissonance (Evanston: Row, Peterson and Company, 1957).
[30] Robert Jervis, Perception and Misperception in International Politics (Princeton, New Jersey: Princeton University Press, 1976).
[31] Sherman Kent, Strategic Intelligence for American World Policy (Princeton: Princeton University Press, 1949).
[32] Richards J. Heuer, Jr., Psychology of Intelligence Analysis (MacLean: Center for the Study of Intelligence, 1999).

The above list is only aimed at identifying the seminal and key publications which must be read for a basic understanding of the subject; a complete bibliography is to be found at the end of this dissertation.

Chapter 2

The Philosophical Debate -- Why BW?

> "If you want to understand BW you must figuratively stand on your head. BW is an upside-down science, an inversion of nature. Normally we study disease in order to prevent it or cure it. This is bacteriology right side up. But BW sets out to produce disease. It is not normal or natural but abnormal and artificial. Yet it is curious and very significant that the abnormality and the artifice of BW don't just make it *different* from normal science; in important ways they make it easier, more predictable. In places where bacteriology right side up stalls or goes snailwise at the frontiers of knowledge, the topsy-turvy artificial science can find detours."[33]

What appears as a simple, obvious question has never been given proper consideration. Why BW? – a question of great import to any examination of the twentieth century, for the thinking that went into the establishment of biological weapons programs in the United States and other countries was, essentially, the same sort of thinking that went into developing nuclear weapons, other so-called "weapons of mass destruction,"[34] and the

[33] Rosebury, Peace or Pestilence.
[34] An analysis of the term "weapons of mass destruction" and BW's role as a WMD is discussed in the chapter, A Military Revolution.

resultant "Cold War."[35] It was, in a sense, the demonstration of what Winston Churchill termed "perverted science." "Why BW?" quickly becomes a cover for a number of other questions that need to be addressed. This part of the study examines some of the issues that became the framework of the Cold War.

The first question that needs to be addressed is: what were the factors which gave rise to an interest in biological weapons as a means of war? The factors involved in the rise were only in small part strategic or military decisions. In fact, it appears that military applications were only a minor consideration, if considered at all. Other factors were at least as significant in the decisions to produce biological weapons. Contemporary analysts have built a mythology about biological weapons. Part of this mythology is the illusion that biological weapons bestow a State with a degree of "WMD club membership." The sobriquet "the poor man's atomic bomb" has been tossed around so much that it has almost lost its meaning.

But the claim that because biological weapons are a less-expensive weapon of mass destruction that countries are more willing to invest the money in a BW program than a nuclear weapons program is a false argument. Firstly, it suggests that there is a militarily-justifiable rationale for the possession of WMD.[36] As will be discussed later in the study, the deterrence factor imbued in WMD may be over-rated. Possession of WMD

[35] Iklé, Annihilation from Within.
[36] For the purposes of this study, "WMD" will mean nuclear, chemical, or biological weapons. U.S. Congress, Technologies Underlying Weapons of Mass Destruction (Washington, D.C.: Office of Technology Assessment, 1993). This study will NOT examine the quantitative question of the enormity of destruction implicit in the definition of "mass destruction."

does not necessarily provide added security to a country. Secondly, the argument that BW is a cheaper variant of WMD (than either nuclear weapons or chemical weapons) loses much of its validity as an argument when we examine the list of countries with known or suspected nuclear weapons and biological weapons programs. The lists are quite similar. In fact, more countries have reportedly pursued nuclear weapons programs than biological weapons programs. While BW programs may be less expensive than nuclear weapons programs, most countries have or have had both programs and it can be concluded that saving money was not an element in those countries' decisions (See Table 1, p. 14).

In reality, the mythology, unchallenged as it is, is still mythology. The traditionally assumed "factors" used in electing to proceed with a biological weapons program are not the chief factors used by any State in this study or, probably, by any State choosing to go down the BW road. Gregory Koblentz[37], for example, summarized four attributes supposedly making biological weapons advantageous as offensive weapons: potency, diversity of threat agents, ease of surprise, and difficulty in defending against an attack. And, yet, despite these supposed attributes, there were no known *confirmed* uses of biological weapons against armed forces in the twentieth century. Why? Something inhibited the use of BW in a wartime setting. Or, the alleged attributes were not the attributes persuading possession of the agents by the various belligerents.

[37] Gregory Koblentz, "Pathogens as Weapons," International Security 28.3 (2004).

Table 1, The WMD Matrix[38 39 40].

	Nuclear	CW	BW
Argentina	X		
Belarus	X		
Brazil	X		
Canada			X
China	X	X	X
Egypt		X	X
France	X	X	X
Germany	X	X	X
United Kingdom	X	X	X
India	X	X	X
Iran	X	X	X
Iraq	X	X	X
Israel	X	X	X
Japan			X
Kazakhstan	X		
Libya	X	X	
North Korea	X		X
Pakistan	X	X	X
Poland			X
South Africa	X		X
Sudan		X	X
Switzerland	X		
Syria		X	X
Ukraine	X		
USSR/Russia	X	X	X
United States	X	X	X

The table shows countries identified as having pursued weapons programs in nuclear, chemical or biological weapons.

[38] Joseph Cirincione, Jon B. Wolfstahl and Miriam Rajkumar, Deadly Arsenals -- Tracking Weapons of Mass Destruction (Washington, D.C.: Carnegie Endowment for International Peace, 2002).
[39] Erhard Geissler, John Ellis van Courtland Moon and Graham S. Pearson, "Lessons from the History of Biological and Toxin Warfare," Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945, eds. Erhard Geissler and John Ellis van Courtland Moon, vol. 18, SIPRI Chemical & Biological Warfare Studies (Oxford: Oxford University Press, 1999).
[40] Office of the Secretary of Defense, Proliferation: Threat and Response (Washington, D.C.: U.S. Government Printing Office, 1997).

Malcolm Dando and others developed a second set of "overarching themes" to explain the nature of BW programs in the post-World War II world may illustrate this better. These themes are (1) the changing perceptions of BW and their utility or lack of utility; (2) the limitations of intelligence; (3) the shifting balance between secrecy and transparency, suspicion and confidence; and (4) the influence of treaties and of international technological collaboration upon national BW programs.[41]

These themes, while closer to reality, are also myths. The military utility or lack of utility of BW was never an obvious factor in the development or non-development of BW. In 1921, General "Black Jack" Pershing spoke out about the heinous nature of biological weapons. In 1933, Major Leon Fox argued that "practically insurmountable technical difficulties prevent the use of biologic agents as effective weapons of warfare."[42] Despite that belief, the Germans were allegedly testing biological agents in the Paris subway and, within a decade, the U.S. would be developing and producing biological weapons. The limitations of intelligence are discussed throughout this study but in some detail in the penultimate chapter, "Avoiding the Tyranny of Experts." The value (or non-value) of transparency is discussed in the chapter "Through the Looking Glass." The lack of influence of treaties such as the Geneva Protocol and the Biological and Toxins Weapons Convention is reviewed in "The Impact of Arms Control."

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[41] P. 360-7, Malcolm Dando, Graham S. Pearson, Lajos Rózsa, Julian Perry Robinson and Mark Wheelis, "Analysis and Implications," Deadly Cultures: Biological Weapons since 1945, eds. Mark Wheelis, Lajos Rózsa and Malcolm Dando (Cambridge: Harvard University Press, 2006).
[42] Leon Fox, "Bacterial Warfare: The Use of Biologic Agents in Warfare," Military Surgeon 72 (1933).

The Golden Age of Biotechnology

Scientific breakthroughs were necessary before biological warfare could develop beyond the concept of smallpox-infected blankets or catapult-delivered cadavers. Without these breakthroughs, biological warfare could never have been considered as a strategic means of war.[43] With these breakthroughs, however, the notion of broad-scale warfare was possible and the concomitant notion of weapons of mass destruction became a reality.

The first of these breakthroughs was a commercial discovery that, in many ways, revolutionized Europe, equally overthrowing the "old order" as much as the French Revolution and the Industrial Revolution.[44] That breakthrough was the discovery of synthetic dyes. In Germany in 1856, William Perkin, a seventeen year old British student of August Wilhelm von Hoffman, while seeking a means of making quinine from coal tar, discovered instead a process for making artificial dyes. Soon, these new rich colors, easily and cheaply produced, became all the fashion throughout Europe. More importantly (at least to this study), was the application of dye technology in the laboratory. Aniline dyes were first used for staining plant and animal cells by F.W. Beneke in the 1860s. Paul Ehrlich recognized that coal-tar staining could highlight parts of the cell in the 1870s (for example, methyl green allowed the cell nucleus to stand out in green while they cytoplasm stained red). Ehrlich's cousin, Carl Weigert, did further

[43] This does not deny the effectiveness of these early uses of biological weapons. In a modern context, the concept of a strategic weapon implies an element of deterrence. This is a concept of game theorists and was likely an unknown discipline in 18th century colonial America and certainly in 14th century Caffa. Mark Wheelis, "Biological Warfare before 1914," Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945, eds. Erhard Geissler and John Ellis van Courtland Moon, 2003 ed., vol. 18, SIPRI Chemical & Biological Warfare Studies (Oxford: Oxford University Press, 1999).

[44] The Industrial Revolution is widely considered to have begun in the 18th century in Ironbridge, England.

research into bacteriological stains which then assisted Robert Koch's research in Berlin on the bovine anthrax bacillus and tuberculosis[45].

The second of the critical breakthroughs was the development of germ theory through the work of people like Agostino Bassi, Louis Pasteur, and Robert Koch in the latter half of the 19th century.[46] Germ theory, simply put, is the notion that disease has a specific etiology – that specific microorganisms are the source of specific diseases. Germ theory is of great importance to the health practitioner/specialist; it also has a certain relevance to the aspiring germ warfare specialist.

Koch's Postulates

In 1876, Robert Koch, after working on the isolation of anthrax in the laboratory, formulated[47] the basis of germ theory in what is now known as Koch's Postulates:

1. The organism must always be found in the diseased animal but not in healthy ones.

2. The organism must be isolated from diseased animals and grown in pure culture away from the animal.

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[45] John Cornwell, Hitler's Scientists -- Science, War, and the Devil's Pact, Paperback ed. (New York: Penguin Books, 2003).

[46] Wolfgang K. Joklik, Hilda P. Willet, D. Bernard Amos and Catherine M. Wilfert, eds., Zinsser Microbiology, 20th ed. (Norwalk: Appleton & Lange, 1992).

[47] Koch's Postulates should probably, more correctly, be ascribed to Koch's teacher, Jacob Henle, who, in 1840, based on the silkworm work of Bassi, said that in order to find and fully implicate the causative agent of disease, it would be necessary (1) to prove that it was *always* present with the disease; (2) to isolate this causal agent in a pure culture; and (3) to reproduce the disease in a susceptible animal, using a sample from the culture. Sheldon Watts, Disease and Medicine in World History, Themes in World History, ed. Peter N. Stearnes (New York: Routledge, 2003) p.113. Others credit Koch's assistant, Friedrich Loeffler, with the original Postulates. D. Jay Grimes, "Koch's Postulates -- Then and Now," Microbe May 2006 2006.

3. The organism isolated in pure culture must initiate and reproduce the disease when re-inoculated into susceptible animals.

4. The organism should be re-isolated from the experimentally infected animals.

The work of Koch led to what some have called "the golden age of bacteriology." By 1900 almost all major bacterial disease organisms had been described. The list included anthrax (*Bacillus anthracis*), diphtheria (*Corynebacterium diptheriae*), thyphoid fever (*Salmonella typhi*), gonorrhea (*Neisseria gonorrhoeae*), gas gangrene (*Clostridium perfringens*), tetanus (*Clostridium tetani*), dysentery (*Shigella dysenteriae*), and syphilis (*Treponema pallidum*).[48] Treatments for many of these diseases were slower in coming, though, and it was not until the 1930s and the discovery of sulfa drugs[49] that diseases such as pneumonia, plague, tuberculosis, diphtheria, cholera, and meningitis were capable of being treated.[50] The timing of the discovery of sulfa drugs and the rise of State-run biological weapons may, or may not, be a coincidence. The rational tactician would likely not use a weapon that could not be controlled; hence, a biological weapon without a medical treatment response for one's own troops would be considered a very risky weapon.

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[48] P.5, Joklik, Willet, Amos and Wilfert, eds., Zinsser Microbiology.

[49] "Sulfa drugs" refers to drugs containing sulfanilamide. They are also known as sulfonamide drugs. "For a time they seemed to be effective against pneumonia, meningitis, polio, rheumatic fever, trachoma infections in the eye, mastoid infections in the ear and, to some degree, against tuberculosis." Watts, Disease and Medicine in World History: p. 135-136

[50] Thomas Hager, The Demon under the Microscope, First ed. (New York: Harmony Books, 2006).

The Golden Age Tarnishes

The early promise of that golden age of bacteriology spawned many divergent paths. The breakthroughs in bacteriology gave hope of new hygienic utopias, with theories such as natural selection, eugenics, racial hygiene, and Lysenkoism taking hold in different scientific circles – each vying for primacy or, at least, a toehold in the struggle to understand and explain the origin of life, as well as the more metaphysical meaning of life. Some of the theories became widely accepted and are still considered valid today, such as Darwin's theory of Natural Selection. Other theories, such as Lysenkoism, are now generally discredited. Yet others, like eugenics, enjoy popularity, fall out of fashion, and then arise again in popularity years, or even decades, later. Some, for lack of a better term, can truly be called "perverted science[51]" – science which can be considered, in hindsight, completely against the better interests of society, yet somehow enjoys currency, not because of any merit to the ideas, but because an "expert" has convinced a ruling class that a program has some, possibly ill-defined, benefit.

Experiments in "perverted science" were not the exclusive property of Japan's Unit 731 (to be discussed later) or Nazi Germany's Dr. Josef Mengele. Many other countries, including the United States, participated in experiments that can, at best, be called misguided abuses of scientific authority. Any list of U.S. abuses would certainly include the Tuskegee syphilis experiments of the 1930s through the 1970s [52] [53] and the U.S.

[51] Appendix 2, Perverted Science – Some Examples, includes a review of Lysenkoism, Eugenics, and racial hygiene.
[52] P. 79-84, Andrew Goliszek, In the Name of Science -- a History of Secret Programs, Medical Research, and Human Experimentation, First ed. (New York: St. Martin's Press, 2003).

Army's human radiation experiments of the 1940s through the 1960s.[54] But one could also include the military's bacteriological aerosol dispersal experiments off the coast of San Francisco and other parts of the United States[55], the use of Seventh Day Adventists for defensive biological weapons experiments at Fort Detrick from 1953 to 1975 as part of Operation Whitecoat[56], and the CIA's experiments with LSD in the 1950s and 1960s as examples of questionable scientific judgment and, possibly, perverted science. But these U.S. experiments pale in comparison with some of the other scientific theories that were expounded and supported in the late nineteenth century through the first half of the twentieth century.

Lysenkoism, Eugenics, and racial hygiene transcended experimentation and were national policy (or virtually national policy) in their respective countries. What is important about these examples of perverted science is not only the fact that they became national policies but that each in its own way did something to devalue human life.[57] The impact of this devaluation was to cheapen the value of the individual and allow for a

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[53] Harriet A. Washington, Medical Apartheid: The Dark History of Medical Experimentation on Black Americans from Colonial Times to the Present (New York: Doubleday, 2006).

[54] P. 120-155, Jonathan D. Moreno, Undue Risk -- Secret State Experiments on Humans (New York: Routledge, 2001).

[55] The official report, U.S. Army Activity in the U.S. Biological Warfare Programs, includes an extensive list of tests conducted "in the public domain" of United States from the mid-1940s to the mid-1960s. Department of the Army, U.S. Army Activity in the U.S. Biological Warfare Programs (U.S. Department of the Army, 1977), Volume II, Appendix IV to Annex E.

[56] P. 51-54, Goliszek, In the Name of Science -- a History of Secret Programs, Medical Research, and Human Experimentation.

[57] Lewis Mumford described this phenomenon as part of the dichotomy between a mechanistic world and a more organic, biological, one. Biology, Mumford argues, was not realized as a science until the sixteenth century (Mumford notes the study of organisms was not called "biology" until 1813) and "yielded" its primacy to mechanical models because of the need to use mechanical processes (read "human labor") for the power system. Lewis Mumford, The Myth of the Machine -- the Pentagon of Power (New York: Harcourt Brace Jovanovich Inc., 1970).

broader approach to killing and, consequently, war. As whole sectors of the population could now be considered deserving of sterilization or elimination of traditional living conditions, so could whole populations be deemed deserving of genocide or becoming the targets of weapons of mass destruction without consideration of the populaces' roles or non-roles as belligerents in wartime. War became no longer a question of man to man combat – sword against shield or bullet against bullet. War could now be conducted at a distance, without the perpetrators "seeing the whites of their eyes."

Science as Truth

> "One of the greatest enemies of science is pseudo-science. In a scientific age, prejudice and passion work seek to clothe themselves in a garb of scientific respectability; and when they cannot find support from true science, they invent a pseudo-science to justify themselves. . . .Nowhere is this lamentable state of affairs more pronounced than in regard to 'race.' A vast pseudo-science of 'racial biology' has been erected which serves to justify political ambitions, economic ends, social grudges, class prejudices."[58]

The rationales behind the above pseudo-scientific programs are only partially of importance here. The question of "Science as Truth" is the real issue. The notion that there is an indisputable truth that must be accepted is, in itself, false. In addition, scientific truth is transmutable, depending on its social context. That is, to reject a

[58] P. vii, Julian S. Huxley and A. C. Haddon, We Europeans - a Survey of "Racial" Problems (New York: Harper & Brothers Publishers, 1936).

scientific fact is not as simple as to say the fact is wrong. Individual facts must be considered in the cultural context in which they have been uncovered. To understand the science of the early twentieth century, one must understand the relationship between the ideas and the idea-makers of that time just as much as a historiographer of the renaissance would want to understand the works of DaVinci or Galileo in the context of their contemporaries.[59] We should not attempt to evaluate the science of the early twentieth century using the standards of the early twenty-first century, nor should we accept blindly the concept of scientism – the belief that the natural sciences are the only valid mode of knowledge.[60]

Just as one should not evaluate "knowledge" outside of its context, one should also not assume that knowledge is advanced in an atmosphere of slow and steady progress with each discovery building quietly and carefully on its preceding discovery.[61] Science is often tumultuous, as evidenced by the revolution in thinking caused by Einstein's theory of relativity. Because of the tumult often in evidence in these peaceful revolutions, it is quite difficult for the lay-person or the policy-maker to make decisions based on a current understanding of the "known" facts. Thus, the ill-informed public is forced to either accept the word of the experts or bury their head in the sand.

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[59] P. 3, Thomas S. Kuhn, The Structure of Scientific Revolutions, International Encyclopedia of Unified Science, ed. Otto Neurath, second ed., vol. II, no. 2, 19 vols. (Chicago: The University of Chicago Press, 1973).
[60] P. 343, Eric Hobsbawm, The Age of Extremes -- a History of the World, 1914-1991 (New York: Vintage Books, 1994).
[61] P. 32, Ernst von Glaserfeld, "The Radical Constructivist View of Science," Foundations of Science 6 (2001).

A classic view of "science as truth" would focus on "true knowledge," a commodity that exists timeless and outside of human experience. But, we will quickly see that "facts" are of little utility. A single, "accurate" view of the world is impossible and, probably, nonexistent. Albert Einstein in 1955 redefined the purpose of science as "to co-ordinate our experiences and to bring them into a logical order."[62] Thus, logic and experiential perception transplants true knowledge as the goal of science.

But, what happens when there are conflicting theories or concepts? If there are multiple "truths", there is, in effect, no truth.[63] All hypotheses are potentially valid until rejected in all fora. The fact that there are still people in the twenty-first century who put forth the hypothesis that the earth is flat illustrates, not the insanity of some people, but the possible rationality of argument in some otherwise irrational thoughts. If multiple "truths" exist for each question, then what becomes the arbiter of choice, especially in complicated questions such as science or even domestic or national policy? For lack of a better phrase, this arbitration of options will be called, at least in this study, the tyranny of experts.

"Experts" is a somewhat pejorative term in this context. An expert need not be the authority on a subject, or even one of many authorities. Rather, the expert is any person able to capture the attention or the imagination of either the public or of policy-makers.

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[62] Albert Einstein, The Meaning of Relativity (Princeton: Princeton University Press, 1955).
[63] This is what Adorno termed "negative dialectics:" a critique of both the foundation concept, as well as the primacy of intellectual thought. Theodor W. Adorno, Negative Dialectics, trans. E.B. Ashton, English language ed. (New York: Continuum, 1966).

In the context of this dissertation, experts include journalists such as H. Wickham Steed, physicians such as Theodor Rosebury and Shiro Ishii, or Nobel Prize winners such as Frederick Banting. The expert may, in fact, know little about a subject or even may be a charlatan. The important factor is the expert's ability to have their opinion hold sway in a discussion of the issue. As we shall see in this dissertation, oftentimes the expert will create the discussion on their terms, thus preordaining the results of the discussion.

An alternative view to the concept of "science as truth" (but a view with great relevance to this dissertation) is Yehuda Elkana's[64] association of fate in Greek tragedy with the order of nature.[65] This was also the view of Alfred North Whitehead[66] when he described a 1919 session of the Royal Astronomical Society:

> "The whole atmosphere of tense interest was exactly that of the Greek drama: we are the chorus commenting on the decree of destiny as disclosed to the development of a supreme incident. There was dramatic quality in the very staging, the traditional ceremonial, and in the background the picture of Newton to remind us that the greatest of scientific generalizations was, now, after more than two centuries, to receive its first modification."

The essence of Greek tragedy, in Whitehead's mind, is the emphasis on "the inexorable sequence of events which has its own logic and which imposes this logic on the acts and

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[64] Physicist, History of Science professor, President of Central European University of Budapest.
[65] Leo Corry, "Calculating the Limits of Poetic License: Fictional Narrative and the History of Mathematics," Mathematics and Narrative (Mykonos: 2005), vol.
[66] (b. 1861 – d. 1947) British mathematician, logician, philosopher.

even on the motivations of men."[67] Science, in this analogy, is not facts based upon experimentation and discovery, but rather is preordained and simply revealed to the audience and the acclaiming and supportive Greek chorus. The essence of this preordination is a fatalistic, deterministic outlook upon life and scientific discovery. Consequently, such a theorist would conclude, the uncovering of "bad" science and the subsequent development of biological weapons was inevitable.[68]

Sociologist Robert K. Merton discussed the value of scientific "truth" in his 1938 essay "Science and the Social Order."[69] Quoting Max Weber, Merton observed that "the belief in the value of scientific truth is not derived from nature but is a product of definite culture." But Merton also pointed out the following corollary to that observation: "And this truth is readily transmuted into doubt or disbelief." He also argues that changes in institutional structure may "curtail, modify, or possible prevent the pursuit of science."[70] [71] The final words of his journal article may be of value here:

> "…as long as the locus of social power resides in any one institution other than science and as long as scientists themselves are uncertain of their primary loyalty, their position becomes tenuous and uncertain."[72]

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[67] P. 249-250, Anatol Rapoport, "Lewis F. Richardson's Mathematical Theory of War," Conflict Resolution 1.3 (1957).
[68] Max Holland, "The Politics of Intelligence Postmortems: Cuba 1962-63," International Journal of Intelligence and CounterIntelligence 20.3 (2007).
[69] P.254-66, Robert K. Merton, The Sociology of Science -- Theoretical and Empirical Investigations, Sociology of Science and Knowledge, ed. Norman W. Storer (Chicago: The University of Chicago Press, 1973).
[70] P. 254, Merton, The Sociology of Science -- Theoretical and Empirical Investigations.
[71] Merton's argument was focused on Nazi Germany's abuses of science and racialism.
[72] P. 266, Merton, The Sociology of Science -- Theoretical and Empirical Investigations.

Chapter 3

The False Dichotomy of "Dual Use" and the Banality of Evil

It has been argued that a fundamental obstacle to controlling the proliferation of biological weapons technology and equipment is the fact that both the technology and the equipment is "dual use," necessary both for legitimate commercial purposes as well as for developing weapons.[73] The arguments illustrating the difficulty of assessing BW capability because of the dual use nature of the BW production process present a false dichotomy. Everything about biological weapons maintains this duality dilemma.[74] Consequently, if everything has a dual nature, nothing about the dual nature should be perceived as unusual or particularly noteworthy. The dual use nature of biology was recognized early on, even by policy makers. Winston Churchill, in his famous "Our Finest Hour" speech, found cause to speak of the "perverted science" of Nazi Germany. Theodor Rosebury, in his classic study, Peace or Pestilence, refers to BW as "science turned upside-down."[75]

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[73] P. 85, U.S. Congress, Technologies Underlying Weapons of Mass Destruction. That definition effectively eliminates the role of man in the misapplication of technology. For this discussion, the definition is simplified to mean the dual nature of man: good vs. bad.
[74] Edgar J. DaSilva, "Biological Warfare, Bioterrorism, Biodefence and the Biological and Toxins Weapon Convention," Electronic Journal of Biotechnology 2.3 (1999).
[75] P. 36, Rosebury, Peace or Pestilence.

The dual-use nature of biological research has also been recognized by the World Health Organization which identified standards for scientists in "dual use" research as part of its Professional Ethics work program for the 2005-6 program year. This program included "the need to develop containment strategies and global preparedness plans for deliberate misuses of developments in the life sciences.[76]

But all biological science is inherently "dual use." Nothing is exclusively peaceful in nature except by the intent of the scientists involved. Even then, the fact that a scientist had peaceful ends in mind does not mean that a second team of scientists could not take the same science and use it for illicit or immoral purposes. Additionally, even if the scientists' purpose was peaceful and innocent of heart, how policy-users direct its final outcome can be evil. A further exploration of the duality of purpose is in the subsequent chapter, "Through the Looking Glass."

But there is a different sort of dual utility that is of importance when addressing the question of "Why BW?" That is the moral duality of scientists and medical specialists who choose to work on the dark side of BW. There are competing explanations as to why a specialist chooses to "go bad." The most famous treatise on the subject of "evilness" is probably Hannah Arendt's 1963 study of Eichmann in Jerusalem, subtitled

[76] World Health Organization Ethics and Health Unit, Programme of Work (World Health Organization, 2005).

the Banality of Evil.[77] The historical accuracy of the text has been challenged as "apocryphal,"[78] but the ethical questions remain relevant nearly a half century later.

The "banality of evil" was coined by Arendt to describe her visceral reaction (or, more accurately, non-reaction) to peering into the eyes of Adolf Eichmann at his trial in Jerusalem:

> "Eichmann was not Iago and not Macbeth, and nothing would have been farther from his mind than to determine with Richard III 'to prove a villain.' Except for an extraordinary diligence in looking out for his personal advancement, he had no motives at all. . . .He *merely*, to put the matter colloquially, *never realized what he was doing*." (emphasis in original)[79]

To suggest that Eichmann or other Germans had no motives behind their actions in World War II may be difficult to accept. Less of a stretch, though, is to put honorable ends behind that behavior. Elvira Scheich, in her study of German scientists Lise Meitner and Elisabeth Schiemann, illustrates clearly the patriotic nationalism of Germans during World War I. As a scientist at the Kaiser Wilhelm Institute for Chemistry in 1916, Meitner's only complaint about Fritz Haber's research into chemical weapons at the same Institute was that it posed a threat to her own research because it took over resources at

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[77] Hannah Arendt, Eichmann in Jerusalem -- a Report on the Banality of Evil, Penguin Twentieth Century Classics ed. (New York: Penguin Books USA, 1994).
[78] Dan Diner and Rita Bashaw, "Hannah Arendt Reconsidered: On the Banal and the Evil in Her Holocaust Narrative," New German Critique 71.Memories of Germany (1997).
[79] P. 287, Arendt, Eichmann in Jerusalem -- a Report on the Banality of Evil.

the Institute.[80] Meitner, like many Jewish intellectuals in Germany at the time, "saw German culture as an expression of universal human values: rationality, science, knowledge, truth."[81] There is no reason to expect an alteration in German ideals between the two world wars, even with the Nazi attempts to subvert those ideals for fascist ends.

Despite writing a series of essays on the subject, Arendt never defines what "the banality of evil" means. Perhaps it was assumed that everyone understood the concept of "evil" as embodied by the Nazis put on trial in Jerusalem and elsewhere. It has been suggested that she was attempting to construct a bimodal contrast with Immanuel Kant's notion of "radical evil."[82] [83] More practical is the definition used by Professor of Psychology Ervin Staub: "The essence of evil is the destruction of human beings," whether physical or psychological destruction.[84] Staub's simplistic definition is central to the view of Weapons of Mass Destruction: "WMD are evil." Fred Alford, professor of government and politics at the University of Maryland, expounds his own definition of evil: "Whatever evil is, it is not just going along with malevolent authority. It is identifying with malevolent authority, finding pleasure and satisfaction in joining with its destructiveness." The significance of Alford's definition becomes evident in radical analyses of the post-Watergate era asking if it is appropriate to lump Richard Nixon with

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[80] P. 144-145, Elvira Scheich, "Science, Politics, and Morality: The Relationship of Lise Meitner and Elisabeth Schlemann," Osiris 12.Women, Gender, and Science: New Directions (1997).
[81] P. 145, Scheich, "Science, Politics, and Morality: The Relationship of Lise Meitner and Elisabeth Schlemann."
[82] Kant defined evil as the result of a distorted rank-ordering of goods from choosing selfish satisfactions over moral duty. Allen Dunn, "The Roots of Radical Evil," Soundings 85.1-2 (2002): p.3.
[83] P. 417, Barry Clarke, "Beyond 'the Banality of Evil'," British Journal of Political English 10.4 (1980).
[84] P. 1, C. Fred Alford, "The Political Psychology of Evil," Political Psychology 18.1 (1997).

Hitler as "evil-doers". The difference, as perceived by these analysts, was magnitude of intent: Nixon's "actions were guided by a kind of pedestrian self-interest or even sincere political confusion rather than the kind of grand evil scheme found in Hitler's Nazism."[85] But, in fact, pedestrian self-interest is, in Arendt's mind, actually more complicit with evil than Eichmann in Jerusalem or, in this dissertation, biologists pursuing offensive biological weapons research. The difference is the external, but interactive, principle of nationalism or public good.

Kantian philosophy is fundamental to Arendt's thesis. Kant's concept of a transcendental dialectic argues that man's ethics can be divided between an autonomous and heteronymous will, the first acting from an inner principle, the latter from an external principle. "The will as autonomous reflects the noumenal[86] itself, and is capable of operating without taking account of desires or inclinations."[87] Thus, Kant and Arendt might suppose, the behavior of Eichmann and others was beyond their own control. But is such a concept of inevitability rational? If evil is so banal, so commonplace, can we as humans prevent acts of evil or even develop a palpable reaction to evil? The fatal finality of Arendt's thesis is more than slightly disconcerting.

The significance of the concept of free will to this study is great. If, as Kant and others suggest, free will does not exist, then the development of biological weapons was

[85] P. 1, Dunn, "The Roots of Radical Evil."
[86] Noumenal --Relating to a ground of phenomena that is unknown by the senses but is conceivable by reason.
[87] P. 278, W.L. Reese, Dictionary of Philosophy and Religion: Eastern and Western Thought (Atlantic Highlands: Humanities Press, Inc., 1980).

inevitable. One would be compelled by outside, mystical forces to proceed down all avenues of pursuit, including evil ones. The forces may not, in fact, need to be so mystical. It may be a convenient nexus or "*interaction* between the evil within and institutions, ideologies, and historical opportunity that explains evil in the world."[88] But, one could argue, there are other practical forces which should have prevented the development of such weapons. Such practical forces include the existence of international laws, such as the Geneva Protocol, that should have prohibited the development and use of such weapons. In reality, though, the Protocol served not as a barrier but, in at least one case (Japan), served as a rationale behind a country's program. Indeed, the practical forces do more to confound the free will of man, rather than protect the will. "With all of the multiple masters, tribal politics, and value ambiguity prevalent in bureaucratic culture – reinforced by the constant battering of powerful externalities in the form of interest groups – it becomes more understandable how an individual can get swept up in forces that one believes are beyond one's control."[89]

Arendt argued in The Origins of Totalitarianism that totalitarianism[90] was a new form of evil unique to the twentieth century and that the nature of totalitarianism was dependent on ideological structures. The key to totalitarianism is that it destroyed all previous institutional symbols of government: social, legal, and political. The result of such an upheaval of tradition is "that none of our traditional legal, moral, or common sense

[88] C. Fred Alford, "The Organization of Evil," Political Psychology 11.1 (1990).
[89] P. 17, Peter M. Leitner and Ronald J. Stupak, "Ethical Dynamics and the National Security Process: Professionalism, Power, and Perversion," Journal of Power and Ethics: An Interdisciplinary Review 1.1 (2000).
[90] Arendt posited both Nazi Germany and Stalinist Russia as examples of twentieth century totalitarianism.

utilitarian categories could any longer help us to come to terms with, or judge, or predict their course of action."[91]

One could easily argue from such a construction the inevitability of the development of biological weapons by both Germany and the Soviet Union. How, then, does one argue, first, for the apparent absence of such a program in Germany, and, second, against the development of such weapons in democratic societies such as in the United States, the United Kingdom, and Canada? Apparently, either bureaucracies are not inherently "evil," or "evil" is not the cause of the development of biological weapons or WMD in general. Or, Arendt's basic premise about totalitarian evil is incorrect. Or, perhaps, Arendt's notion of the banality of evil *is* correct, and evil is so ordinary in appearance as to be indefinable and (almost) common. What, then, does Arendt's thesis have to say about the development of WMD and biological weapons?

Theodor Rosebury may have explained the question of the banality of evil and WMD when he said: "We resolved the ethical question just as other equally good men resolved the same question at Oak Ridge and Los Alamos."[92] This explanation, however, suggests an internalization of the ethical question; there is no record of any town hall meetings at Camp Detrick, Oak Ridge, or Los Alamos to develop a community consensus. In fact, any history of the U.S. nuclear weapons program in the days of the Manhattan Project

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[91] P. 460, Hannah Arendt, The Origins of Totalitarianism, A Harvest Book (San Diego: Harcourt, Inc., 1985).
[92] Michael Christopher Carroll, Lab 257 -- the Disturbing Story of the Government's Secret Plum Island Germ Laboratory, 1st ed. (New York: Wm. Morrow, 2004).

suggests that the program was so compartmentalized that only a few knew the magnitude of the project they were working on. But an internalization of the ethics would have been counter to Alford's thesis of an interaction of self and institution. Alford's concept has been specifically rejected by other psychologists, such as Fred Dallmayr.[93]

Hannah Arendt's solution to the problem of an individual's evilness brings the question of the banality of evil to a twenty-first century context. Arendt believed Eichmann's evilness came, not from premeditated posturing or as a response to the interaction of the individual and the political institutions surrounding him but, rather, from a lack of considering the ramifications of his actions or, as Arendt called it, his thoughtlessness.[94] Therefore, what Arendt proposed as a solution "is very simple: it is nothing more than to think what we are doing."[95] This solution should not be dismissed quickly, but should be measured in terms of the frequent current calls for a "code of conduct" for biological researchers in order to increase biosecurity and reduce the risk of "science turned upside-down."

Perhaps the most visible and significant of these calls for a code of conduct is the National Academies' "Fink Report," colloquially named after the Chair of the Committee on Research Standards and Practices to Prevent the Destructive Application of Biotechnology but correctly titled "Biotechnology Research in an Age of Terrorism:

[93] P. 33, Fred Dallmayr, "Political Evil: A Response to Alford," Political Psychology 11.1 (1990).
[94] P. 421, Clarke, "Beyond 'the Banality of Evil'."
[95] P. 5, Hannah Arendt, The Human Condition (Chicago and London: University of Chicago Press, 1958).

Confronting the Dual Use Dilemma." The Report made a series of seven recommendations[96], the first of which was: "Educating the Scientific Community – We recommend that national and international professional societies and related organizations and institutions create programs to educate scientists about the nature of the dual use dilemma in biotechnology and their responsibilities to mitigate the risks."[97] This directly addresses Arendt's call to "think about what we are doing." Whether being more thoughtful will satisfactorily redress the development of new ways to kill people is highly dubious; nobody can challenge the amount of brain power dedicated to the development of nuclear weapons in the Manhattan Project, for example.

Concerns about the concept of "bio-ethics and bio-security" have spawned other proposals much less reliant on the ethical upbringing of a nation's scientists. Consequently, organizations such as the University of Maryland's Center for International and Security Studies at Maryland have proposed an international Biological Research Security System, requiring a licensing and reporting scheme which includes an institutional, national, and international review panel. Contrary to Arendt's thesis of individual freedom and responsibility, the Center argues that "protection can only be achieved by imposing some constraint on freedom of action at the level of fundamental

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[96] The seven committee recommendations were: Educating the Scientific Community; Review of Plans for Experiments (the so-called "seven deadly sins"); Review at the Publication Stage; Creation of a National Science Advisory Board for Biodefense; Additional Elements for Protection against Misuse; A Role for Life Sciences in Efforts to Prevent Bioterrorism and Biowarfare; and, Harmonized International Oversight.
[97] P. 87, Committee on Research Standards and Practices to Prevent the Destructive Application of Biotechnology, Biotechnology Research in an Age of Terrorism: Confronting the Dual Use Dilemma (Washington, D.C.: National Research Council of the National Academies, 2003).

research."[98] To date, none of the myriad of proposals and recommendations made in the name of "bio-security and bio-ethics" has gained any significant traction within either the government or within the scientific circles in the United States or elsewhere.

[98] John Steinbruner, Elisa D. Harris, Nancy Gallagher and Stacy M. Okutani, Controlling Dangerous Pathogens: A Protective Oversight System (College Park: The Center for International and Security Studies at Maryland, 2007).

Chapter 4

Wickham Steed Fans the Embers

Any analysis of the rise of State-run BW programs must begin with the writings of H. Wickham Steed (b. 1871 – d. 1956). In a pair of articles published in the British monthly magazine, The Nineteenth Century and After, Steed presented a story presumably designed to warn the British populace about the emerging threat of a National Socialist Germany.

The first article, "Aerial Warfare: Secret German Plans"[99], was published in July 1934. Steed claimed to have in his possession several documents from the German War Office and, more specifically, the "*Luft-Gas-Angriff*" department – Air Gas Attack. None of the documents were produced for public scrutiny but, rather, we are forced to rely on Steed's ability (and honesty) in describing the papers.[100]

The first document was described as "though written on plain paper, bears official reference numbers and is dated from Berlin at the end of July 1932, is marked 'strictly secret,' and is signed with an illegible name above the words "Colonel and Chief of the

[99] Henry Wickham Steed, "Aerial Warfare: Secret German Plans," The Nineteenth Century and After CXVI.689 (1934).
[100] The documents may no longer exist. Steed's executrix and custodian of Steed's private papers was unable to locate them and believes Steed may have destroyed them in 1939. Martin Hugh-Jones, "Wickham Steed and German Biological Warfare Research," Intelligence and National Security 7.4 (1992).

department L.G.A." The document was written to an aircraft firm (no further identification) and discussed the conclusions of an LGA expert (known as No. IX) regarding how "air warfare may be waged effectively and ruthlessly against important military and industrial centres and, above all, also against the civilian population of large cities." Steed admits the document's "style . . . is not especially military" but the document's attachment gave him reason to consider it important. The attachment, albeit incomplete in Steed's article, included the tantalizing passage: " . . . in the necessary provision of raw materials by a simple transformation of the proper departments of large chemical undertakings, so as to produce Yellow Cross or compressed Yellow Cross, could easily be answered." Yellow Cross, Steed asserts, is a codename for mustard gas, also known by the German names "Senfgas," "Lost," or "Yperit."

Even more tantalizing, at least in terms of this dissertation is the rest of the attachment: a description of a test procedure to understand "the conditions of raining down liquids containing chemicals or bacteria, as is desired by the L.G.A. and L.G.V.[101] This procedure has the advantage of being extremely simple and cheap and at the same time of being practicable on the largest scale without enabling our civilian population or the secret agents of other governments to notice anything." Expert No. IX was recommending large-scale aerosol testing using *Micrococcus prodigiosus*, a bacillus now more commonly known as *Serratia marcescens.*[102] [103]

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[101] (Luft-Gas-Verteidigung, or Air Gas Defense)

[102] Indicative of how the understanding of biology evolves over the years, *Serratia* were at one time thought to be harmless saphrocytes, and pigmented variants of *Serratia marcesens* were used as markers to trace air currents in both the environment and in hospitals. These organisms have now been identified as major

Oddly, at least based on the Steed documents, is the argument that *M.prodigiosus* was being used in the tests, not because it was a model for any particular pathogenic agent planned for the German arsenal, but because it was easily detectable using a simple experimental technique used in German medical schools whereby a lecturer drinks a solution containing the *M.prodigiosus* agent and delivers the lecture. The agent then is collected on culture plates at various distances from the speaker, thereby measuring quantity, range, and trajectory of the aerosol produced by the speaker's saliva.

Steed then refers to another purported document, titled "Militarily Important Aero-dynamic Investigations in Enemy Countries." This document obliquely references air current tests which apparently had already taken place in the underground railway systems of Berlin and Hamburg. The document went on to urge, as "much more important," comparable tests "to investigate the conditions of air circulation in the Paris Metro and in the various London underground railway systems according to the Berlin scheme of measurements." The paper further suggests that rudimentary tests had already been conducted in both London and Paris but the results were "too fragmentary and in part also lacking in objective exactness."

The timing of the correspondence and these experiments is noteworthy. The experiments began prior to Hitler being appointed to the German Chancellorship, taking place during

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entities in nosocomial infections. In nature they are found widely distributed in soil and water and are associated with a large number of plants and animals, for which they may be pathogenic." Joklik, Willet, Amos and Wilfert, eds., Zinsser Microbiology.

[103] Guillemin, Biological Weapons -- from the Invention of State-Sponsored Programs to Contemporary Bioterrorism.

both the Papen and Bruning administrations. Again based on Steed's documents, Hitler reportedly officially approved of the experiments on May 16, 1933.[104]

After a short discourse on German plans using aerial attacks with Yellow Cross, including a list of potential target cities in France[105], comes perhaps the most cryptic note in the entire Steed portfolio. The paper reportedly is a series of notes, written in pencil, apparently scribbled in haste, possibly written during field tests since it is described as being dirty, with clearly visible fingerprints. The page consists entirely of German abbreviations and figures. A sample of the code was thoughtfully included by Steed:

O.P.f.Vers.u.Koor.Conc. (ob.). – Mehrf. Umf. –ca.210 x 10^{12}*-.*

Be.m.H.Pers; gen. 6 h sp. Strg. – 2.47.pm. -18.8.33.

Nr. I: Pl. Rpq: ON)); 3, 12 km: B 1-2; A. 8,75; nor.

neg.; s.g.ggt. K 4231.

Somehow Steed made sense of the scribbles and, aided with a map of Paris, determined the text showed "how thoroughly the plans for air attack with bacteriological solutions or gas, or both, have been tested by German agents in Paris (and probably elsewhere)."

By Steed's account, these supposed field notes include colony culture counts with an impressive accuracy. Counts such as 95,778; 91,389; and an impressive 1,124,781

[104] May 16, 1933 being the eve of Hitler's famous "Peace Speech" in the Reichstag.
[105] The cities identified were Diedenhofen (Thionville), Metz, Strasbourg, Mutzig, Belfort, Nancy, Briey, Verdun, Toul, Epinal, the inner city and the suburbs of Paris, Toulon, Marseilles, Lyons, Havre, Rouen, Caen, Nantes, Le Creuzot, St. Etienne, Roubaix and Tourcoing, besides eleven places in the Nord department and nine in the department of Meurth and Moselle. Steed, "Aerial Warfare: Secret German Plans."} .

colonies were apparently counted in the field, in a process that was supposedly so urgent that only abbreviations were used and the researchers did not even have time to prepare a clean copy.

Steed apparently laboriously deciphered the entire field study, finding verbs and articles, researchers' comments, and even exclamation points among the abbreviations and figures. For example, the above code was interpreted (Steed's words) to be:

> "The Place de la Concorde is the zero point for tests and co-ordination of all measurements, the obelisk being the centre of the co-ordination point. The Place de la Concorde was driven round several times, about 210 units, containing a billion germs each, were sprayed. Done with the help of assistants; and, exactly six hours later, the results were measured. The spraying itself took place at 2:47 p.m. on August 18, 1933."

The Editor of the Nineteenth Century and After saw fit to include a fairly lengthy Editorial Note immediately after this first article. The editor admitted that it was "impossible to guarantee by any direct method of verification the authenticity of the information" the article contained. Yet the editor accepted Mr. Steed's assurances that the scientific data had been checked out by experts. The editor's concluding thoughts added an interesting twist:

> "In deciding to take the risk of publication I have based myself upon the Italian proverb *se non é vero é ben trovato*[106]. For even if the whole tale is a forgery, the fact that anyone should deem it worth while to perpetrate such an ingenious fraud is not without a sinister significance, which makes it all the more essential that ordinary citizens should realise the kind of horrors with which modern war is threatening them."

A month later, Steed published a follow-up article, "The Future of Warfare."[107] "The Future of Warfare" began with what was essentially a review of the reactions to the "Aerial Warfare" article. In a tautological response, Steed defended the earlier article with: "The only hypothesis which fits the facts as I know them is that the documents themselves are entirely genuine and that they reached me through trustworthy channels."

Somewhat oddly, though perhaps not in the context of national interpretation of the 1925 Geneva Convention, the standard defense taken by both Steed, his supporters, and his critics was not that research in offensive biological (and chemical) warfare was illegal or even morally reprehensible, but the fact that testing took place in another country's capital, presumably without the foreign government's knowledge.

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[106] "If it is not true, it is well invented" The American Heritage Dictionary of the English Language, Fourth ed. (Houghton Mifflin Company, 2000). The latter half has also been translated as "happily invented;" a slightly different twist.
[107] Steed, "The Future of Warfare."

The bulk of the second article, though, was a discussion of a recent German patent application by Dr. Hugo Stoltzenberg entitled "Procedure for the attainment of a field of drops from great heights with especial reference to the combating of [insect] pests." Because of some of Dr. Stoltzenberg's previous writings, including a couple of pamphlets published in 1929 entitled "The Ultra Poisons" and "Methods of Attack in Gas Warfare: Aircraft and Ultra-Poisons," one must take pause and question the peaceful nature of the patent application. Why, as Steed questions, did Stoltzenberg find it efficacious to spray pests from high altitude, unless the pests were of the human sort?

The publication of the two Steed articles had the desired effect. It mobilized the British government and stirred up the attention of many of the European governments. Sir Maurice Hankey, then a senior UK civil servant and secretary of the Committee of Imperial Defence, was directed by the Secretary of the UK Medical Research Council (MRC) in the strictest confidence to obtain official views on the potential for BW. The MRC produced a cautious memorandum regarding the use of BW as being unlikely but that such a possibility could not be disregarded.[108] More critically, the authors[109] remarked that:

> "In support of their authenticity we would, as bacteriologists, merely remark that if *ad hoc* experiments were to be undertaken by any Power as a guide to contemplated offensive action involving the distribution of bacteria discharged

[108] Hugh-Jones, "Wickham Steed and German Biological Warfare Research."
[109] The analysts of the Steed papers were Professor John Ledingham, Director of the Lister Institute; the epidemiologist and bacteriologist Professor William Topley of the London School of Hygiene and Tropical Medicine, and Captain Stewart Ranken Douglas, Deputy Director of the National Institute for Medical Research.

> directly from aircraft, from explosive bombs, dropped glass containers or from spray machines in the hands of enemy agents, they would take very much the form and method of those detailed in Wickham Steed's secret documents."[110]

The French, too, looked on the documents with skepticism and concern: "We cannot affirm under oath that the documents are authentic, but we do not have the right to doubt them" quoted the Sartory brothers in the book, La Guerre Bacteriologique, and then continued with somewhat less trepidation: "The peril is great. One must awaken the conscience of the world. Public opinion in Paris, Washington, and London must pillory war."

Henry Wickham Steed was not a biologist. Rather he was a journalist, the Paris correspondent for the New York World, later a foreign correspondent for The Times in London before finally becoming editor of The Times from 1919 until 1922. During World War I he served in the "British War Mission," a cover name for the "Enemy Propaganda Department."[111] He was, in fact, labeled by one contemporary as "one of the leading war makers of 1914"[112] and was blamed for "creating the war psychology in the years before 1914."

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[110] P. 15, Balmer, Britain and Biological Warfare.
[111] Henry Wickham Steed, Through Thirty Years, 1892-1922, Vol. II, vol. 2, 2 vols. (London: William Heinemann, Ltd., 1924).
[112] Henry Elmer Barne, "Vital Peace," Annals of the American Academy of Political and Social Science 189 (1936).

At least one modern analyst[113] has ascribed a racist, anti-Semitic bent to Steed's writings, though that appellation may be colored with a modern awareness which was much less prevalent in the early twentieth century. Steed seemed to dislike anything that was not British: "Thus, I have ever been a partisan -- in politics a partisan of England, as I conceived England, integrally, with a mind devoid of some insular preconceptions; a partisan of ordered freedom as against tyranny or licence; a partisan of reality against humbug and pretence; and a partisan of men whom I thought honest."[114]

In analyzing any documents, one must consider the source, the facts, and the situation. The provenance of these documents must be challenged, albeit *in absentia*. If the documents were, in fact, destroyed in 1939, as Steed's executrix surmises, one must ask why? Steed had a clear understanding of history and his role in the history of Europe in the twentieth century, as his two volume autobiography clearly demonstrates. Destroying the documents seems to be out of character, especially since Steed had identified the papers as being "an important secret document." In the absence of any other rationale or counter-explanation from Steed, or his executrix, we must assume that the papers were destroyed because Steed did not want them to be seen by other analysts. Why? Either the documents were not as compelling as Steed argues in his articles or the information in the documents was not as Steed suggested. The documents may, in fact, have been falsified.

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[113] Richard Lawson, "Nationalism, Racialism and Early British Socialism," The Journal for Historical Review 1.4 (1980).
[114] Henry Wickham Steed, Through Thirty Years, 1892-1922, Vol. I, vol. 1, 2 vols. (London: William Heinemann, Ltd., 1924).

Steed probably did not falsify the papers himself. Not being a biologist, it is highly unlikely that he could have prepared papers with enough detail to pass the scrutiny of the British scientific elite of the day. It is not possible to determine if Steed was perhaps the victim of an elaborate hoax; but, if so, by whom? It is evident from Steed's other writings that he was willing to be less than a thorough journalist when the facts got in the way of his rhetoric.

Consider, for example, his biography of Hitler, That Bad Man – a tale for the young of all ages. In this fanciful tale, a traditional English mum (mother) relates the history of Germany and the rise of Hitler to her two young sons. Within the first six pages of the book, the "mum" has identified Hitler as a "self-made dunce" twice, a "pin-headed dunce" once and asserted that Hitler would not have become Chancellor of Germany if he had not changed his last name from Shicklgruber because Germans cannot pronounce the name easily and it would have made them laugh to salute and say "Hail Shicklgruber."[115] Such was the balanced writing of Wickham Steed.

Steed had a strong anti-Fascist bent to his rhetoric, but he also seemed to have a pro-war predilection that had more to do with bravado than concerns over the morals or ethics of other States. In November 1936 Steed was involved in the internal debate between the War Department and Foreign Office concerning how the UK should treat Germany's inroads to the East. Steed provided "intelligence" reporting to the War Department that

[115] P. 3, Henry Wickham Steed, That Bad Man -- a Tale for the Young of All Ages (London: Macmillan & Co., Ltd., 1942).

referred to the inevitability of war with Germany within the next three years. The War Department, which preferred to let Germany have its way with the East, suggested that the Foreign Office was causing "psychological danger" by speaking of the inevitability of war and was failing to carry out its role of keeping the country out of war.[116] What is unclear is how Steed, then an ordinary citizen, no longer associated with either the Propaganda Department or with the Times, managed to get involved in the contretemps between the War Department and the Foreign Office. It does demonstrate the power of his name and the influence he was still able to muster, despite lacking the imprimatur of office.

Steed was a prolific writer and lecturer throughout the United Kingdom. One of his books, Vital Peace, was self-described by Steed as "a challenge . . . addressed to pacifists and non-pacifists alike. Its purpose is to bid them reflect upon the 'peace' of which they often speak."[117] Steed divides history into three segments: war, non-war, and peace. Significantly, Steed claims "peace" has never been attained.[118] Early on in the book, Steed describes war as "half hell, half picnic, and, at moments, whole ecstasy."[119] [120] How does one confidently choose between three alternatives where one has never

[116] P. 88, Wesley K. Wark, The Ultimate Enemy -- British Intelligence and Nazi Germany, 1933-1939, Cornell Studies in Security Affairs, eds. Robert J. Ark and Robert Jervis (Ithaca: Cornell University Press, 1985).
[117] P. v, Henry Wickham Steed, Vital Peace -- a Study of Risks (New York: The Macmillan Company, 1936).
[118] P. vi, Steed, Vital Peace -- a Study of Risks.
[119] P. 7, Steed, Vital Peace -- a Study of Risks.
[120] Steed was, of course, a "desk jockey" in World War I, though he mentions in the book an incident when he was on the front lines in France. He was a passenger in a staff car and watched as a regiment marched off towards its likely destruction: "I think all of us felt ashamed that we were not also marching in that column." This overly-romantic view of war echoes through all of his writing. Steed, Vital Peace -- a Study of Risks p.8.

existed, one is (momentarily) whole ecstasy, and the third is never defined? If one accepts Steed's pleasurable definition of war as accurate, then war *must* be the best alternative – the path Steed hopes the reader will choose.

Returning to the German BW articles, one must reconsider the paper reportedly containing the test results of aerosol tests in the Paris Metro system. Can it reasonably be expected that a team of German scientists could spend six hours taking measurements at one of the busiest Metro stops in Paris without being questioned? Why did the Germans conduct the test using a pathogen not intended as a surrogate of another pathogen? Surely, if the tests were intended only to prove that bacteria could survive in an urban setting, there was no need to travel to Paris for the tests. The Germans could have conducted the tests in the relative privacy and security of a German urban setting. (Unless the Germans wanted to be discovered conducting the tests in order to convince the Allies that Germany had a "secret" weapon of mass destruction. Except that in 1934 the Germans did not know who the Allies were going to be in the next war, much less than they should reasonably have expected a war to be imminent.)

But it is not an altogether unrealistic proposition to consider that the Germans planted the story with Steed. Germany was still suffering from the military constrictions placed on them after World War I, via the Treaty of Versailles. But Germany under Hitler already had its eyes on becoming the dominant power in Europe. What Germany needed was a deterrent force that would prevent an immediate response by its potential enemies. In the

absence of an effective navy or air force or, for the most part, an army, Germany needed a super-weapon. Nuclear weapons were still a far-off dream. Chemical weapons had proved to be valuable only in trench warfare and defenses to CW had been quickly discovered. Biological weapons were still an unknown but realistic possibility. Short of actually developing a biological weapon capability, presenting evidence of testing may have been just as effective (and significantly cheaper). If Germany had in fact decided on such a ruse, the idea clearly backfired on them as the United Kingdom and eventually the United States and Canada, quickly embarked on serious offensive BW programs of their own in response to the perceived threat. But, of course, this assumes that 1930's Germany understood and considered the prospects of deterrence theory.

By the early 1930s Germany was well experienced in techniques of denial and deception to keep its activities hidden from the rest of Europe. The other European powers had very little visibility into Germany's operations. The arms inspectors who had been part of the Versailles Treaty mandate had been out of the country since 1927. Neither the international press nor the business community was a source of useful information on Germany's activities.[121] The possibility of Germany successfully attempting a hoax is not beyond the realm of possibility.[122]

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[121] P. 51, Barton Whaley, Covert German Rearmament, 1919-1939: Deception and Misperception, Foreign Intelligence Booke Series, ed. Thomas F. Troy (Frederick: University Publications of America, Inc., 1984).
[122] Interestingly, Igor Domaradskij refers in his memoirs to a book by the son of Red Army Bacteriology Institute Director, I. M. Velikanov, which "implicates" the Soviets as having helped the Germans in the Paris subway tests! P.127, Igor V. Domaradskij and Wendy Orent, Biowarrior -- inside the Soviet/Russian Biological War Machine (Amherst, New York: Prometheus Books, 2003).

In fact, there is strong evidence that the Germans *did* mislead the United Kingdom and others as to its weapons in the 1930s. Sir Basil Liddell Hart describes one such deception in his memoirs. Germany allegedly had an armor-piercing shell, the *Halger-Ultra*, capable of penetrating steel over a half-inch thick.[123] In 1932 Sir Basil called the shell "a gigantic bluff," but the damage was done. The rumor of the weapon was enough to set back the development by Britain of armored forces as the pro-cavalry elements in the War Office used the possibility of the weapon as justification to remain with the horse rather than the tank![124]

An Intriguing Possibility

> "There were some papers, a newspaper or two, and a small bag tied with black cord. The last I opened, while Mary looked over my shoulder. It contained a fine yellowish powder.
>
> 'Stand back,' I said harshly. 'For God's sake, stand back and don't breathe.'
>
> With trembling hands I tied up the bag again, rolled it in a newspaper, and stuffed it into my pocket. For I remembered a day near Peronne when a Boche[125] plane

[123] P. 242, Basil H. Liddell Hart, The Liddell Hart Memoirs -- 1895-1938, vol. 1, 2 vols. (New York: G. P. Putnam's Sons, 1965).
[124] P. 117, Norman Dixon, On the Psychology of Military Incompetence (London: Pimlico, 1976).
[125] Boche – French slang for 'rascal', first applied to German soldiers during World War I. Bill Casselman, Wording Room, 2007, Available: http://www.billcasselman.com/wording_room/boche.htm, November 3, 2007 2007.

had come over in the night and had dropped little bags like this. Happily they were all collected, and the men who found them were wise and took them off to the nearest laboratory. They proved to be full of anthrax germs . . .

I remembered how Eaucourt Sainte-Anne stood at the junction of a dozen roads where all day long troops passed to and from the lines. From such a vantage ground an enemy could wreck the health of an army . . .

I remembered the woman I had seen in the courtyard of this house in the foggy dusk, and I knew now why she had worn a gas-mask.

This discovery gave me a horrid shock. I was brought down with a crash from my high sentiment to something earthly and devilish. I was fairly well used to Boche filthiness, but this seemed too grim a piece of the utterly damnable. I wanted to have Ivery by the throat and force the stuff into his body, and watch him decay slowly into the horror he had contrived for honest men.

'Let's get out of this infernal place,' I said."

Mr. Standfast, (1919)[126]

[126] P. 525, John Buchan, The Complete Richard Hannay (London: Penguin Books, 1956).

There are a large number of similarities between the patriotic fervor that Steed presented in his countless talks throughout the United Kingdom in the years between the two World Wars and the heroic bravado of Richard Hannay, the protagonist in John Buchan's fictional writing during the same period. The fact that John Buchan[127] and Wickham Steed worked in the same office during World War I makes the coincidences lessen and the providence of Steed's receipt of the German papers seem a bit more enigmatic.

A common *leitmotiv* in Buchan's series of Richard Hannay mystery-adventure novels[128] is the use of encrypted messages which hold major clues to the upcoming adventure. The codes were indiscernible to all but Hannay and were as short as "v.I.," which Hannay easily translated to "von Einem," the last name of a then-mysterious female foe in an earlier novel, Greenmantle. A simple decoding technique is revealed in the stories but, inconveniently, virtually none of the secret messages in the stories use the code as described by Buchan. Intuition is always the key to solving the mysteries in Buchan's novels. The fact that the key papers in Steed's revelations were also encoded may be merely a coincidence, of course.

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[127] John Buchan's biography is perhaps more heroic and awe-inspiring than that of his prime character, Richard Hannay. Besides being a renowned novelist (his "The Thirty-Nine Steps" having been made into a classic movie by Alfred Hitchcock) and biographer, he was head of the Ministry of Information during World War I, he was also a Member of Parliament for eight years and ended his public life as Lord Tweedsmuir, Governor-General of Canada. Andrew Lownie, John Buchan: The Presbyterian Cavalier (Toronto: McArthur & Company, 1995).

[128] While not wanting to push the coincidences to the extreme, it is interesting to note that Mr. Standfast uses as a literary device the themes developed in John Bunyan's 1678 classic, The Pilgrim's Progress. John Bunyan, The Pilgrim's Progress, 7th ed. (New York: Washington Square Press, Inc., 1964). The hero of Progress wonders what he must do to avoid the prophesied destruction of himself, his family and his town. Benét, Benét's Reader's Encyclopedia, ed. Carol Cohen, 3rd ed. (New York: Harper & Row, Publishers, 1987).

But there are other reasons to be drawn to the above-quoted material. There is no mention in the historical records of World War I that raises the specter of battlefield use of biological weapons during the war.[129] There are references to intended German use of anthrax as a supplement to its use of glanders as sabotage against livestock, but none of the references suggest any sort of complicated weaponization of the anthrax for use against troops.[130] In fact, as will be shown later in the section on Germany's World War II activity, the Germans apparently believed anthrax had no effect against humans.[131] Where did Buchan get the idea? Why anthrax? Did Buchan know something secret from his wartime position that he felt necessary to reveal via his alter ego? The town of Peronne mentioned in the Buchan text was one of the crossroads in the five-month long Battle of the Somme. Was there a similar event during that battle? There is no reference to any particularly notable air tactics in Lee Kennett's history of strategic bombing (Kennett) and Buchan's history of the battle at Somme has been criticized as "inaccurate and naïve" by historian Peter Buitenhuis.[132]

In Buchan's defense (if he needs one) is the fact that, while there are coincidental path-crossings in the careers of Buchan and Steed, the crossings do not appear to have been

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[129] The use of glanders by the Germans was not battlefield use, but was espionage behind the lines. In this case, against noncombatants' livestock. There is, though, one cryptic report in the New York Times that "French writers charged the Germans with intending and even attempting to use glanders bacilli on the Western Front in 1916." There were no details and no mention if this was against livestock, troops, or civilians. Waldemar Kaempffert, "Deadly Germs Described," New York Times May 19, 1947 1947.
[130] Kathryn Crockett, "A Historical Analysis of Bacillus Anthracis as a Biological Weapon and Its Application to the Development of Nonproliferation and Defense Strategies," PhD, George Mason University, 2006.
[131] Ferdinand Kuhn, "Germany Admits to Use of Bombs and Germs Here in 1915 and 1916," New York Times September 25, 1930 1930.
[132] P. 125, Lownie, John Buchan: The Presbyterian Cavalier.

significant in either's life. Buchan was a war correspondent for The Times in the very early days on World War I, prior to Steed becoming editor in 1919, but while Steed was serving also as a correspondent and as an after-dinner speaker boosting political fervor. Steed served during World War I in the "British War Mission," a cover name for the "Enemy Propaganda Department," the same organization in which Buchan was a senior official. Steed's name is not mentioned in either Buchan's memoirs[133] nor in a prominent biography of Buchan's life[134], nor is Buchan's name mentioned in Steed's memoirs. Buchan, in fact, makes little mention of the war except to say that he had been commissioned as an intelligence officer[135] and served in France until 1917 when he took the job in the War Cabinet leading the Department of Information.[136]

Propaganda was a significant tool during World War I and in the period between the two wars. The significance to this study of propaganda as a tool of the tyranny of experts should be obvious. Serge Capotkin called the journalist "an engineer of the souls," clearly demonstrating the concern and the blurring line between journalist and

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[133] John Buchan, Memory Hold-the-Door (Toronto: The Musson Book Company Ltd., 1940).
[134] Lownie, John Buchan: The Presbyterian Cavalier.
[135] Apparently Buchan was not employed in spying. According to Lownie, "personnel on support duties such as censorship, publicity and propaganda" were also members of the Intelligence Corps. Lownie, John Buchan: The Presbyterian Cavalier.
[136] The wartime mission of propaganda in the UK was complicated by the fact the Foreign and Commonwealth Office, the War Office, and the Admiralty all had offices responsible for propaganda, as well as for the fact that the name of the various departments seemed to keep changing. Thus, there was the Department of Enemy Propaganda, which later became British War Mission under the Department of Information, which later became known as the Ministry of Information. There was also a War Propaganda Bureau. A Neutral Press Committee, and a News Department. More confusing was the fact that the various entities became known by the location of the offices, not the office roles; thus we find reference to Crewe House and Wellington House. Buchan and Steed were associated with Wellington House.

propagandist.[137] Sir Reginald Brade, UK War Office, said at the time: "The really important thing was not the facts, but the way in which they were presented."[138] Publicizing German atrocities, both real and imagined, was essential to the British war-fighting machine. "The British public, unprepared as it was for war with Germany, needed to believe the Germans were capable of the grossest behavior possible."[139]

So, it is possible to suggest that Steed's writings for the Nineteenth Century and Beyond were pure propaganda, intended to motivate a British population tired of war-fighting and sway the British government to action in the years leading up to World War II. Certainly, Steed had the skill and the understanding necessary for such an exploit. Additionally, he had the political fervor and nationalistic intent which might justify such an effort. Buchan's success as a writer of fiction with the "Richard Hannay" novels might have been the necessary impetus and the blueprint for his idea. But we are missing the so-called smoking gun to solve this mystery conclusively.

An additional coincidence needs to be mentioned. In 1934, John Buchan was appointed by the Crown as Governor General of Canada, replacing Mackenzie King.[140] By 1936 Canada had begun its first tentative steps into biological weapons research, under the

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[137] Alice Goldfarb Marquis, "Words as Weapons: Propaganda in Britain and Germany During the First World War," Journal of Contemporary History 13.3 (1978).
[138] Philip M. Taylor, "The Foreign Office and British Propaganda During the First World War," The Historical Journal 23.4 (1980).
[139] Marquis, "Words as Weapons: Propaganda in Britain and Germany During the First World War."
[140] King returns to the story as the solicitor of charitable donations to Banting's research John Bryden, Best-Kept Secret -- Canadian Secret Intelligence in the Second World War (Toronto: Lester Publishing Limited, 1993) p.40.. See the section, the Canadian BW Program, 1937-1947.

guidance of Dr. Frederick Banting. It is highly likely that Buchan knew Banting, particularly due to Buchan's position and Banting's stature as a Nobel Laureate. Did Buchan put the "BW bug" in Banting's ear? Again, the written record holds no supporting evidence to defend the notion. This quotation from Buchan's memoirs may be relevant in this regard:

> "The tragedy of man is that he has developed an intelligence eager to uncover mysteries, but not strong enough to penetrate them. With minds but slightly evolved beyond those of our animal relations, we are tortured with precocious desires, and pose questions, which we are sometimes capable of asking but rarely are able to answer."[141]

[141] P. 291, Buchan, Memory Hold-the-Door.

Chapter 5

A Military Revolution

"Who can think without dismay of the fears, jealousies, and suspicions which have compelled nations, our own among them, to pile up their armaments? Who can think at this present time without a sickening of the heart of the appalling slaughter, the suffering, the manifold misery brought by war to Spain and China? Who can think without horror of what another widespread war would mean, waged as it would be with all the new weapons of mass destruction? Yet how fruitless seem to be all the efforts to secure a really settled peace."[142]

Archbishop of Canterbury, December 1937

World War I sparked a revolution in strategic military thinking. Long-range artillery and aerial attacks introduced a new type of warfare. It was no longer necessary to face your enemy. Sabotage, while still important, could be supplanted by strategic bombing of third-echelon industries. Civilian populations, long considered to be non-combatants and off-limits, were now subject to the same indignities and privations of the military.

[142] Archbishop of Canterbury, "Archbishop's Appeal -- Individual Will and Action -- Guarding Personality," The Times 28 December 1937 1937.

The concept of "Weapons of Mass Destruction" originated in the 1930s with the Spanish Civil War. The first known usage of the term was in The Times reporting of the Battle of Guernica in April 1937[143] and the phrase was later used by the Archbishop of Canterbury referring to Spain and China in a 1937 Christmas Day radio broadcast which was also reported in The Times.[144] [145] What is significant about the early use of the phrase is that WMD referred to the method of delivery of the attack, not the type of munition. George Steer, in his initial reporting (seven months prior to his seminal use of the term "weapon of mass destruction") called the tactics by Nazi bombers: "the new military science."[146] The tactics comprised a wave of attacks by Heinkel fighter aircraft and Junkers and Heinkel bomber aircraft used to bombard the city of Guernica in Basque-held Spain.

What was not mentioned in the Steer column was the fact that the new military science apparently also included the attack by military forces on a defenseless, populated city of non-combatants. This may have been the true lesson of the first use of "WMD." Additionally, the bombing of Guernica came while there was still some hope that the Non-Intervention agreements could be enforced and the fighting could be localized. The bombing of Guernica confirmed the fears that "Franco would go to any extreme to gain a victory over Spain."[147] But perhaps the most important lesson to learn from the use of

[143] This battle was immortalized by Pablo Picasso in the painting "Guernica."
[144] A common misconception is that the Archbishop's editorial was the first use of the term. The published record, however, refutes this belief.
[145] P.2, W. Seth Carus, Defining "Weapons of Mass Destruction", Center for the Study of Weapons of Mass Destruction, Washington, D.C.
[146] George Steer, "Bombing of Guernica," The Times 1937.
[147] P. 195, Robert Payne, The Civil War in Spain -- 1936-1939, History in the Making (New York: G.P. Putnam's Sons, 1962).

"WMD" against Guernica was the mixed journalistic reporting on the response of the populace. According to some reports, the bombing may not have caused panic. If anything, the citizens (reportedly) enjoyed the spectacle of the exploding shells, watching the bombing from their rooftops and balconies.[148] Robert Payne's collection of eye-witness accounts disputes that claim, however, arguing that the inhabitants were seized with fear.[149] The dichotomy of perception between the two accounts may be seen as evidence of the confusion among so-called experts as to the efficacy of WMD.

The modern definition of the term "Weapons of Mass Destruction" has been frequently debated. Oren and Solomon, for example, have argued that the phrase is a "metonym"[150] and should only be used if nuclear weapons are included in the context. Thus, they claim, President Bush "rhetorically magnified" the Iraqi threat by using the term "WMD" in arguing for the reinvasion of Iraq when he actually meant biological and chemical weapons.[151] Oren and Solomon provide a "genealogy" of the origin of the phrase and ask whether chemical and biological arms are appropriately called WMD. Because CW and BW potentially would kill far fewer people than a nuclear weapon (or even, they add, "the extreme lethality of the 'conventional' strategic bombing of Tokyo, Hamburg,

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[148] P. 96, Lee Kennett, A History of Strategic Bombing (New York: Charles Scribner's Sons, 1982).
[149] P. 195-199, Payne, The Civil War in Spain -- 1936-1939.
[150] Metonym -- "a particular kind of substitution: the abstract for the concrete, the container for the thing contained, the cause for the effect" William J. Brandt, The Rhetoric of Argumentation (Indianapolis: Bobbs-Merrill Company, Inc., 1970) p.143.
[151] P. 1, Ido Oren and Ty Solomon, "Weapons of Mass Destruction: A Conceptual History," ed. American Political Science Association (Philadelphia: University of Florida, 2006), vol.

Dresden and other axis cities"[152]) the phrase is, they claim, factually incorrect and is more "a social construct".

Linguistic rhetorical devices, such as metonymy, aside, a definition of WMD including biological weapons was made in a UN Security Council resolution of the Commission for Conventional Armaments in August, 1948: "…weapons of mass destruction should be defined to include atomic explosive weapons, radioactive material weapons, lethal chemical and biological weapons…"[153]

The potential military utility of biological weapons as WMD is apparent in several different scenarios. In a World War II context, the military purposes were identified by Rosebury, Kabat and Boldt[154] as: for close fighting with rapid movement; for the reduction of isolated strongholds; in connection with the siege of cities or other static warfare; for the disorganization of industrial areas well within enemy territory; for army camps and training centers; in connection with strategic retreats or the application of the "scorched earth" policy' and, for applications against livestock and against food plants and industrial crops.[155]

The first purpose, for close fighting with rapid movement, is counter-intuitive and the authors admitted as much but identified an interesting possible exception. "The use of

[152] P. 7, Oren and Solomon, "Weapons of Mass Destruction: A Conceptual History,"
[153] Central Intelligence Agency, Disarmament: Chemical-Biological Warfare Controls and Prospects for Improvement (Washington, D.C.: Central Intelligence Agency, 1969).
[154] Rosebury pointed out that they were approaching the subject as bacteriologists, not military strategists.
[155] P.26-27, Rosebury, Kabat and Boldt, "Bacterial Warfare."

agents such as viruses of measles or yellow fever, or perhaps psittacosis, where the attacking troops might be picked men who had recovered from measles or had been actively immunized against the other disease." Significantly, of all the scenarios imagined by Rosebury et al, only this counter-intuitive application is directly related to combat with belligerents; all the other applications would be considered secondary uses of a weapon. Rosebury assumed airborne dissemination of the agents.

It can only be assumed that a country would use BW in expected ways in certain expected scenarios. The scenarios of Rosebury et al. are simply that: imagined scenarios. The actual military doctrine for employing BW by any country has never been made available for analysis by outside experts. The relatively few examples of BW use are not enough to draw conclusions of any modern strategic concept. Military theorist B.H. Liddell Hart, for example, theorized in the 1950s about the use of "a toxin mixed in a dust-spray . . . capable of infecting the whole population of a whole city" but then suggested that research "is now being directed to ways of producing localized and temporary effects, rather than a spreading epidemic."[156]

As was stated earlier, the first use of the term 'Weapons of Mass Destruction" was in 1937 during the Spanish Civil War, to describe the use of aerial bombardment in Guernica.[157] Aerial bombardment was, to a large degree, a continued military evolution

[156] P. 87, Basil H. Liddell Hart, Defence of the West (London: Cassell and Company, Ltd., 1950).
[157] This was not the first planned use of aerial bombardment as a means of war, however. Lee Kennett reports on an attempt by Austrian lieutenant Franz Uchatius to bomb the city of Venice using a hot air balloon in 1849. The attempt failed. Kennett, A History of Strategic Bombing p.5.

from the earlier development of long-range artillery.[158] But very early in the history of flight some forward-thinkers were already envisioning that the very nature of warfare might be changed by the use of air power.[159] [160] The concept of aerial bombardment as a means of war was developed earlier in the century by General Billy Mitchell in the United States and by Giulio Douhet in Italy. Coincidentally, both Mitchell and Douhet were court-martialed by their respective services for suggesting the use of aerial bombardment during wartime.

The goals of strategic aerial bombardment were twofold: to deprive the enemy of both the material means and the will to continue waging war.[161] Using strategic bombing to wage biological warfare would not address the first of these two goals, especially in any long-term deprivation.[162] At least in theory, BW could break the will of the people to continue to support the fighting. More importantly, the application of biological warfare would be enhanced by the use of aerial bombardment – the ability to reach far beyond the "forward edge of the battle area" made aerial bombardment an ideal platform for BW.

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[158] Michael Howard, "Men against Fire: The Doctrine of the Offensive in 1914," Makers of Modern Strategy from Machiavelli to the Nuclear Age, ed. Peter Paret (Princeton: Princeton University Press, 1986).

[159] The first known reference to "command of the air" was in 1893 at Chicago's World Columbian Exposition by Major J.D. Fullerton of the British Army's Royal Engineers. David MacIsaac, "Voices from the Central Blue: The Air Power Theorists," Makers of Modern Strategy from Machiavelli to the Nuclear Age, ed. Peter Paret (Princeton: Princeton University Press, 1986) p.627.

[160] P. 625, MacIsaac, "Voices from the Central Blue: The Air Power Theorists."

[161] P. 53, Kennett, A History of Strategic Bombing.

[162] This is true except in two extreme cases. The most obvious is that BW would seriously degrade if not destroy human capital – troops to wage war. More exotic would be the use of anti-material agents, such as enzymes that eat away at electrical insulation or pipe fittings. But these weapons have not yet been proved (and legally can't be developed by any signatories of the BWC, except with peaceful and prophylactic intentions).

Giulio Douhet, in his 1921 classic book on the subject, The Command of the Air, argued that few military war planners recognized the significance of aircraft as a new form of war during World War I. Consequently, the airplane was used only to augment traditional war-fighting but did not expand appreciably beyond those traditional areas. The aircraft was used for reconnaissance and observation and counteracting enemy aerial operations, but not for attacking the enemy beyond its own battle lines as "no great importance was attached to this function because it was thought that the aircraft was incapable of transporting any heavy kind of offensive materiel."[163] [164]

But, Douhet argued, the airplane could change traditional warfare. War had always been fought linearly, along lines drawn on the surface of the globe. Thus, battles had to be fought along and across those lines: "Hence, to win, to gain control of the coveted area, one side had to break through the fortified defensive lines of the other and occupy the area."[165] The airplane was able to transcend the fortified lines on the globe (both literally and figuratively) and go far behind the defensive lines and wage war. For the first time, one could attack the material means of warfare without first having to march through the physical means of warfare (i.e., Sherman's march to the sea during the U.S. Civil War). In the absence of this revolution in warfare, one can argue, the development of Weapons of Mass Destruction would have been impractical – the WMD (of whatever

[163] Douhet's basic thesis in the study was that air forces should not be an augmenting tool to support ground operations but, like the sea and naval operations, the air must be considered its own theater of operations and air forces should be able to conduct independent operations.
[164] P.3, Giulio Douhet, The Command of the Air, trans. Dino Ferrari, USAF Warrior Studies, eds. Richard H. Kohn and Joseph P. Harahan (Washington, D.C.: Office of Air Force History, 1983).
[165] P. 8-9, Douhet, The Command of the Air.

sort) must be detonated/released far enough away from your own forces to prevent collateral damage, otherwise it is self-defeating. Significantly, perhaps presciently, Douhet considers the value of the aircraft in delivering WMD to an enemy, in Douhet's case using an undefined "gas."

> "Aerial offensives will be directed against such targets as peacetime industrial and commercial establishments; important buildings, private and public; transportation arteries and centers; and certain designated areas of civilian populations as well. To destroy these targets three kinds of bombs are needed – explosive, incendiary, and poison gas – apportioned as the situation may require. The explosives will demolish the target, the incendiaries set fire to it, and the poison gas bombs prevent fire fighters from extinguishing the fires."[166] [167]

Edward Warner, writing in 1943, summarized Douhet's concept of future war:

> "(1) modern warfare allows for no distinction between combatants and noncombatants; (2) successful offensives by surface forces are no longer possible; (3) the advantages of speed and elevation in the three dimensional arena of aerial warfare have made it impossible to take defensive measures against an offensive aerial strategy; (4) therefore, a nation must be prepared at the outset to launch massive bombing attacks against the enemy centers of population, government, and industry – hit first and hit hard to shatter enemy civilian morale, leaving the

[166] Douhet's book was written before negotiations began on what became known as the 1925 Geneva Protocols, prohibiting the use of gas in war.
[167] P. 21, Douhet, The Command of the Air.

> enemy government no option but to sue for peace; (5) to do this an independent air force armed with long-range bombardment aircraft, maintained in a constant state of readiness, is the primary requirement."[168] [169]

General Billy Mitchell, writing in the United States, understood the same factors. He argued that "a new set of rules for the conduct of war will have to be devised and a whole new set of ideas of strategy learned by those charged with the conduct of war."[170] By the time of Mitchell's writing in 1925, the United States had already embraced the suggestion of Douhet and had developed an air doctrine as distinguished from its land doctrine and its sea doctrine.

In 1939, at the onset of hostilities in World War II, President Franklin D. Roosevelt, recognizing the new threat of aircraft against civilian populations and cities, issued an "Appeal Against Aerial Bombardment of Civilian Populations," saying:

> "The ruthless bombing from the air of civilians in unfortified centers of population during the course of hostilities which have raged in various quarters of the earth during the past few years, which has resulted in the maiming and in the death of thousands of defenseless men, women, and children, has sickened the

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[168] Douhet's writing not only predicted the rise of air power but also the concept of a massive first strike option, later memorialized in the deterrence theory of Mutual Assured Destruction. Since Douhet was envisioning an offensive strategy, he did not consider the possibility of defense or deterrence.
[169] Edward Warner, "Douhet, Mitchell, Seversky: Theories of Air Warfare," Makers of Modern Strategy, ed. Edward Mead Earle (Princeton: Princeton University Press, 1943).
[170] P. 173, William Mitchell, "The Development of Air Power," The Impact of Air Power, ed. Eugene M. Emme (Princeton: D. Van Nostrand Company, Inc., 1925).

hearts of every civilized man and woman and has profoundly shocked the conscience of humanity."[171]

The Appeal was favorably received, at least in theory, by all nations; Hitler calling it "a humanitarian principle . . . which corresponds completely with my own point of view."[172] Hitler's *Luftwaffe* then bombed the city of Warsaw from the air.

The revolution of military theory and doctrine that came about due to the development of the airplane is undeniable. This revolution caused a rethinking of how to approach war. This rethinking helped pave the way for the development of biological weapons as well as all WMD as strategic weapons. As was posited earlier, key elements of warfare changed when it no longer became necessary to face the enemy. As the enemy became a more notional idea rather than a soldier at the end of a bayonet so, too, did the concept of killing become a much more abstract idea, removed from the reality of the frontline trench. The real revolution was not in the concept of warfare, but in the loss of a concept of humanity and the sacrifice of the traditional "laws of war."

But, were biological weapons part of this new revolution in warfare? From the early days of Steed's revelations in the Nineteenth Century and After the United Kingdom began considering the possible utility of BW. A 1934 memorandum to Sir Maurice Hankey, Secretary of the Committee of Imperial Defense, summed up the confusion well, warning

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[171] P. 541-542, U.S. Department of State, Foreign Relations of the United States, 1939 (Washington, D.C.: U.S. Government Printing Office, 1956).
[172] P. 68, Eugene M. Emme, The Impact of Air Power - National Security and World Politics (Princeton: D. Van Nostrand Company, Inc., 1959).

that "*unforeseen ingenuity* in aggressors must be watched and anticipated."[173] (emphasis added) It was not defense against a military threat, but defense against the unforeseen, and not understood, threat of biological weapons. But even this was a question of conjecture. Other advisors to Sir Maurice believed the Steed revelations were not about biological weapons, but rather were plume modeling tests for chemical weapons.[174]

In the United States, the debate about the utility of BW began a bit later but continued longer, until Nixon's 1969 proscription of BW research, production, or use. The 1946 Merck Report, for example, argued for the use of biological weapons as simply another type of weapon, and one that brought benefits to humanity "in public health, agriculture, industry and the fundamental sciences."[175] [176]

In 1950, the Stevenson Committee recommended a continuation of the U.S. offensive as well as defensive BW policy. The Stevenson Committee was chaired by Earl Stevenson, president of Arthur D. Little, Inc., a consulting firm that played a role in developing BW delivery systems – hardly an unbiased observer. Other members included Dr. Willis A. Gibbons, associate director of research and development for the U.S. Rubber Company; Arthur W. Page, former vice-president of AT&T; Dr. Eric G. Bell, a professor of biological chemistry at Harvard; retired Army General Jacob L. Devers; Frederick

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[173] P. 169, Gradon B. Carter and Graham S. Pearson, "British Biological Warfare and Biological Defence, 1925-45," Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945, eds. Erhard Geissler and John Ellis van Courtland Moon, vol. 18, SIPRI Chemical & Biological Warfare Studies (Oxford: Oxford University Press, 1999).
[174] P. 15, Balmer, Britain and Biological Warfare.
[175] Essentially science turned upside down, turned right side up.
[176] Merck, "Biological Warfare,"

Osborn, former deputy U.S. representative to the United Nations Committee on Atomic Energy; and R. Gordon Arneson, Special Assistant to the Undersecretary of State. The Stevenson Committee did not address the utility of BW but refuted the moral arguments against BW, arguing: "It is not a fact that these or other modern weapons in themselves have increased the horrors of war . . . wars have gone on until the suffering and losses of the people on one side or the other have been sufficient to produce surrender or collapse."[177] Whether or not BW may have been part of the new military revolution in doctrine, it certainly helped define the horrors of war.

If the utility of BW was questioned from the very beginning of its development, then the development of a new doctrine of warfare would have been coincidental, but irrelevant, to the debate of BW's utility. But, if the uselessness of BW was an accepted, albeit debatable fact, then why did countries continue with its development? As has been postulated earlier, the rationale behind BW must have been something other than its utility.

One possible explanation requires a redefinition of WMD and of the concept of war from the traditional early 20th century concepts. To begin, one must consider the von Clausewitz definition of war as "an extreme but natural expression" of foreign policy.[178] This statement assumes a spectrum of activity: a spectrum that we can portray as

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[177] Stephen Endicott and Edward Hagerman, The United States and Biological Weapons -- Secrets from the Early Cold War and Korea (Bloomington: Indiana University Press, 1998).
[178] Peter Paret, "Clausewitz," Makers of Modern Strategy from Machiavelli to the Nuclear Age, ed. Peter Paret (Princeton: Princeton University Press, 1986).

beginning with "peace" and continuing through various forms of diplomatic negotiation, violence, and conflict, terminating at the far end with "total war."[179] The concept of "total war" may be a misnomer under von Clausewitz's thesis. Because war exists only as an extension of political purpose, by definition, every action in a war should be in response to the political ends.[180] Certain "tools" are appropriate for certain points along the spectrum, but not other points. For example, a State might find it inappropriate to bring warships into a harbor during negotiations of a trade agreement but possibly appropriate if trying to resolve a border dispute. Under such a spectrum, one can imagine WMD having an appropriate use only in terminating a "total war."

That does not limit the importance of WMD, though. WMD plays a more critical role as a surrogate for open warfare. This explanation relies not on the military doctrines of von Clausewitz or Lee Kennett, but rather on the work of animal behaviorist Konrad Lorenz. In his book, On Aggression, Lorenz argues that there is a phylogenetic ritualization of behaviors which, despite the aggressive appearance, are actually a survival instinct in which one diverts aggression "into harmless channels, and to inhibit those of its actions that are injurious to the survival of the species.[181] The possession of WMD – nuclear, biological, and chemical weapons – is merely such a ritualized behavior, intended to divert otherwise dangerous, aggressive behaviors.

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[179] This spectrum should not be confused with Wickham Steed's definition of history as War, Non-War, and Peace. (see p.46)
[180] Peter Paret, Understanding War -- Essays on Clausewitz and the History of Military Power, Princeton Paperbacks ed. (Princeton: Princeton University Press, 1992).
[181] Konrad Lorenz, On Aggression (New York: MJF Books, 1963).

Consider for a moment the history of the use of WMD in the twentieth century. Aside from the use of mustard gas in World War I, the use of biological weapons against civilians in Manchuria by the Japanese in World War II, and the use of chemical weapons during the Iran-Iraq War, the only *notable* use of WMD has been the U.S. dropping of atomic weapons at Hiroshima and Nagasaki. But the infrastructure to produce, test, and stockpile such weapons is enormous and incredibly costly. There must be a reason other than military expediency for such weapons.

Weapons of Mass Destruction are a symbol, an icon of status in the late 20th century and early 21st century, what Umberto Eco would call a semiotic device – a sign. "These signs are not only words, or images, they can also be forms of social behavior, political acts, artificial landscapes."[182] The symbolism of WMD, though, is still a largely unstudied phenomenon. Here, symbolism can also be considered as "ritual," or "strategic culture" – "shared beliefs, assumptions, and modes of behavior, derived from common experiences and accepted narratives.(both oral and written), that shape collective identity and relationships to other groups, and which determine appropriate ends and means for achieving security objectives."[183] This follows the hypothesis of Italian philosopher Giorgio Agamben, who argues that sovereign culture has transplanted the "bare life" of

[182] P. xi, Umberto Eco, Travels in Hyperreality (London: Pan Books, Ltd., 1986).
[183] Kerry M. Kartchner, Weapons of Mass Destruction and the Crucible of Strategic Culture (Defense Threat Reduction Agency, 2006).

the sacred man (*homo sacer*) – replacing the survival of man for the survival of humanity.[184]

Under such a semiotic formulation, tests of nuclear weapons become something beyond the physics package and the resultant detonation. Tests *become* the symbol. As Lorenz argued, the tests become aggression diverted into apparently harmless (albeit potentially megaton) channels. An interesting correlation is theoretically possible. If nuclear weapons have a role beyond their explosive potential, then nuclear tests may also have a role beyond testing the explosive potential. Certainly many, if not most nuclear tests were conducted to ensure that the weapons were effective or safe. But the U.S. conducted 1030 nuclear tests from 1945 until 1992; the Soviet Union and Russia conducted another 715 tests. There were also extended periods of test moratoria, suggesting that tests were not an absolute technical necessity. Tests, therefore, could be a barometer of political frustration on the international front. Compared with tests of chemical or biological weapons, nuclear tests are easy to measure. Successful tests can be measured by their seismic signals[185] and nuclear test preparations are long and involved processes, easily detectable. Nuclear tests could be a sign of bilateral political displeasure, easily monitored and conceivably easily understood.

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[184] Giorgio Agamben, Homo Sacer - Sovereign Power and Bare Life, Meridian - Crossing Aesthetics, eds. Werner Hamacher and Daniel E. Wellbery (Stanford: Stanford University Press, 1998).
[185] P. 185, William E. Burrows, Deep Black -- Space Espionage and National Security (New York, New York: Random House, 1986).

If nuclear tests represent "war by other means," the number of nuclear tests should reflect the political climate between the two superpowers of the age: The United States and the Soviet Union. The Bulletin of Atomic Scientists has such a measurement of political climate – the "minutes to midnight" clock putatively illustrating the nearness of nuclear annihilation. The clock has existed almost since the very first nuclear bomb detonation. Theoretically, the closer the minute hand is to midnight, the closer the world is to nuclear war. There should, then, be a correlation between the number of nuclear tests and how near "the clock" is to midnight.

Figure 1 illustrates the results of such a barometer. The left side vertical axis measures the annual total of U.S. and USSR nuclear tests, from zero to 200. The right side vertical axis measures minutes to midnight, from 11:30 to 12 midnight (11:30 being the same as 30 minutes to midnight). The horizontal axis shows the number of combined nuclear tests by year, beginning in 1948 and continuing through 1992, the last year of a nuclear test by either the U.S. or the Soviet Union/Russia. While there are some peaks of the minutes to midnight line which seems to be reflected in the number of nuclear tests (the period between 1957 and 1962, for example), for the most part there is little correlation between the two graphs. That lack of visual correlation is reflected in the statistical analysis which provides us with a coefficient of determination, R Squared, value of .018 – a very small correlation value. This does not mean, of course, that the theory is wrong, only that the case study does not directly support the theory. The fact that both the

United States and the Soviet Union recognized test moratoria during the 45-year period suggests that nuclear tests have some purpose besides ensuring that the devices work.[186]

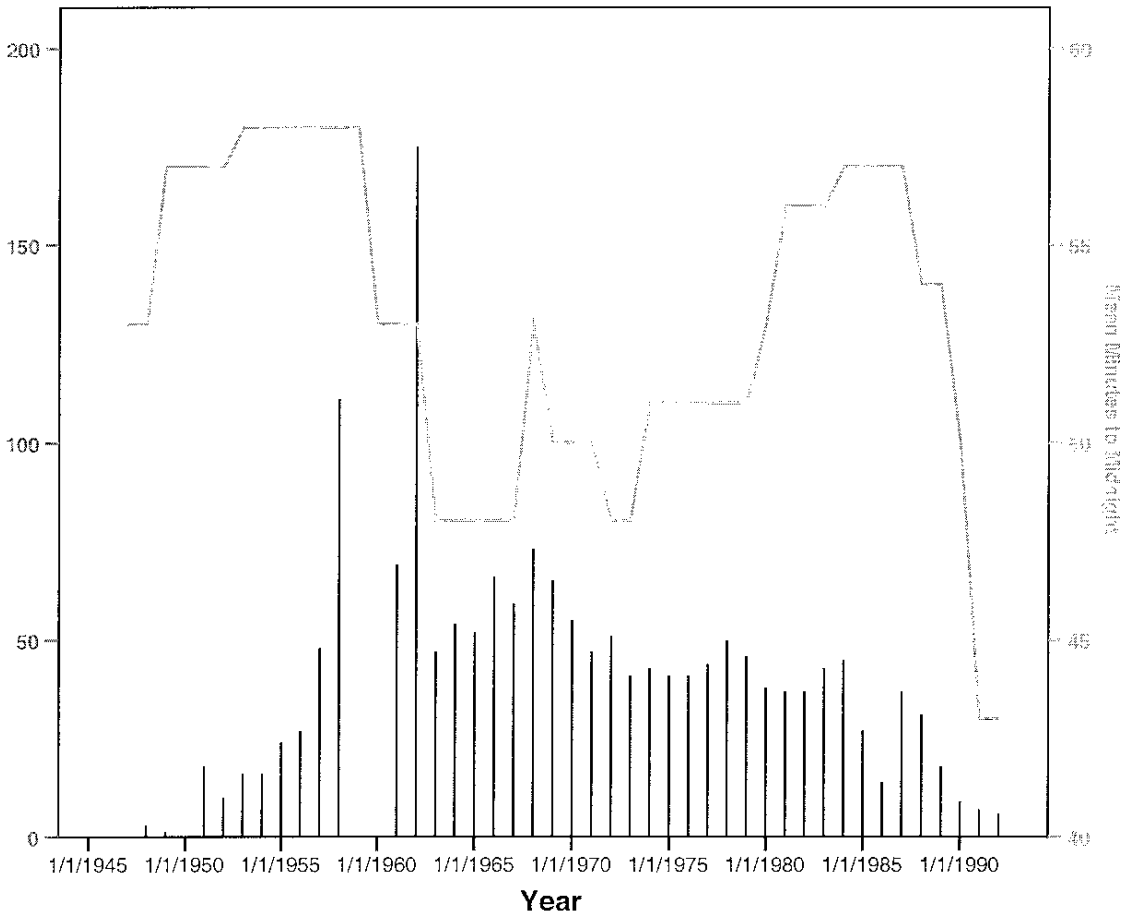

Figure 1. Minutes to Midnight, 1948-1992[187]

[186] Department of Energy, United States Nuclear Tests: July 1945 through September 1992, DOE/NV-209 (Rev 14) (Oak Ridge: Office of Scientific and Technical Information, 1994).
[187] SPSS, "SPSS 14.0," (Chicago: SPSS, Inc., 2005).

Chapter 6

The Impact of Arms Control

"Germany, Italy and Japan are well prepared by specialized training, production facilities and natural resources to engage in immediate unrestricted use of gas. These nations have repeatedly violated treaties for reasons of military expediency. In Ethiopia and China, both parties to the Geneva Gas Protocol but unequipped to retaliate in kind, gas attacks were freely made by Italy, herself party to the Protocol, and Japan respectively. Regardless of treaty obligations the only effective deterrent is fear of retaliation which we must maintain, through active preparation and constant readiness. A statement at this time that our Government is prepared, on a basis of reciprocity, to observe the terms of the Geneva Protocol might, through introduction of domestic, political, and moral issues, impede our preparation, reduce our potential combat effectiveness and be considered, by our enemies, an indication of National weakness."

Secretary of War Henry L. Stimson's response to a query by Secretary of State Cordell Hull as to whether the United States should declare its adherence to the principles of the Geneva Protocol, February 18, 1942[188]

[188] P. 217, John Ellis van Courtland Moon, "U.S. Biological Warfare Planning and Preparedness," Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945, eds. Erhard Geissler and John Ellis van Courtland Moon, vol. 18, SIPRI Chemical and Biological Warfare Series (Oxford: Oxford University Press, 1999).

It is a legitimate question to ask what the impact of arms control had on BW programs. This is actually a two-edged question. First, did arms control negotiations and agreements have any impact on a State wishing to have a BW program? And second, did arms control negotiations provide any insight into a State's programs or interest in a BW program?

The International Committee of the Red Cross identifies thirty different treaties and documents as forming the corpus of international humanitarian law concerning methods and means of warfare.[189] There are several treaties of importance to any discussion of biological weapons and the prohibition of such weapons. These include, most prominently, the 1925 Protocol for the Prohibition of the Use of War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of War (commonly referred to as the 1925 Geneva Protocol) and the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction (commonly referred to as the BWC or BTWC). However, the first attempts to control the use of biological means of warfare can be traced back to the unratified Brussels Declaration of 1874 and the Hague Peace Conferences of 1899 and 1907, and other treaties also have a relevance to this discussion.

[189] International Committee of the Red Cross, International Humanitarian Law -- Treaties and Documents, 2006, Available: http://www.icrc.org/ihl.nsf/TOPICS?OpenView.

The Declaration of St. Petersburg

Prior to the Brussels Declaration, was the 1868 Declaration of St. Petersburg (Russia), signed by 20 nations, which prohibited "the employment of arms which uselessly aggravate the sufferings of disabled men or render their death inevitable . . . as contrary to the laws of humanity." This language was frequently used at later conferences to support the "unnecessary suffering" principle and to argue against the use of gas warfare or the use of poisons.[190] But, in reality, the calling of the conference was the result of an earlier memorandum discussing the development of a new type of bullet (the so-called "dumdum" bullet) which exploded on contact with hard substances (used to blow up military and ammunition wagons) but which was modified to explode on contact with soft surfaces, i.e., a human body. The humanitarianism of the St. Petersburg Declaration becomes questionable when one refers to the some of the clauses of the final declaration: "That the only legitimate object which states should endeavour to accomplish during war is to weaken the military forces of the enemy; That for this purpose *it is sufficient to disable the greatest possible number of men.*"[191] (emphasis added) This reads more like the endorsement of weapons of mass destruction, not a declaration to assuage needless suffering.

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[190] Central Intelligence Agency, Disarmament: Chemical-Biological Warfare Controls and Prospects for Improvement.

[191] P. 5, A. Pearce Higgins, The Hague Peace Conferences and Other International Conferences Concerning the Laws and Usages of War -- Texts of Conventions with Commentaries (Cambridge: Cambridge University Press, 1909).

The Brussels Declaration

Called by Czar Nicholas II of Russia, The Brussels Declaration is considered to be one of the first attempts at the codification of the laws of war. Early drafts of the Brussels Declaration of 1874 included the prohibition of "the spreading, by any means whatsoever, of disease on enemy territory."[192] This prohibition was removed from later drafts because some delegates reportedly believed the clause was made redundant with the prohibition on poison and poisoned weapons. The Declaration was never ratified for a number of reasons: "the British Government declined to accept the Declaration on the ground that the Articles contained many innovations, while Germany saw in some of its rules, a condemnation of her recent practices in the conduct of the Franco-German war."[193]

The Hague Conferences of 1899 and 1907

According to the U.S. Arms Control and Disarmament Agency, "In the late 19th century the control of armaments took on new importance. The techniques of industrialization applied to the manufacturing of weapons, mounting imperialist rivalries, nationalism, competing alliance systems – all contributed to an increasingly dangerous and costly arms race."[194] Consequently, Tsar Nicholas II convened the International Peace

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[192] P. 37, Mark Wheelis, "Biological Sabotage in World War I," Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945, eds. Erhard Geissler and John Ellis van Courtland Moon, vol. 18, SIPRI Chemical & Biological Warfare Studies (Oxford: Oxford University Press, 1999).
[193] P. 258, Higgins, The Hague Peace Conferences and Other International Conferences Concerning the Laws and Usages of War -- Texts of Conventions with Commentaries.
[194] P. 3, U.S. Arms Control and Disarmament Agency, Arms Control and Disarmament Agreements -- Texts and Histories of the Negotiations, 6 ed. (Washington, D.C.: U.S. Government Printing Office, 1990).

Conferences in The Hague in 1899 and 1907. The Conferences helped codify the rules of war and helped establish institutions and procedures for settling international disputes.

Declarations signed at the 1899 conference prohibited the use of dum-dum bullets, asphyxiating gases, and the launching of projectiles from balloons or by other new methods of similar nature. The use of poison or poisoned weapons was forbidden by regulations annexed to both the 1899 convention and the 1907 Hague Peace Conference (the so-called "Convention IV")[195], and a convention prohibiting or restricting the use of specific automatic contact mines and torpedoes was adopted in 1907.[196] Twenty-seven States eventually ratified the Declaration. The United States did not ratify the Convention.

The Treaty of Versailles

The 1919 Treaty of Versailles, known as the *Versaillesdiktat* in Germany, is an example of arms control by mandate. In the aftermath of World War I ("The Great War"), the Allied forces demanded that Germany should cede some of its territories to neighboring countries[197] and that Germany must engage in large-scale disarmament. Reparation

[195] The Hague Convention of 1907 prohibited "the use of projectiles the sole object of which is the diffusion of asphyxiating or deleterious gases." Other means of disseminating gas were not illegal.
[196] P. 3-4, Arms Control and Disarmament Agency, Arms Control and Disarmament Agreements -- Texts and Histories of the Negotiations.
[197] Of significance to this dissertation, the region of Posen was ceded to Poland. See page 97.

payments were demanded of Germany on the grounds that it alone was responsible for World War I.[198]

The Allied terms of surrender for Germany ordered that Germany's army be reduced to 100,000 troops. (Germany had hoped for a negotiated reduction to 300,000.) Universal service was abolished and Germany's Great General Staff was abolished. The new German Army was not permitted to have aircraft, tanks, or heavy artillery. The period of military service was also reduced to twelve years for enlisted troops, and twenty-five years for officers. The German Navy also suffered major reductions. The fleet was reduced to a few cruisers and a few old ships of the line, underwater craft were banned, and personnel were reduced to 15,000 men.[199] Remarkably, when the numbers of weapons found in Germany were fewer than the numbers estimated by the Inter-Allied Control Commission, the Commission ordered the Germans to manufacture new armaments in order to then destroy them![200]

Did the magnitude of the demilitarization mandate drive the Germans to pursue other types of military defense for national security, including biological weapons? If one accepts some of the common arguments in favor of BW programs, such as deterrence on the cheap, one might say yes. Such an opportunity of preserving "the possibility of a military resurrection" was a strong consideration when Germany accepted the strictures

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[198] P. 267, German Bundestag Press and Information Centre, Questions on German History -- Ideas, Forces, Decisions -- from 1800 to the Present (Bonn: German Bundestag Press and Information Centre, 1984).
[199] P. 215, Walter Goerlitz, History of the German General Staff -- 1657-1945, trans. Brian Battershaw, 1st ed. (New York: Praeger, 1952).
[200] Whaley, Covert German Rearmament, 1919-1939: Deception and Misperception.

of the Versailles treaty.[201] But, if John Buchan's "anthrax letter" in Mr. Standfast[202] is based on fact, then Germany was pursuing BW prior to the Versailles Treaty and some other force besides an inexpensive deterrence option was probably driving the German program.

As a lesson in unintended consequences[203], the Treaty of Versailles must rank in the first tier. The terms of the surrender were so harsh that Germany immediately began preparing options for violating the treaty. Domestically in Germany, the Treaty terms pushed forward a number of social problems which rapidly culminated in strikes, the end of the Weimar Republic[204], and the rise of Adolf Hitler and the Nazis in the vacuum that followed.[205] Internationally, the acceptance of the Treaty was, at best, lukewarm; none of the delegates, reportedly, liked the terms[206] and President Wilson, for one, saw its sole saving grace as being the possibility of modifying the agreement in the future.[207]

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[201] Goerlitz, History of the German General Staff -- 1657-1945.
[202] Buchan, The Complete Richard Hannay.
[203] One of the rarely acknowledged consequences of the Versailles Conference was the snubbing of efforts by Japan to be an equal party with the western nations. Japan sought unsuccessfully to obtain a declaration of racial equality from the Conference. This has been noted as part of "a policy of gratuitous insults to America's Pacific rival." P. 61, Patrick Glynn, Closing Pandora's Box -- Arms Races, Arms Control. And the History of the Cold War (New York: Basic Books, 1992).
[204] Centre, Questions on German History -- Ideas, Forces, Decisions -- from 1800 to the Present.
[205] Adolf Hitler, Mein Kampf -- the Unexpurgated Edition, trans. Ludwig Lore (New York City: Stackpole Sons, 1939).
[206] P. 336, Steed, Through Thirty Years, 1892-1922, Vol. II.
[207] Chapter XI-XII, Alexander L. George and Juliette L. George, Woodrow Wilson and Colonel House: A Personality Study (New York: Dover Publications, Inc., 1964).

The 1921 Conference on the Limitation of Armament

In the winter of 1921, The United States hosted the Conference on the Limitation of Armament and the Problems of the Pacific. Attending were representatives of the United States, the British Empire, France, Italy, and Japan, known as the Principal Allied and Associated Powers. As its name suggests, the Conference had two separate and competing agendas: the limitation of armaments and resolving issues related to the Pacific, specifically solving "questions relating to China"[208] – what other observers of the day termed the antagonisms of the "yellow peril" and the "white peril."[209] The arms limitation agenda for the Conference considered four different issues: a limitation of the number, character and use of aircraft; the use of submarines in warfare; the utilization of poisonous gases[210]; and rules for the conduct or war. While the phrase "weapons of mass destruction" had not yet been coined, to a great extent, the Conference was one of the first gatherings to consider the impact of WMD upon unarmed populations. And, in perhaps a first nod to the now-current concern over "dual use" technology, the Conference found it "impracticable to adopt rules for the limitation of aircraft in number, size, or character, in view of the fact that such rules would be of little or no value unless the production of commercial aircraft were similarly restricted."[211]

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[208] P. 505, James Brown Scott, "Conference on the Limitation of Armament and Problems of the Pacific," The American Journal of International Law 15.4 (1921).

[209] P. 138, Yamato Ichihashi, The Washington Conference and After (Stanford University: Stanford University Press, 1928).

[210] Referred in the treaty text as "asphyxiating, poisonous or other gases, and all analogous liquids, materials or devices." "Treaty between the United States of America, the British Empire, France, Italy and Japan for the Protection of the Lives of Neutrals and Non-Combatants at Sea in Time of War, and to Prevent the Use in War of Noxious Gases and Chemicals," (1922).

[211] P. 39, "Address of the President of the United States Submitting the Treaties and Resolutions Approved and Adopted by the Conference on the Limitation of Armament," The Conference on the Limitation of Armament (Washington, D.C.: Government Printing Office, 1921- 1922).

The discussion concerning unnecessary suffering is enlightening with respect to the WMD argument and the decision by the United States to begin a BW program during World War II. The General Board of the U.S. Navy, responding to questions from the Conference said

> "[T]wo principles in warfare, (1) that unnecessary suffering in the destruction of combatants should be avoided, (2) that innocent noncombatants should not be destroyed, have been accepted by the civilized world for more than one hundred years. The use of gases in warfare in so far as they violate these two principles is almost universally condemned today, despite its practice for a certain period during the world war . . . Moreover, the diffusion of all these gases is practically beyond control and many innocent non-combatants would share in the suffering of the war, even if the result did not produce death or permanent disability . . .Gas warfare threatens to become so efficient as to endanger the very existence of civilization."[212]

General John "Black Jack" Pershing, serving as Chairman of the Subcommittee on Land Armament of the Advisory Committee, offered a resolution of similar finality, but also one that clearly connected the relationship between poison gases and biological weapons:

> "Resolved, That chemical warfare, including the use of gases, whether toxic or nontoxic, should be prohibited by international agreement, and should be classed

[212] P. 734-735, "Committee on Program and Procedure with Respect to Limitation of Armament," Conference on the Limitation of Armament (Washington, D.C.: Government Printing Office, 1921-1922).

with such unfair methods of warfare as poisoning wells, introducing germs of disease, and other methods that are abhorrent in modern warfare."[213]

The British representative, Mr. Arthur James Balfour, objected to the belief of the French that all parties were interested in banning the use of poisonous gases in war. Mr. Balfour stated that the British Delegation "believed there was no use in trying to limit the use of instruments in the hands of belligerents during the stress of warfare, when *obedience to such regulations would only be rewarded by unfair advantage being taken of them by an unscrupulous enemy*." [214] [emphasis added] The Secretary General of the Committee countered that "the matter required examination because the sense of humanity had been outraged."[215] Elihu Root[216], in presenting the Treaty text to the Senate for ratification, put the argument in an optimistic context: "Cynics have said that in the stress of war these rules will be violated. Cynics are always near-sighted, and often and usually the decisive facts lie beyond the range of their vision."[217]

The Conference's greatest contribution to international security, however, may have been in its role as a loose "association of nations" – a concession to President Harding after the

[213] P. 732, "Committee on Program and Procedure with Respect to Limitation of Armament."
[214] P. 412, "Committee on Program and Procedure with Respect to Limitation of Armament."
[215] P. 414, "Committee on Program and Procedure with Respect to Limitation of Armament."
[216] U.S. Secretary of War (1899-1904), U.S. Secretary of State (1905-1909). 1912 Nobel Peace Prize.
[217] P. 38, "Address of the President of the United States Submitting the Treaties and Resolutions Approved and Adopted by the Conference on the Limitation of Armament."

U.S.'s failure to join the League of Nations[218], but an important step eventually resulting in the United Nations.

The Geneva Protocol of 1925

The 1925 Geneva Protocol was drawn up and signed at the conference for the supervision of the international trade in arms and ammunition, held in Geneva under the auspices of the League of Nations from 4 May to 17 June 1925. The conference adopted a convention for the supervision of the international trade in arms, munitions and implements of war which has not entered into force and, as a separate document, a protocol on the use of gases. The protocol refers back to The Hague Declaration concerning asphyxiating gases of 29 July 1899 and the Treaty of Versailles of 28 June 1919 as well as the other peace treaties of 1919. The United Nations General Assembly has adopted several resolutions in which it calls for strict observance by all states of the principles and objectives of the Geneva Protocol of 1925.[219]

What was the impact of the Geneva Protocol on countries interested in pursuing biological weapons? The cynic would say none. Theodor Rosebury and Elvin Kabat in their benchmark survey, Bacterial Warfare, were "impressed with the virtually unanimous *unbelief* in their effectiveness, expressed or implied."[220] [emphasis added] Of the seven countries believed to have pursued biological weapons in the period between

[218] P. 296, Quincy Wright, "The Washington Conference," The American Political Science Review 16.2 (1922).
[219] P. 116, Dietrich Schindler and Jiri Toman, eds., The Laws of Armed Conflicts: A Collection of Conventions, Resolutions and Other Documents (Aphen aan den Rijn: Sitjhoff & Nordhoff, 1981).
[220] P. 10, Rosebury, Kabat and Boldt, "Bacterial Warfare."

the two World Wars (Canada, France, Germany, Japan, UK, US, USSR)[221], only two (the United States and Japan[222]) had not ratified the treaty before beginning its BW research program.[223] As will be discussed later, the head of the Japanese program identified the near universality of the Protocol as being to Japan's advantage, since countries would be barred from using biological weapons and would be defenseless.[224] In fact, this assumption proved false for a number of reasons.

Some in Germany argued that agreements like the *Versaillesdiktat* and the Geneva Protocol should have no impact when considering national security and national survival. Professor Ewald Banse argued: "True, the League of Nations, with sanctimonious mien, has forbidden this means of warfare. But when the existence of the nation is at stake, 'every method is permissible to stave off the superior enemy and vanquish him.'"[225]

Many countries took reservations to the treaty. Canada, France, the United Kingdom, and the Soviet Union all took reservations to the Protocols as:

- Binding only as regards relations with other countries; and

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[221] Geissler and Moon, eds., Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945.
[222] Both the United States and Japan were signatories of the Protocol in 1925, but neither ratified the agreement until the 1970s.
[223] An eighth country, Italy, was suspected of having a BW program during World War II, according to a U.S. Chief of Naval Intelligence report, "Naval Aspects of Biological Warfare." Hal Gold, Unit 731 Testimony (Boston: Tuttle Publishing, 1966) p.92.
[224] P. 81, Guillemin, Biological Weapons -- from the Invention of State-Sponsored Programs to Contemporary Bioterrorism.
[225] Frederick T. Birchall, "Reich Is Thinking of War Despite Its Talk of Peace," New York Times October 8, 1933 1933.

- To cease to be binding with regard to any enemy States whose armed forces or allies do not observe provisions.

The United States took a reservation "to cease to be binding as regards use of chemical agents[226] with respect to any enemy State whose armed forces or allies do not observe provisions."[227] In fact, forty-two of the State Parties to the treaty took reservations with the treaty to allow them to perhaps use biological weapons in a future conflict without violating their perception of the treaty's protocols.

It quickly became apparent to many that there were significant loopholes to the treaty. A once-classified examination by the Central Intelligence Agency of the Geneva Protocol portrayed the situation as: "Few documents of international law have experienced the difficulties of interpretation, however, that have surrounded the Geneva Protocol."[228] For example, the French argued that the language of the Protocol outlawed only specific classes of agents: those intended to kill or permanently disable. Incapacitating agents would be legal by the French interpretation. Certain fungi, rickettsiae, and viruses also fell into the realm of legal interpretation.[229]

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[226] Chemical weapons were presumably specified by the United States since it had already shut down its BW program by the time it ratified the treaty in 1975 and could no longer retaliate in kind.
[227] P. 19, Arms Control and Disarmament Agency, Arms Control and Disarmament Agreements -- Texts and Histories of the Negotiations.
[228] P. 6, Central Intelligence Agency, Disarmament: Chemical-Biological Warfare Controls and Prospects for Improvement.
[229] When President Nixon shut down the U.S. BW program in 1969, he also faced this question of definitions and needed to put out later a second statement declaring that toxins also fell into the general BW ban.

The United Nations took up the charge against biological weapons and other forms of WMD in 1948 when the Security Council's Committee for Conventional Armaments passed a resolution on August 12 declaring "weapons of mass destruction should be defined to include atomic explosive weapons, radioactive material weapons, lethal chemical and biological weapons . . ."[230]

The Biological Weapons Convention of 1972

Deficiencies of the Geneva Protocol of 17 June 1925 and the wish to prohibit not only the use but also the production and stockpiling of biological and chemical weapons induced the UN General Assembly and the Committee on Disarmament to take up the issue controlling biological weapons. The Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction was drafted by the Committee on Disarmament and recommended for adherence by Resolution 2826 of the General Assembly on 16 December 1971. It is limited to biological weapons but, curiously, does not prohibit the *use* of biological weapons but only the development, production and stockpiling of such weapons (presumably based on the logical conclusion that a country can not use what is does not have and can not produce). The inclusion of chemical weapons proved impossible as no agreement on international supervision could be attained.[231] According to the International Committee of the Red Cross, international supervision of the production and

[230] Central Intelligence Agency, Disarmament: Chemical-Biological Warfare Controls and Prospects for Improvement.
[231] P. 137-142, Schindler and Toman, eds., The Laws of Armed Conflicts: A Collection of Conventions, Resolutions and Other Documents.

stockpiling of biological weapons seemed to be dispensable as it was assumed that the use of such weapons would have no immediate military advantage.[232]

Any assumption that the BWC ended the interest in biological weapons of every nation should be immediately dispelled. Perhaps because there was no mechanism to ensure compliance with the treaty, certain countries either continued or initiated programs in biological weapons. The Soviet Union, for example, not only continued its program, but expanded it after signing the Convention in 1972.[233] Other countries which are believed to have had offensive BW programs while Parties to the BWC include: China, Cuba, Iran, Iraq, and Syria (a signatory).[234]

In any case, the role of arms control agreements seemed to have little effect in limiting the development or potential use of biological weapons in war. But, let us return to the original two-edged question. Do arms control negotiations give us any insight into a country's intent regarding biological weapons? Presumably, a country enters arms control negotiations under its own free will. A country should enter negotiations to control a class of weapons because of altruistic goals – it wants to be (or feel) safer than it would feel if the weapons were allowed to flourish. Indirectly, the country wants the world to be a safer place, but it can be safely assumed that any country's first priority is its own security and safety. Accepting that premise as the basis of negotiations, a country

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[232] International Committee of the Red Cross, International Humanitarian Law -- Treaties and Documents.
[233] Alibek and Handleman, Biohazard -- the Chilling True Story of the Largest Covert Biological Weapons Program in the World -- Told from inside by the Man Who Ran It.
[234] U.S. Department of State, Adherence to and Compliance with Arms Control, Nonproliferation and Disarmament Agreements and Commitments (Washington, D.C.: U. S. Department of State, 2005).

would have essentially two goals in mind in any negotiation: increase its security by eliminating, with reasonable assurance[235], a current or future threat; or, ensure that the current level of national security is not jeopardized. Consequently, a country's objective in any arms control negotiation may not be to prohibit a weapon threat but rather to ensure the country's ability to respond to a threat is not sacrificed. However, an inability or unwillingness to recognize this objective by the other negotiating countries may put the negotiations at peril. Thus, the U.S. efforts during the 2001 BWC Review Conference to block the proposed inspection protocols were seen by the international community as an attempt by the U.S. to sabotage the BWC, rather than as an effort to protect national security installations and pharmaceutical industry proprietary secrets.

[235] Or, in the lexicon of Ronald Reagan, "Trust, but Verify."

Chapter 7

The BW Dominoes

> "The whole fury and might of the Enemy must very soon be turned upon us. Hitler knows that he will have to break us in this island or lose the war. If we can stand up to him, all Europe may be free and the life of the world may move forward into broad sunlit uplands. But if we fail, then the whole world, including the United States, including all that we have known and cared for, will sink into the abyss of a new Dark Age made more sinister, and perhaps more protracted, by the lights of perverted science."
>
> Sir Winston Churchill
>
> Address to the House of Commons
>
> London, June 18, 1940[236]

This chapter is not intended as a history of biological weapons programs. Rather, it is intended as a discussion of some of the perceptions which drove the initiation of BW programs in the early part of the twentieth century. As such, it will not discuss all the programs that existed or were initiated on the years between the two world wars. Firstly, the amount of information available on programs such as France or Italy is extremely

[236] Paul Halsall, "Modern History Sourcebook: Winston Churchill: "Their Finest Hour"," Internet Modern History Sourcebook (New York: Fordham University, 1998).

limited[237] and, secondly, it is sufficient for this discussion to draw only the relationships between the six main programs of the era: Germany, Japan, the Soviet Union, and the tripartite program of Canada, the United Kingdom, and The United States.

It is necessary, however, to first define and limit the parameters of a national BW program. For the purpose of this study, a national BW program is a biological weapons program intended to be part of a nation's strategic military program. This both expands and limits the size and complexity of programs to be discussed. It is not necessary, for example, for a national program to be funded by national revenues – but it does have to have a budget line to pay bills. This limits any impromptu nature of "contingency warfare". Nor does it necessarily have to be approved by national leadership – as long as it is intended for use as a military weapon and its existence is known and planned for by its military leadership. It does, therefore, require a doctrine and operational plan. This also limits the scope of what is meant by a biological weapons program. Most of the ancient historical examples of the use of so-called biological weapons are, properly, excluded. First of all, many of the reported uses of biological "weapons" pre-twentieth century are poorly documented and may be fanciful. Secondly, these uses – whether catapulting carcasses over castle walls or dropping dead livestock into drinking water supplies – seem to be impromptu, tactical uses of possible pathogenic agents, not the deliberate and planned use of biological agents.[238] For a program to be strategic in scope

[237] Geissler and Moon, eds., Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945.
[238] One possible exception to this occurred in 1763 involving the use of smallpox-infected blankets by the British Army at Fort Pitt to infect the local Delaware Indian tribe. The fact that a Captain Ecuyer had to

there needs to be a research and development effort in order to maximize the potential of the pathogen, no matter what pathogen is used. Even if a BW agent was obtained from another source, somewhere along the procurement chain was a center of R&D, even if not identified as such. I will not attempt to define what is required for a biological agent to become a military weapon. Weaponization can cover a large number of armaments and delivery systems, ranging from the very simple (like smallpox-laden blankets) to highly complex aerosol and bomblet dispersal systems. Types of weaponization are an immaterial distinction for this study.

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sign a receipt for the infected blankets suggests at least some sort of planning (or an overly-officious bureaucrat). Wheelis, "Biological Warfare before 1914," p.23. But this, too, was a tactical employment of BW, albeit in support of a strategic end, but not a strategically-planned employment of a weapon.

Germany

Germany had a biological weapons program during World War I aimed at sabotage.[239] The program was based on anti-livestock and anti-crop pathogens and included plans to use Glanders against horses in the United States. Anthrax was used to infect horses and mules in New York and other cities in 1915 and 1916 using "Negroes in German pay 'jabbing horses and mules as they came close.'"[240] There were allegations that tetanus was used against Americans as part of Germany's espionage campaign against the U.S. prior to its joining the war. Dr. Karl von Lewinski, chief counsel for Germany before the German-American Mixed Claims Commission claimed "it was fantastic to assert 'that human life was endangered'" because, Dr. Lewinski contended, "anthrax germs are not harmful to human beings."[241] Weaponization was extremely simple. No record of a dedicated German offensive BW research and development program before or during World War I has been identified.

No confirmed attempts to use BW against combatants during World War I were ever identified, but there were many unconfirmed allegations. There was the alleged incident in John Buchan's novel, Mr. Standfast.[242] [243] As mentioned earlier, there was a French report that Germany may have attempted to use *Glanders bacilli* on the Western Front in 1916, but the report had no details and was doubted by Thedor Rosebury, then a scientist at Camp Detrick and, presumably, in a position to know what information the U.S. may

[239] P. 35, Wheelis, "Biological Sabotage in World War I."
[240] "Says Germans Used Disease Germs Here," New York Times September 24, 1930 1930.
[241] Kuhn, "Germany Admits to Use of Bombs and Germs Here in 1915 and 1916."
[242] See chapter 4, Wickham Steed Fans the Embers
[243] Buchan, The Complete Richard Hannay.

have had on such an incident.[244] Germany, for its part, claimed that France "applied bacteriological cultures to their prisoners of war in Germany for poisoning cattle and grain. 'the devilish plan miscarried'. . .but the idea offers possibilities for the next war."[245]

One interesting aspect of the German sabotage program in World War I was that it was not directed at the enemy it was fighting, but rather at "secondary" nations supporting the war on the side of the allies. Thus, the United States was an early target, as were Argentina, Romania, Norway, and possibly Spain. This possibly indicates a curious "calculus" on the part of the German General Staff and its understanding of biological weapons. Were biological weapons viewed as something other than military arms? Was sabotage considered as something not falling under the generally accepted Laws of War as developed and practiced since the Middle Ages? How did the German General Staff view BW and its use in war? An understanding of this question might help us to understand why Nazi Germany did not (or did) use BW during World War II.

An examination of the German General Staff's reaction to the Armistice ending World War I might be indicative of their view. Walter Goerlitz describes the Emperor's abdication, under pressure of President Woodrow Wilson, as the destruction of the monarchy, the Prussian Army, the General Staff, the Military Cabinet and all the other

[244] Kaempffert, "Deadly Germs Described."
[245] Birchall, "Reich Is Thinking of War Despite Its Talk of Peace."

extra-constitutional institutions dependent directly on the Crown."[246] General Ludendorff complained to Sir Neil Malcolm, a British General, that the German people were no longer deserving of its military and that he had been stabbed in the back by the surrender. If the German military establishment felt such a heavy betrayal, it may be reasonable to think they might seek a weapon that would prevent such a cost in the future – a weapon of mass destruction.

As will be noted frequently throughout this study, legal barriers did not prevent the development and use of biological agents by any of the belligerents desiring to pursue such ends in either World War. The German General Staff, in fact, specifically prohibited the use of biological weapons during the period of World War I. The 1902 General Staff handbook on land war stated that "certain means of war which lead to unnecessary suffering are to be excluded. To such belong: the use of poison both individually and collectively (such as poisoning of streams and food supplies). [;] . the propagation of infectious diseases."[247] Despite this prohibition, the German military employed both chemical and biological weapons during World War I and possibly continued the programs through World War II.

As discussed in the chapter on Wickham Steed, a question that remains to this day is what happened to the German program in the inter-war period? Did the program continue and expand in its sophistication, as Steed suggested in his writings? Was the

[246] P. 200, Goerlitz, History of the German General Staff -- 1657-1945.
[247] P. 37, Wheelis, "Biological Sabotage in World War I."

program halted when Hitler took over as Chancellor? Did it continue unabated but was never employed? Or, in fact, did Germany use BW against Allied forces on more than one occasion, as some suggest? Some contemporary writers state, without documentation, that Nazi Germany did not have a BW program during World War II because Hitler was opposed to BW, ostensibly because of the fact that he had been a victim of poison gas while fighting in World War I.[248] [249] If true, it took some time for that antipathy to reach Hitler's consciousness. It was not until May 1942 that Hitler directed that German BW research would be strictly confined to defensive work only.[250] The fact that the German General Staff reportedly issued two more proscriptions against offensive research before Hitler repeated his ban in March 1943 suggests that German researchers may have continued offensive research without official guidance.[251] In any event, it is evident that the elements of an offensive biological weapons program existed in Germany both before, and after, any bans from the Nazi leadership.

In fact, *Generalarzt* Walter Schreiber, testifying at the Nuremberg Trials, claimed that in July 1943 a meeting took place at the High Command of the *Wehrmacht* in Berlin and "that as a result of the war situation the High Command authorities now had to take a different view of the question of the use of bacteria as a weapon in warfare from the one

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[248] P. 42, Guillemin, Biological Weapons -- from the Invention of State-Sponsored Programs to Contemporary Bioterrorism.

[249] P. 99, Erhard Geissler, "Biological Warfare Activities in Germany, 1923-45," Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945, eds. Erhard Geissler and John Ellis van Courtland Moon, vol. 18, SIPRI Chemical & Biological Warfare Studies (Oxford: Oxford University Press, 1999).

[250] P. 87-88, Simon M. Whitby, Biological Warfare against Crops, Global Issues Series, ed. Jim Whitman (Houndsmills: Palgrave, 2002).

[251] Multiple proscriptions on BW R&D are not that unusual, as we shall see later with the United States' program.

held up till now by the Army Medical Inspectorate. Consequently, the *Führer*, Adolf Hitler, has entrusted *Reichsmarschall* Hermann Göring to direct the carrying out of all preparations for bacteriological warfare, and had given him the necessary powers."[252]

Erhard Geissler argues that the Germany biological weapons program during World War II was motivated by its knowledge of the BW R&D activities of Canada, France, the UK, the U.S. and the Soviet Union.[253] [254] More specifically, some writers allege that the capture by Germany of four French BW-related laboratories in 1940 was the impetus behind the Nazi program.[255] This suggests there was a clear break between the World War I effort and the later effort. If Goerlitz is correct in his analysis of the Armistice reactions by the General Staff, this may be a correct assumption. However, if one looks at research being conducted in the German universities in the inter-War period, a different picture begins to emerge. Biology, as with most of the natural sciences, remained robust and Germany was widely considered the international leader from the 1920s until the Second World War.[256] Research into pathogens and other materials useful for biological weapons continued throughout this period.

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[252] P. 88, Nizkor Project, The Trial of German Major War Criminals, Volume 22, 1946, 14 July 2007.
[253] Recall that the allied BW program was supposedly begun because of perceptions of an active German BW program. The Soviets claim there program was established in response to the U.S program. Japan is apparently the only country that accepts its program as being its own, albeit in response to the 1925 Geneva Protocol.
[254] P. 95, Geissler, "Biological Warfare Activities in Germany, 1923-45."
[255] P. 512, John D. Hart, "The ALSOS Mission 1943-1945: A Secret U.S. Scientific Intelligence Unit," The International Journal of Intelligence and Counterintelligence 18.3 (2005).
[256] P.3, Ute Deichmann, Biologists under Hitler, trans. Thomas Dunlap (Cambridge: Harvard University Press, 1996).

For example, Walter Zimmermann at Tübingen was doing breeding research in the 1930s on the castor-oil plant.[257] This research was apparently intended for developing lubricants for airplane motors. But the extract from the castor bean is used to derive the protein cytotoxin ricin, frequently identified as a biological weapon for assassinations and wider dissemination.[258] Research work on "military use of carcinogenic substances" and "chemically tagged antigens" at the University of Göttingen was being conducted in 1942, ostensibly because it was believed the United States was already actively researching using cancer as a weapon.[259]

It has been suggested that the cancer research at Göttingen was simply a means to help prevent German scientists being drafted into the military and the supposed connection to American research was simply a ruse. More puzzling, though, is the cancer research reportedly being conducted at the Reich Institute for Cancer Research (*Reichinstitut für Krebsforschung*). The Institute was established in 1942 near Poznán in occupied Poland.[260] To this day, the institute's original purpose remains shrouded in mystery. From July 1943 to December 1944, the institute was funded to a level of 1.5 million Reichsmarks. Major funding came from the German Research Council and the *Kaiser Wilhelm Gesellschaft.*[261] Was this really a facility for researching cancer? It has been alleged that this was the center of Nazi Germany's BW program. The Center may have

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[257] P. 137, Deichmann, Biologists under Hitler.
[258] LTC Mark Kortepeter, ed., USAMRIID's Medical Management of Biological Casualties Handbook, Fourth ed. (McLean: International Medical Publishing, Inc., 2001).
[259] P. 173, Deichmann, Biologists under Hitler.
[260] This is likely the same facility identified by Geissler as the Zentralinstitut fur Krebsfoschung. Geissler, "Biological Warfare Activities in Germany, 1923-45," p.108. Poznán is referred to as Posen by Germans.
[261] P. 260-261, Robert N. Proctor, The Nazi War on Cancer (Princeton: Princeton University Press, 1999).

been created as a sop to the General Staff in exchange for the failed Nazi nuclear weapon program (recall the earlier hypothesis that the German General Staff sought a WMD capability in order to prevent another "Armistice situation").[262]

Professor Kurt Blome was designated by *Reichsmarshall* Hermann Göring to coordinate all biological and toxin research under the guise of cancer research at the Institute. Besides being a cancer researcher prior to the war, Blome had also been a chief critic of the German military for not responding to the mounting BW threat from the Allies.[263] Blome was willing to use human subjects to evaluate aerosols for dissemination as well as for vaccine efficacy, especially for plague. Blome claimed to ALSOS[264] interrogators that he had been directed by S*chutzstaffel* (SS*) Reichsführer* Heinrich Himmler to develop an offensive BW capability without Hitler's approval but, before Blome could begin, Russians captured the laboratory.[265]

A number of other facilities have been identified as being associated with Nazi offensive BW research and, possibly, production. It is notable that most of these facilities were ostensibly established for peaceful medical research and, in some cases, were established in occupied territory. This is an interesting phenomenon. It could be that Germany, like other BW state programs, wanted the research to be done safely away from its main

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[262] P. 10, Proctor, The Nazi War on Cancer.
[263] P. 103, Geissler, "Biological Warfare Activities in Germany, 1923-45."
[264] See page 122 for more on ALSOS. Note: ALSOS is not an acronym, but rather a pun on the name of General Leslie Groves. It is usually printed in capital letters.
[265] P. 12, Linda Hunt, Secret Agenda: The United States Government, Nazi Scientists, and Project Paperclip, 1945 to 1990 (New York: St. Martin's Press, 1991).

population centers. But placing a facility in a foreign nation, particularly an occupied land, should have placed the facilities at an undesirable risk of sabotage. Most significantly, though, is the fact that no German facility associated with its BW program apparently was identified as such by the Western Allies during the war.[266]

Koch Foundation – In May 1941, the military attaché in Berne, Switzerland reported that Germans were working on botulinum toxin at the Koch Foundation laboratories near Paris in occupied France. The Germans were reportedly working with French collaborators to develop the toxin to be dropped "in an inert container" from aircraft.[267] This claim is interesting in light of Wickham Steed's reporting of the Hugo Stoltzenberg pamphlet arguing for using "glass balls" to carry poisonous gases as well as "pear-shaped bombs of 20, 50, and 100 kilogrammes."[268]

The Kliewe Laboratory – Established in 1940 as a department of the Institute for General and Military Hygiene of the Military Medical Academy. This was a small lab with only three or four scientists. Despite its small size, Kliewe "continued French experiments on the combined use of chemical and biological warfare agents, studied the survival of different bacteria species dried in vacua[269], attempted to enhance the resistance to heat of

[266] P. 262, Geissler, Moon and Pearson, "Lessons from the History of Biological and Toxin Warfare."
[267] Sheldon H. Harris, Factories of Death: Japanese Biological Warfare, 1932-45, and the American Cover-Up (London: Routledge, 1994).
[268] P. 134, Steed, "The Future of Warfare."
[269] Vacua – the plural of vacuum

Bacillus anthracis by using ultraviolet irradiation and, after 1943, carried out a number of disinfectant experiments."[270]

The Sachsenburg Institute for Microbiology – Two institutes were established in October 1943 at this 12th century castle: one for Army microbiology and a second civilian branch of the Robert Koch Institute. The institutes were concerned with the possible natural or deliberate spread of plague from, and by, the Soviet Union. The institute's main product was the development and production of 60,000 doses and 76 liters of plague vaccine.[271] *Generalarzt* Professor Walter Schreiber, while a prison of war of the Soviet army, claimed during the Nuremberg trials that an offensive biological warfare plague program had been moved to Sachsenburg from the Reichinstitut at Poznán.[272]

The Insel Riems State Research Institute – This was the largest facility used for BW research in Nazi Germany. It was founded in 1909 for the study and treatment of Foot and Mouth Disease. It was located at Riems Island in the Baltic Sea. It was not primarily focused on offensive BW but may have provided FMD virus for use in open-air defensive experiments. There was great concern at the time that the Western Allies were intending to use FMD against German cattle. The facility also apparently did some work on Rinderpest, but with lackluster results.[273]

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[270] P. 107, Geissler, "Biological Warfare Activities in Germany, 1923-45."
[271] P. 107-108, Geissler, "Biological Warfare Activities in Germany, 1923-45."
[272] P. 88-90, Project, The Trial of German Major War Criminals, Volume 22.
[273] P. 109-110, Geissler, "Biological Warfare Activities in Germany, 1923-45."

The Kruft Potato Beetle Research Station – This facility, located near Koblenz, was a small facility where beetles were kept for dissemination experiments.[274] A March 1943 Nazi study revealed the significance of the potato beetle:

> "…considering the use of plant parasites, foremost would be the use of potato beetles against England where the defence against them has not been organized . . .England probably has about 400,000 hectares of potato fields for whose destruction 20 - 40 million beetles would be necessary."[275]

There was at least one report of German use of the Colorado beetle against potato crops in southern England. A prominent British naturalist who claimed to have been involved in defensive measures against the beetles said cardboard "bombs" containing between 50-100 beetles had been dropped on the Isle of Wight in 1943. The naturalist said that during the war the fact of the attacks was kept highly secret by the government in order to not raise alarm in the populace.[276]

The Institute for Entomology of the Waffen-SS and Police (Entomologisches Institut der Waffen-SS und Polizei) – This reportedly was a dual-use facility involved in the control of fleas, other insects and rats as well as BW research.

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[274] P. 110, Geissler, "Biological Warfare Activities in Germany, 1923-45."
[275] P. 86, Whitby, Biological Warfare against Crops.
[276] P. 223, Julian Perry Robinson, The Rise of CB Weapons, The Problem of Chemical and Biological Warfare, vol. I (New York: Humanities Press, 1971).

The Kaiser Wilhelm Institute for Horticultural Research (*Kaiser-Wilhelm-Institut für Kulturplanzenforschung*) – was founded in April 1943 to evaluate the use of weeds against enemy crops. The facility was bombed before research progressed and the weed project was apparently terminated.[277] Other institutes of the Kaiser Wilhelm Society have also been linked to research in both biological and chemical weapons. Researchers at the Kaiser Wilhelm Institute for Medical Research (*Kaiser-Wilhelm-Institute für Medizinische Forschung*) in Heidelberg have been directly implicated in Nazi Germany's BW program.[278]

Fort Fransecky, Alsace-Lorraine – has been identified as a top secret military compound run by the German *Luftwaffe*. The Fort was located a couple miles north of Strasbourg and scientists from the Polyclinic of the University Medical School at Strasbourg were known to conduct research at Fort Fransecky, initially with Phosgene but eventually BW experiments were conducted there after Strasbourg was declared a war zone in November 1944.[279]

Relying on intelligence analysis of Nazi German international statements proved to be an impossible task – the Nazis became quite inconsistent in the use of their signals and indices. For example, by 1939 the foreign affairs departments of many European

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[277] P. 111, Geissler, "Biological Warfare Activities in Germany, 1923-45."
[278] Gerhard Baader, Susan E. Lederer, Morris Low, Florian Schmaltz and Alexander V. Schwerin, "Pathways to Human Experimentation, 1933-1945: Germany, Japan, and the United States," Osiris, 2nd Series 20.Politics and Science in Wartime: Comparative International Perspectives on the Kaiser Wilhelm Institute (2005).
[279] Baader, Lederer, Low, Schmaltz and Schwerin, "Pathways to Human Experimentation, 1933-1945: Germany, Japan, and the United States."

countries believed they could anticipate Nazi attacks on neighboring countries because the Nazis always issued an ultimatum prior to the attack and this, it was believed, was a consistent trait of Nazi behavior. Thus, the Europeans were taken by surprise when Hitler altered his behavior and attacked Denmark and Norway without warning. European governments were also unable to draw inferences from Nazi propaganda, eliminating that source as a possible indicator of Nazi intentions.[280]

German Intelligence relied heavily on human intelligence sources: undercover agents, prisoners of war, enemy deserters, and captured documents. Intelligence reports were either sent to the Foreign Ministry or the *Amt Ausland/Abwehr* (Office of Military Intelligence) or the Departments Foreign Armies West and East of the Supreme Command of the German Armed Forces.[281] [282] Nazi Germany's BW preparations were apparently driven by erroneous intelligence reports suggesting its enemies were planning BW attacks against Germany's homeland. The reports included alleged sabotage in German-occupied areas. Germany interrogation of French BW researchers convinced Germany that the United Kingdom likely intended to disseminate a deadly combination anthrax/mustard gas cocktail. Additional reports in April 1942 suggested England had obtained Colorado beetles from the U.S. for dissemination over Germany. Possibly repeating this story, Walter Hirsch, in his study of Soviet BW and CW Preparations (see the Soviet section for details) stated (as an assertion) that the Allies had dropped potato

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[280] P. 26, Robert Jervis, The Logic of Images in International Relations (Princeton: Princeton University Press, 1970).
[281] *Oberkommando der Wehrmacht, Fremde Heere West und Fremde Heere Ost*
[282] P. 95-96, Geissler, "Biological Warfare Activities in Germany, 1923-45."

beetles over Western Germany in 1941.[283] The Germans claimed that British planes had dropped bags of Colorado potato bugs in fields in Germany, Luxembourg, Belgium, and Holland as early as September 1940.[284] Hirsch also alleged that the U.S. had conducted research to dry Psittacosis (the active agent of parrot fever) for use as a biological weapon.[285] In January 1943, Germany received reports of research at Edgewood Chemical Center on the effects of Anthrax and Foot and Mouth disease which resulted in the vaccination of Germany's cattle population.[286] It is not evident, however, that Germany was aware that the allies had developed anthrax cakes for use against Germany's livestock.

Kriegsarzt Professor Doktor Heinrich Kliewe, a bacteriologist, was asked by his Nazi leadership to evaluate the intelligence coming out of the U.S., the UK, Canada, France, and the Soviet Union. His bottom line assessment in 1944 was that "reports from England and America are so scant that at the moment we can say nothing about the state of their [biological warfare] preparedness."[287] The U.S. Army assessment of the German files after the war concluded that they had "extensive information on Russian and Polish BW efforts and were fairly complete on French research. But they contained no reliable information from the United States or the United Kingdom after 1942."[288] Erhard

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[283] P. 113, Walter Hirsch, Soviet BW and CW Preparations and Capabilities (Washington, D.C.: U.S. Army Chemical Corps, 1951).
[284] P. 230, Nicholson Baker, Human Smoke: The Beginnings of World War Ii, the End of Civilization (New York: Simon & Schuster, 2008).
[285] P. 111, Hirsch, Soviet BW and CW Preparations and Capabilities.
[286] P. 80-83, Whitby, Biological Warfare against Crops.
[287] P. 97, Geissler, "Biological Warfare Activities in Germany, 1923-45."
[288] P. 114, Brophy, Miles and Cochrane, The Chemical Warfare Service: From Laboratory to Field.

Geissler similarly concluded after his review of the German archives that "most of the intelligence gathered by Germany on the U.S. biological warfare program was incorrect."[289]

A recent news article from the UK argues that Germany used malaria-infested mosquitoes in an attempt to stop the Allied march through Italy in January 1944. The Germans reportedly flooded the Pontine Marshes marshland[290] from southern Italy to Rome and introduced larvae of *anopheles labranchiae*, a species of malaria-carrying mosquito. British and American troops landed just south of the marshes at Anzio, but had been treated with anti-malarial drugs. There is no record of a malaria epidemic among the Allied troops despite the winter conditions in that region of Italy. Among the local inhabitants, however, the cases of malaria soared from 1,217 in 1943 to 54,929 in 1944 in a population of about 245,000.[291]

Newly declassified files also suggest Germany intended to use biological weapons against the United Kingdom in 1943.[292] This plan was to ferry the BW from Norway, hidden in pens and pencils, to the Shetland Islands where the pathogens would then be released to float in the wind to the rest of the British Isles. A test sail was conducted but

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[289] P. 98, Geissler, "Biological Warfare Activities in Germany, 1923-45."
[290] In the 1930s, Mussolini had drained the Pontine Marshes to curb mosquito-borne disease. After the Nazis re-flooded the marshland, malaria remained rife in the region until the 1950s when the Italian government drained the marshland once again and the mosquito strain died out.
[291] Hilary Clarke, "Nazis Tried to Halt Allies in Italy with Malaria Epidemic Attack," Telegraph (UK) February 14, 2006 2006.
[292] John Crossland and Gayle Ritchie, "Nazis Planned Biological Strike from Shetland," The Sunday Times March 5, 2006 2006.

the three Norwegian spies were arrested by British intelligence on January 8, 1943. One of the three spies alleged that 50 fishing boats had been assembled for the operation at Trondheim, Norway by German intelligence. The likelihood of this report being true, however, is questionable because the spy, Arnold Evensen, claimed to be a double agent working for the British[293] but a psychiatric evaluation of him found that he "ought not to be judged by ordinary standards as it is obvious that his mental powers are sub-normal, his memory hopeless, and his mind an inchoate jumble." Despite that evaluation, the British officials concluded that his story was probably true and he was released from captivity in early 1944 "on condition that he never made contact with the Nazis or fell into their hands again."

Interestingly, it took nearly a year from the above event for the United States' Office of Strategic Services to warn the Joint Chiefs of Staff in December 1943 of indications that the Germans might be planning to use biological weapons.[294] (It is not revealed what drove the OSS to this conclusion.) This would have been five months after the reported meeting when the Germans decided to return to offensive BW.[295]

Recently uncovered information in Germany's military archives reveals details of a meeting between Karl Brandt, the Reich commissioner for health and sanitation, and Richard Kuhn, a professor of Chemistry at the Polyclinic of the University Medical

[293] British Intelligence found it unlikely that Evensen was working for them and deemed it probable that he was, in fact, a triple agent – a German agent pretending to work for the UK by pretending to be a German agent!
[294] P. 1-2, Army, U.S. Army Activity in the U.S. Biological Warfare Programs.
[295] Project, The Trial of German Major War Criminals, Volume 22.

School in Strasbourg, Alsace-Lorraine (and a chemical weapons researcher), on May 7, 1944. During this meeting Kuhn and Brandt apparently discussed including the use of "infectious disease" in the research of Otto Bickenbach, the head of the Biology Department at the Polyclinic (and the conductor of human experiments with Phosgene at the concentration camp at Natzweiler). By August of 1944, Bickenbach had been approved for a grant from the Reich Research Council to study "Biological and Physical-Chemical Experiments on Protein-Plasma Substances regarding the effects of Chemical Warfare Agents and Bacterial Poisons."[296] This research may have been intended for nearby Fort Fransecky.

A Czechoslovakian source reported on "German diversion actions to disturb the victorious advances of the Soviet Armies" using BW and to a case in May 1945 of a reservoir in northwestern Bohemia being repeatedly polluted with fecal matter. The Czech source was the chief epidemiologist and investigator concerning this incident.[297] It is not evident, though, if the polluting qualifies as a deliberate use of BW or may be more akin to the use of animal carcasses to pollute water wells during the Middle Ages. Neither incident has been confirmed or alleged in other source documents.

Generalarzt Walter Schreiber, testifying at the Nuremberg Trials in 1946, expressed his views as to why Germany had not used biological weapons during the War:

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[296] Baader, Lederer, Low, Schmaltz and Schwerin, "Pathways to Human Experimentation, 1933-1945: Germany, Japan, and the United States."
[297] P. 223, Robinson, The Rise of CB Weapons.

"The High Command probably did not carry out the plans for the following reasons: In March, 1945, I was visited by Professor Blome at my office at the Military Medical Academy. He had come from Posen and was very excited. He asked me whether I could accommodate him and his men in the laboratories at Sachsenburg so that they could continue their work there; he had been forced out of his institute at Posen by the advance of the Red Army. He had had to flee from the institute and he had not even been able to blow it up. He was very worried at the fact that the installations for experiments on human beings at this institute, the purpose of which was obvious, might be easily recognized by the Russians for what they were. He had tried to have the institute destroyed by a Stuka bomb but that, too, was not possible. Therefore, he asked me to see to it that he be permitted to continue work at Sachsenburg on his Plague cultures, which he had saved. I told *Herr* Blome that Sachsenburg was no longer under my command and, for that reason, I could not give him my consent, and I referred him to the chief of the Army Medical Service, *Generaloberstabsarzt* Handloser. The next day *Generaloberstabsarzt* Handloser called me up and said that Blome had come to him and that he had an order from the Commander of the Reserve Army, Heinrich Himmler, and that on the strength of this order he was unfortunately compelled to give Blome a place in which to work at Sachsenburg. I took note of this but I had nothing more to do with it. Thus Blome had had to leave the Posen institute. It is difficult to imagine what the work of such an institute entails. If one wants to cultivate plague bacteria on a large scale, one must have an adequate laboratory

> with appropriate precautionary measures. The personnel must be trained, for a German, even an expert bacteriologist, has no experience with plague cultures. That takes time, and after its founding had been decreed there was a considerable lapse of time before the institute at Posen began work. Now it had suffered a severe blow; it was to carry on at Sachsenburg. During his visit Blome told me that he could continue his work at an alternative laboratory in Thuringia, but that this was not yet completed. It would take a few days or even a few weeks to complete it, and he had to have rooms until then. He added that if the plague bacteria were to be used when the military operations were so near to the borders of Germany, when units of the Red Army were already on German soil, it would, of course, be necessary to provide special protection for the troops and the civilian population. A serum had to be produced. Here again time had been lost, and as a result of all these delays it had never been possible to put the idea into effect."[298]

The institute at Posen (Poznan) in Poland was reportedly supported by *Reichsmarshall* Hermann Göring as a secret facility to study anthrax for use against both humans and livestock. It's not clear if the above-mentioned plague research was in addition to the anthrax research or if some of the research reports are erroneous in the details. The war ended before the institute produced results with either agent.[299]

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[298] Project, The Trial of German Major War Criminals, Volume 22.
[299] P. 7, Jeanne Guillemin, Anthrax: The Investigation of a Deadly Outbreak (Berkeley: University of California Press, 1999).

By the fall of 1943, the United States developed an intelligence gathering mission called the ALSOS[300] Mission.[301] The Mission was administered by the U.S. Army's G-2 Intelligence, in cooperation with the Office of Scientific Research and Development and the Navy's Office of Naval Intelligence.[302] The main target of the mission was Germany's nuclear fission research, but the mission was also chartered to investigate a broad range of other scientific topics, including biological research.[303] ALSOS claimed all "key scientists who were connected with bacteriological research in Germany" were identified and contacted and over seventy installations were visited, including universities, commercial organizations, medical research institutions, veterinary institutions, concentration camps and medical laboratories.[304] Despite that apparently extensive field investigation, the (apparently incorrect) conclusion of the Mission was that the German BW program was defensive in nature, due in large part to several explicit and direct instructions issued by Adolf Hitler.[305] This defensive program was allegedly aimed "against the sabotage efforts of guerilla fighters that menaced the German Army in

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[300] In Greek, "also" means "grove." ALSOS then would be a pun on the plural of grove, or groves, in honor of General Leslie Groves, the director of the Manhattan Project. It's not evident why it is generally written in all capitals; it is not an acronym.

[301] P. 153, Mark Walker, German National Socialism and the Quest for Nuclear Power -- 1939-1949, Paperback 1993 ed. (Cambridge: Cambridge University Press, 1989).

[302] P. 509, Hart, "The ALSOS Mission 1943-1945: A Secret U.S. Scientific Intelligence Unit."

[303] It is not clear if the mission to collect on other topics was genuine or a subterfuge to hide the real mission – nuclear weapons research. For example, an OSS team was sent to Italy, ostensibly to spirit Italian missile and rocket scientists out of Italy and to the U.S. The real intent, however, was to interview German physicists on what they knew about the nuclear research of Werner Heisenberg and Carl Friedrich von Weizsäcker. Nicholas Dawidoff, The Catcher Was a Spy: The Mysterious Life of Moe Berg (New York: Vintage Books, 1994) p.161. Nonetheless, the final report of the ALSOS Mission identified a report on the status of German BW research as one of two "outstanding results achieved." The other outstanding result was identifying the failure of the German atomic weapon program.

[304] P. 510, Hart, "The ALSOS Mission 1943-1945: A Secret U.S. Scientific Intelligence Unit."

[305] Geissler, Biologische Waffen -- Nicht in Hitlers Arsenalen -- Biologische Und Toxin-Kamfmittel in Deutschland Von 1915 Bis 1945.

Poland and Russia." This conclusion, derived from ALSOS Mission material, was termed by Julian Perry Robinson "absurd and . . . based on unfounded propaganda."[306]

It is fairly apparent in reviewing the writings of some of the senior people involved in the ALSOS mission that there was a certain relief and self-satisfaction in NOT finding an extensive, scientifically-advanced Germany. Thus, Samuel Goudsmit, the scientific head of ALSOS, declares in the foreword to his book, "science under fascism was not, and in all probability could never be, the equal of science in a democracy."[307] If you begin with that as your opening premise, it is hard to later come to a different conclusion. Ironically, he later says on the same page: "Complacency, for instance, was one of the worst enemies the German scientists had."[308] ALSOS investigators reportedly visited over 70 sites in Europe where Germany had conducted medical research and concluded that Germany's "defensive measures consisted mainly in alerting agriculture, veterinary, and public health officials to the dangers of biological attack."[309]

Shortly after D-Day, an Allied plan was formulated called "Project Overcast" in which British and American scientific officers planned to plunder every technological plan and product found in the remains of the Third Reich. This plan was later called "Operation Paperclip."[310] Russia and France had similar plans in play.[311] These plans raise

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[306] P. 223, Robinson, The Rise of CB Weapons.
[307] P. xi, Samuel A. Goudsmit, ALSOS (New York: Henry Schuman, Inc., 1947).
[308] P. xi, Goudsmit, ALSOS.
[309] P. 114, Brophy, Miles and Cochrane, The Chemical Warfare Service: From Laboratory to Field.
[310] The change in project name was a result of Overcast being compromised by letters home from the German scientists already moved to the United States were addressed from "Camp Overcast". The new

questions as to the real intent of the Allied war against Nazi Germany. Churchill called German technology "perverted science", yet researchers in all of the Allied countries were eagerly awaiting the data from both the German and Japanese science and technology programs.[312] Conversely, it has been argued that the collection of scientific intelligence from Germany and Japan was a form of reparations since financial reparations were not exacted after war.[313] The drive to collect information and outsmart the Soviet Union in the quest for German technologists and scientists resulted in many probable war criminals being offered new lives and security in the United States.[314]

One such payoff from the "re-direction" of German scientists may have been Erich Traub's contributions to the development of the United States' Plum Island Animal Disease Center, off the coast of Long Island.[315] Traub, along with American Dr. William Hagan, are credited with being the fathers of Plum Island. Traub had been chief scientist at the Insel Riems State Research Institute, now known as the Friedrich Loeffler Institute. During World War II, Riems was the largest BW facility in Germany, although it most likely was conducting defensive BW research on foot and mouth disease. Others, though, allege that Traub worked on packaging weaponized foot and mouth disease for dispersal

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name was chosen because the files of German scientists being offered contracts to work in the U.S. were marked with a simple paperclip on the file. Tom Bower, The Paperclip Conspiracy (Boston: Little, Brown and Company, 1987) p.169.

[311] P. 420, Cornwell, Hitler's Scientists -- Science, War, and the Devil's Pact.

[312] P. 107, Jerrold and Leona Schecter, Sacred Secrets -- How Soviet Intelligence Operations Changed American History (Dulles: Brassey's Inc., 2002).

[313] P. 527, R.W. Home and Morris F. Low, "Postwar Scientific Intelligence Missions to Japan," Isis 84.3 (1993).

[314] P. 82-83, John Loftus, The Belarus Secret, ed. Nathan Miller (New York: Alfred A. Knopf, 1982).

[315] P. 40, Carroll, Lab 257 -- the Disturbing Story of the Government's Secret Plum Island Germ Laboratory.

against cattle and reindeer in Russia. Traub was captured by the Soviet army in 1945 and remained in Soviet custody until 1948. Shortly after that he came to the United States as part of Operation Paperclip and worked at the Naval Medical Research Institute in Bethesda, Maryland, determining lethal doses for more than forty strains of highly infectious disease.[316] It is not clear how, or when, he arrived at Plum Island.

Germany, in fact, became the chessboard for the early days of the Cold War as American and British Intelligence operatives tried to collect scientific intelligence on the Soviet troops stationed in East Germany, focusing on the new technologies which World War II had brought to the fore, notably nuclear weapons, chemical and biological weapons, guided missiles, and military electronics such as radar and sonar.[317] The moral crusade against the tyrannical fascist dictators may have been less moral and more technologically selfish than the public were led to believe. At any rate, the influx of technology from the vanquished Germany was critical to the United States' growth in the second half of the 20th century and was of paramount importance in the ensuing Cold War with the Soviet Union.

The issue, as far as this dissertation is concerned, is not the criminality of the experts brought into this country via the ALSOS operation or Operation Paperclip, but rather the fact that few people in the government were aware that the operations were occurring. In

[316] P. 186, Hunt, Secret Agenda: The United States Government, Nazi Scientists, and Project Paperclip, 1945 to 1990.
[317] P. 74, Paul Maddrell, "British-American Scientific Intelligence Collaboration During the Occupation of Germany," American-British-Canadian Intelligence Relations 1939-2000, eds. David Stafford and Rhodri Jeffreys-Jones (London: Frank Cass, 2000).

fact, there is evidence to suggest that even President Truman was unaware of the details of the Operation or the fact that the military had apparently decided that the interests of national security far outweighed any interest in putting the war criminals on trial for their crimes.[318]

[318] P. 83, Loftus, The Belarus Secret.

Japan

Suspicions and fears about Japan were well-entrenched by the time of the attack on Pearl Harbor. The attack merely gave weight to previously bred insecurities. The American public made little effort to distinguish between Americans of Asian descent and the attacking Japanese, resulting in the internment of thousands of Japanese-Americans for the duration of the war by Executive Order 9066. The fear was of espionage by the so-called Fifth Columnists, not long-range warfare. Thus, the fear could be more easily described and defined as anyone of Asian descent, no matter how distantly descended. Racist advertisements of the day depicted cartoon insects with Japanese faces, ready for extermination by chemical insecticides.[319] "Reports of lurking submarines off the coast, of Fifth Column activities, and even of Japanese infantry units poised to attack within the state (California) were common."[320] False news reports of attacks by Japanese bombers on Long Beach were not unexpected in 1942 and the reactions by the Los Angeleno population were more of resignation than increased fear.[321] Curiously, this suspicion and insecurity did not immediately translate into fear of the very real threat of Japanese employment of biological weapons. The subsequent expectation of plague-loaded balloons flying over the West Coast from Japan came much later and the balloons, somewhat unexpectedly, landed in Canada, not California.

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[319] Edmund Paul Russell III, "War on Insects: Warfare, Insecticides, and Environmental Change in the United States, 1870-1945, Volume I," University of Michigan, 1993.
[320] Mauricio Mazon, The Zoot-Suit Riots -- the Psychology of Symbolic Annihilation (Austin: University of Texas Press, 1984).
[321] This incident was later immortalized on the silver screen in the movie "1942," starring John Belushi.

It is believed that the Japanese began considering biological weapons as early as 1927 when the eventual leader of the Japanese program, Ishii Shiro, began arguing for such a program in the belief that, "after signing the 1925 Geneva protocol, most nations in the world would forgo biological weapons."[322] Ishii concluded that if biological weapons were forbidden by international law, then Japan should possess the weapons to have an advantage over its enemies in any future war.[323] Ishii also recognized the unique advantage biological weapons had for a country like Japan because they did not require raw materials, such as iron (which Japan had difficulty in obtaining).[324] Ishii reportedly was influenced by the writing of Second Class (First Lieutenant) Physician Harada on the results of the 1925 Geneva Convention.[325] [326]

In 1928, Ishii left Japan on a two-year tour of medical facilities in Europe, the United States, and Canada. The travel was paid partly out of his own pocket, partly by the Imperial Japanese Army. During this time he researched the history of gas weapons used in World War I, as well as current research countries were pursuing in chemical and biological warfare.[327]

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[322] P. 81, Guillemin, Biological Weapons -- from the Invention of State-Sponsored Programs to Contemporary Bioterrorism.
[323] P. 131, Sheldon Harris, "The Japanese Biological Warfare Programme: An Overview," Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945, eds. Erhard Geissler and John Ellis van Courtland Moon, vol. 18 (Oxford: Oxford University Press, 1999).
[324] P. 21, Malcolm Dando, Bioterror and Biowarfare, Beginners Guides (Oxford: One World Publications, 2006).
[325] Despite several articles pointing to the influence, it is not reported *how* Ishii was influenced by Harada's report. Nor, apparently, does Harada's report exist for possible clues. According to Sheldon Harris, nobody else in the Japanese government seemed to pay attention to Harada's report.
[326] P. 18, Harris, Factories of Death.
[327] P. 25, Gold, Unit 731 Testimony.

China recently claimed to have discovered 23 pages of new documentation of Japan's biological weapons program in occupied China.[328] The documents reportedly refer to experiments carried out between September 1931 and August 1940 with *"anthrax bacillus"* (sic), according to Ma Jiayu, head of bacterial research at the Harbin Medical Sciences University. The documents have been ascribed to Unit 100, a unit in Changchun, which reportedly was devoted to the study of Anthrax.[329] Unit 100 was identified by the Soviet Union as the "Hippo-epizootic Administration of the Kwantung Army." The Soviet evidence does not identify specifically an anthrax focus to Unit 100, rather it was identified by the Japanese as "charged with the duty of carrying out sabotage measures, i.e., infecting pastures, cattle and water sources with epidemic germs. In this part of its work Detachment 100 was closely connected with the Intelligence Division of the Kwantung Army Headquarters."[330]

It is not clear when the Allies recognized the Japanese biological weapons program. Sheldon Harris believes the Japanese program first became of interest to the U.S. in 1939 after three attempts failed by the Japanese to obtain the Yellow Fever virus from the Rockefeller Institute in New York.[331] Interestingly, the person responsible for the three

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[328] John Schauble, "China Unearths Japan "Germ War" Papers," The Age December 4, 2000 2000.
[329] Unit 731 is the most infamous Japanese BW organization of World War II but it was not the only unit working in Japanese-controlled China. According to the official website of the Chinese Embassy in Washington, DC, from 1932 to 1945 Japan set up sixty germ warfare units in China, involving more than 10,000 troops. Embassy of the People's Republic of China in the United States of America, Scholar: 270,000 Chinese Civilians Victimized by Japanese Germ Warfare, 2005, Available: http://www.china-embassy.org/eng/gyzg/t207037.htm, August 7, 2006 2006.
[330] P. 10-11, Materials on the Trial of Former Servicemen of the Japanese Army Charged with Manufacturing and Employing Bacteriological Weapons, (Moscow: Foreign Languages Publishing House, 1950).
[331] P. 150-151, Harris, Factories of Death.

attempts was Naito Ryoichi, who later became Shiro Ishii's number two at Ishii's research laboratory in Tokyo and after the war in 1945 became the first point of contact between U.S. interrogators and the scientists of Unit 731.[332] But, in 1939, the U.S. military still believed biological weapons to be unlikely and "not a potentially significant military weapon" in the eyes of Lt. Col. G.C. Dunham, Director of the Army Medical Corps.[333]

Even though Japan's activities in China, including the ghastly medical experiments, had been reported in the Western press (including the New York Post) as early as 1937, there is no evidence that the U.S. government or its intelligence services paid any attention to the program as late as 1942. This may be because U.S intelligence services, especially in the military, were focusing on other things. U.S. intelligence units had been intercepting and decrypting Japanese diplomatic communications since well before the beginning of World War II. Naval communications had been collected since the onset of the Pacific War. But Japanese army communications were not decrypted before April 1943 and the traffic was not available for analysis until the end of that year.[334] In fact, World War II found the traditional human intelligence sources of spies and counter-spies rapidly being replaced by cryptologists and photo-reconnaissance interpreters[335] – not extremely useful in identifying clandestine biological research programs.

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[332] P. 94, Gold, Unit 731 Testimony.
[333] P.151, Harris, Factories of Death.
[334] P. 9, Douglas J. MacEachin, The Final Months of the War with Japan: Signals Intelligence, U.S. Invasion Planning, and the a-Bomb Decision (Washington, D.C.: Center for the Study of Intelligence, 1998).
[335] Ronald H. Spector, Eagle against the Sun (New York: The Free Press, 1984).

One interesting piece of intelligence fell into the FBI's lap in December 1941. On December 10 (four days after Pearl Harbor), an individual walked into the FBI office in Milwaukee, Wisconsin and reported that while serving in Japan in 1925 he met with a small group of "white persons", including some German doctors. One of the doctors, while drunk, blurted out that the German doctors were in Japan solely to "teach Japanese the art of bacterial warfare and that some day Germany would get its revenge over the United States through the use of that mode of warfare." The informant claimed (sixteen years after the event) that the German mentioned working with "anthrax bacilli, dysenary *(sic)* and typhus germs."[336] The report was deemed interesting enough that it went to the director of the FBI, J. Edgar Hoover, who forwarded it to the Director of Naval Intelligence and the head of the Federal Security Agency. The FBI responded by investigating Japanese-American pharmacists for possible BW-related sales.

The information was clearly available for the U.S. to be able to respond to a possible Japanese BW threat against the U.S. or its troops. In August 1942, the Rocky Mountain Medical Journal published an article titled "Japanese Use the Chinese as 'Guinea Pigs" to Test Germ Warfare" by Dr. P.Z. King, director of China's National Health Administration.[337] King cited and documented five different attacks in China by the Japanese in 1940 and 1941. It is unclear what effect, if any, this article had on U.S. government response or preparations. No other news or medical journal reported on the findings.

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[336] P. 161-162, Harris, Factories of Death.
[337] P. 164, Harris, Factories of Death.

If U.S. intelligence analysts or biological weapons experts had been paying attention, they might have realized that the Rocky Mountain Medical Journal was repeating a report released by the Chinese Ministry of Foreign Affairs four months earlier on April 9, 1942: "National Health Administration Director General Dr. P.Z. King's report on Japanese attempts at bacterial warfare against China and reports submitted by Chinese and foreign medical experts definitely prove that at least on five occasions Japan has resorted to ruthless bacterial warfare in China."[338] [339]

The five identified possible BW incidents began in October 1940 and continued through to early 1942. A sixth incident, occurring in November 1942, was reported in the journal China at War.[340] [341] According to the Chinese government, "after-war investigations indicated that the Japanese troops waged germ war in more than 20 Chinese provinces."[342]

China alleged that Japan used planes in an attempt to infect Chinese communities with bubonic plague.[343] Chinese authorities believed Japan was dropping wheat grain and rice mixed with infected fleas. It was thought that the grain was used to attract rats and

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[338] P. 18, Newman, Japan's Secret Weapon.
[339] Some books refer to this earlier report as "the Chen Report" after the chief rapporteur, Dr. Wen-Kwei Chen, a Chinese epidemiologist. Daniel Barenblatt, A Plague Upon Humanity: The Secret Genocide of Axis Japan's Germ Warfare Operation (New York: Harper Collins Publishers, Inc., 2003) p.184.
[340] The dates and locations of the six alleged incidents are listed in Appendix A.
[341] P. 27, Newman, Japan's Secret Weapon.
[342] Embassy of the People's Republic of China in the United States of America, Scholar: 270,000 Chinese Civilians Victimized by Japanese Germ Warfare.
[343] Plague's etiologic agent was identified by Newman as *Bacillus pestis*, later reclassified as *Yersinia pestis*. Joklik's Microbiology, however, says *Y.pestis* was previously identified with the genus *Pasteurella*. *Y.pestis* is a gram negative, nonmotile coccobacillus. Joklik, Willet, Amos and Wilfert, eds., Zinsser Microbiology p.585-85.

other vermin, which the fleas would then bite to develop reservoirs. Laboratory tests were conducted on the grain, rats, and human victims of bubonic plague. Some results were positive, some not. Of the five incidents Chinese officials directly attributed to Japanese aircraft, four of the incidents resulted in humans contracting bubonic plague, with at least 126 victims reported.[344] According to Theodor Rosebury, attempts at isolating plague bacilli from the materials allegedly dropped from the planes were negative. There were many explanations for the failure to extract plague (including inadequate laboratory facilities and the excessive delay in conducting tests), making it impossible to draw any reliable conclusion from the negative tests.[345]

Earlier than either the Rocky Mountain Medical Journal or the Chinese reports of biological weapons use was an enticing article in Japan's "The Japanese Journal of Experimental Medicine," published in December 1938. The article was titled "Activities of the Japanese Medical Corps in China" by Dr. Yoneji Miyagawa.[346] [347] According to the coverleaf, it was the journal of the Government Institute for Infectious Diseases of the Tokyo Imperial University. Dr. Miyagawa was the Director. The article purports to provide the history of the Dojin Medical Society – a Japanese medical corps established around 1900 to establish "medical cooperation among all Eastern Asia countries for the sake of common welfare."[348] But there are enticing hints of something else occurring within the Society. It is funded, not by Japanese public health organizations, but by the

[344] Chapter 2, Newman, Japan's Secret Weapon.
[345] P. 109, Rosebury, Peace or Pestilence.
[346] The article, written in English, was included in its entirety in Newman's book, Japan's Secret Weapon.
[347] P. 30-34, Newman, Japan's Secret Weapon.
[348] P. 31, Newman, Japan's Secret Weapon.

Foreign Office as part of its cultural program.[349] A large part of the article is devoted to the remarkable ability of the Society to control cholera in wartime – contrasting the cleanliness inside Japanese-controlled areas with the epidemic conditions in the rest of China. The contrast is so stark, Miyagawa claims, that the enemy may use it as propaganda, claiming the Japanese are using bacterial warfare against the Chinese![350]

But Miyagawa may have come too close to the truth in one of his last, metaphorical, statements. After crediting the Japanese doctors with waging battle against cholera and other wartime disease epidemics, he states "As reported in some newspapers, bacterial war was actually carried out in the present Sino conflict."[351] Was he referring metaphorically to the war against disease? Or was he exposing the world to the true facts behind the large medical presence in Manchukuo? Barclay Newman, for one, suspects Miyagawa was "laughing up his sleeve" by subtly revealing the existence of the Japanese BW program.[352]

Japan's program was publicly revealed to a general reading audience in 1944 in a small book by Barclay Newman, Japan's Secret Weapon.[353] Newman is identified on the book's flyleaf as "a well-known science analyst" though from the titles of his other publications it may be surmised that his audience was the public, not a scientific or

[349] P. 33, Newman, Japan's Secret Weapon.
[350] P. 35, Newman, Japan's Secret Weapon.
[351] P. 34, Newman, Japan's Secret Weapon.
[352] P. 37, Newman, Japan's Secret Weapon.
[353] Newman, Japan's Secret Weapon.

science-trained audience.[354] He was, however, a scientific researcher in the field (he was reportedly working on insecticides and the incorporation of ascorbic acid in foods and beverages –presumably not at the same time he was working on insecticides) and the former Science and Medical Editor for The Literary Digest. In a somewhat breathless writing style, Newman warns of a coming warfare of disease: "not merely bacterial warfare, but even more deadly virus warfare, rickettsia germ warfare, warfare with cancer-causing chemicals."[355] Curiously, after calling for an international response due to the global threat of such a biological outbreak (he references the Spanish flu epidemic following on the heels of World War I) he offers his own remedy to address the problem: "We must make it clear to the enemy that we are prepared, that we can, with one bomber load of spores over Tokyo, set aflame an epidemic to decimate if not utterly annihilate the whole population of Japan – nay, even make the very islands of his empire desolate and uninhabitable for decades and perhaps a century."[356]

Newman alleges several incidents of Japanese use of BW against its enemies, besides the previously chronicled use in China. He claims that Japanese and Nazi scientists worked together in 1939 in Hawaii using spirochetes.[357] For evidence of this partnership Newman cites page 128, volume 10 of the Nazi medical journal Pathology and

[354] The other titles cited on the flyleaf were "Science Rediscovers God" and "Must We Grow Old?"
[355] P. 2, Newman, Japan's Secret Weapon.
[356] P. 5, Newman, Japan's Secret Weapon.
[357] Spirochetes are gram negative, motile, slender, helically coiled, flexible organisms. Their most distinctive morphological property is the presence of axial fibrils which are believed to be responsible for the locomotion of the organism. Joklik, Willet, Amos and Wilfert, eds., Zinsser Microbiology p.657. The genus Treponema includes some spirochetes pathogenic to humans, including *T.carateum, T.pallidum endemicum, T.pallidum pertenue* and *T.pallidum pallidum*, more commonly known as venereal syphilis. James H. Jorgensen and Michael A. Pfaller, A Clinician's Dictionary of Pathogenic Microorganisms (Washington, D.C.: ASM Press, 2004) p.116-8.

Pathological Anatomy. Newman suggests the Japanese used malaria in its fight with the Philippines. He cites figures of 85% of the Philippine forces on Bataan coming down with malaria, while the Japanese forces were "practically disease free."[358] U.S. forces fighting the Japanese at the islands of Guadalcanal, New Guinea, Tarawa, Iwo Jima, Saipan, Guam and others noted a significant number of medically trained personnel, including doctors, medical corpsmen, nurses, pharmacists, and veterinarians among the captured Japanese troops.[359] If there is a correlation between the soldiers being allegedly disease-free and the number of physicians captured, it is not clear. The size of the medical corps may simply be the result of Miyagawa's claim: to combat wartime disease.[360] What is clear is that by summer 1944, U.S. Intelligence was well-aware of the allegations of a Japanese BW program and interrogators were provided with 75 BW-related questions for use with captured Japanese. Supposedly front-line medical corpsman surprisingly knew a lot about Japan's secret BW program, even while they denied Japan having any sort of program. Doctors provided information on the Water Purification Units headquartered at Harbin, knew of biological experimental centers in Tokyo, and identified many of the leading military personalities associated with the program, including Shiro Ishii.[361] If these doctors were, in fact, merely medical

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[358] P.7, Newman, Japan's Secret Weapon.
[359] Harris, Factories of Death.
[360] Japan clearly understood the role of disease during wartime. During the Russian-Japanese war, 1904-05, Japanese medical personnel made significant strides in reducing the number of deaths caused by disease among its soldiers. A U.S. Army doctor, Louis Livingston Seaman, traveling with the Japanese forces during that war, reported "Only one and two-tenths percent of the entire army died of sickness or disease." Contrast that with the statistics from the near-concurrent French campaign in Madagascar in 1894: Out of 14,000 troops, 29 persons killed in action but 7,000 died from preventable disease. Gold, Unit 731 Testimony p.18-19.
[361] Harris, Factories of Death.

professionals treating their own troops, they were surprisingly well-informed of a supposedly secret program.

There were at least four planned attempts by Japan to use biological weapons directly against U.S. military forces during the war.[362] During the 1944 U.S. invasion of Saipan, Ishii sent a team to attack the U.S. forces with plague and possibly other diseases. The ship carrying the BW detachment was sunk before reaching Saipan.

Unit 731 also reportedly planned to use plague against U.S. forces attacking the island of Okinawa in 1945. Those plans were not revealed to the Okinawans until fifty years after the fact when a traveling exhibition arrived on Okinawa revealing the horrors of Unit 731. Not surprisingly, the fact that Japan intended to "sacrifice" Okinawa in order to protect the main island of Japan was not viewed favorably by the descendants of wartime Okinawa.[363] One Japanese intelligence officer claimed to have been sent undercover to one of the remote islands of the Okinawa archipelago posing as a school teacher. He had been supplied pens with which to release bacteria into the island's water supply in the event of an American landing.[364]

There were at least two plans developed to attack the mainland of the United States with biological weapons. In November 1944, huge balloons were released from Japan

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[362] P. 86-87, Gold, Unit 731 Testimony.
[363] P. 88, Gold, Unit 731 Testimony.
[364] P. 133, Stephen C. Mercado, The Shadow Warriors of Nakano -- a History of the Imperial Japanese Army's Elite Intelligence School, Paperback ed. (Dulles: Brassey's, Inc., 2002).

directed towards the North American continent. The balloons needed to be released in winter when favorable wind patterns blew from East Asia to North America. The balloons were intended to be carriers of freeze-dried bacteria or viruses -- specifically recommended were Plague bacillus or Rinderpest. The November releases were designed to test the effectiveness of such a delivery system. However, Tojo cancelled the program before the balloons could be used as weapons, ostensibly because he recognized the war was lost. Japanese BW experts were also reportedly skeptical of the plan.[365] [366] Test balloons were discovered in Hawaii, Texas, Utah, Wyoming, Montana, Iowa, the Dakotas, Michigan, Alberta, and Manitoba. One balloon landed in southern Oregon, where it was discovered by a family. The balloon blew up when the family was trying to drag it to a picnic area, killing the mother and five children. They were the only confirmed balloon casualties during the duration of the balloon program.[367] The Japanese claimed the balloons were not intended for biological weapons but contained explosives and incendiary material and were sent in reprisal for the Doolittle raid.[368]

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[365] The balloon tests had an unintended impact in the United States. In 1945, an all African-American parachute battalion was used in Oregon to fight forest fires started by the incendiary balloons. The battalion, the 555th Parachute Infantry Battalion, was a test to determine whether African-Americans could live up to the expectations of the airborne battalions. They did, eventually being integrated into the 82nd Airborne and leading the way for complete integration of the U.S. armed forces. A statue in the "triple nickel's" honor was unveiled at Fort Leavenworth, Kansas in 2006. Dawn Bormann, "Unsung Heroes Get Their Due," Kansas City Star September 8, 2006 2006.
[366] Geissler and Moon, eds., Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945.
[367] P. 192, Barenblatt, A Plague Upon Humanity.
[368] P. 115, Brophy, Miles and Cochrane, The Chemical Warfare Service: From Laboratory to Field.

Whether Tojo recognized the war was effectively over for Japan, it did not prevent the Japanese General Staff from making other plans to bring the war to the American people, most notably the lyrical "Cherry Blossoms at Night."

A former officer of the Imperial Japanese Navy spoke about the plans in 1977. According to former Captain Eno Yoshio, Japan had four submarines nicknamed an "underwater aircraft carriers."[369] As they became available, the four giant Sen-Toku[370] (special submarines) submarines were assigned to a newly-created Submarine Squadron One (SubRon One) along with a ten Seiran bomber aircraft force, the 631st Air Corps, both under the command of Captain Tatsunoke Ariizumi[371]. The force included the HIJMS *I-13 (*2 aircraft); HIJMS *I-14* (2 aircraft); HIJMS *I-400 (*3 aircraft); and HIJMS *I-401 (*3 aircraft).[372]

First built in late 1944, the I-400 submarine was at the time the world's largest submarine, with a length of 400 feet and a surfaced displacement of 3,530 tons. It could cruise on the surface at 18.7 knots. Above her main deck rose a 115 foot long, 12 foot diameter, hangar housing three Aichi M6A1 *Seiran* (Clear Sky Storm or Mist on a Clear Day) torpedo-bombers. These floatplanes were rolled out through a massive hydraulic

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[369] P. 89-90, Gold, Unit 731 Testimony.
[370] P. 70, Norman Polmar and Kenneth J. Moore, "Flights from the Deep," Air Force Magazine March 2004 2004.
[371] National Air and Space Museum, Aichi M6a1 Seiran (Clear Sky Storm), 2008, Available: http://collections.nasm.si.edu/code/emuseum.asp?profile=objects&quicksearch=a19630308000, July 14, 2008 2008.
[372] Tom Paine, The Transpacific Voyage of H.I.J.M.S. I-400, February 1991 1991, Available: http://www,pacerfarm.org/I-400, 19 August 2006 2006.

door onto an 85 foot pneumatic catapult, where they were rigged for flight, fueled, armed, launched, and, after landing alongside, lifted back aboard with a powerful hydraulic crane.

Figure 2. The I-400 submarine and the M6A1 Seiran torpedo-bomber[373]

The *I-400* was equipped with a snorkel, radar, radar detectors, and capacious fuel tanks that gave her a range of 37,500 miles: one and a half times around the world. She was armed with eight torpedo tubes, a 140mm rear deck gun, one bridge-mounted 25mm antiaircraft gun, and three triple 25mm antiaircraft gun mounts atop her hangar.[374] The I-class submarines also "were crowded, difficult to handle when submerged, took a long time to dive, and had the fatal flaw of being very noisy below the surface."[375] The advent

[373] Paine, The Transpacific Voyage of H.I.J.M.S. I-400
[374] Paine, The Transpacific Voyage of H.I.J.M.S. I-400.
[375] P. 481, Spector, Eagle against the Sun.

of guided missiles and atomic bombs could have transformed her from an overspecialized undersea dinosaur to a menacing strategic threat but, like Germany's Type XXI U-boat, it was produced too late to influence World War II.[376] The first submarine I-400 was finished on December 30, 1944 with I-401 being completed a week later. I-402 was converted into a submarine fuel tanker and work was stopped on two other planned submarines in the I-400 class.[377] Despite the size, the submarines remained unknown to the U.S. Office of Naval Intelligence until after the war.[378]

The plan for using the I-400 class submarines to attack the U.S. mainland with biological weapons – called either "Project PX" or, more romantically, "Cherry Blossoms at Night" – was first discussed in December 1944 at the Naval General Staff headquarters in Tokyo[379]. According to Captain Eno, the combined army-navy staff developed the plan without consulting any of Japan's biological experts. Consequently, they had no knowledge of the viability of pathogens or how to get access to the pathogens. Eventually they called in Shiro Ishii for advice. By March 1945 a plan was finalized to attack the U.S. with plague, cholera, and possibly other pathogens delivered by plane and by teams in a series of suicide missions directed against San Diego.[380]

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[376] After the war, the submarines were ferried to Hawaii and scuttled. One of the subs, I-401, was recently rediscovered by a deep-sea diving expedition. The last remaining *Seiran* torpedo-bomber is maintained by the Air and Space Museum in Washington.
[377] National Air and Space Museum, Aichi M6a1 Seiran (Clear Sky Storm).
[378] P. 16, Henry Sakaida, Gary Nila and Koji Takaki, I-400: Japan's Secret Aircraft-Carrying Strike Submarine -- Objective Panama Canal (Crowborough: Hikoki Publications, 2006).
[379] The first plan to attack the U.S. mainland by submarine was developed two years earlier, in January 1942, by Admiral Yamamoto.
[380] P. 189, Barenblatt, A Plague Upon Humanity.

Figure 3. The only remaining M6A1 Seiran torpedo-bomber aircraft. At the Udvar-Hazy Center of the National Air and Space Museum. (Tail fin of the Enola Gay in background) (photo by author)

At the last minute, General Umezu Yoshijiro, Chief of the General Staff, ordered the plan scrapped. His rationale: "if bacteriological warfare is conducted, it will grow from the dimension of war between Japan and America to an endless battle of humanity against bacteria. Japan will earn the derision of the world." General Umezu was later found

guilty of war crimes at the Tokyo War Crimes Trials. He died in 1949 at Sugamo Prison. He never revealed the plans that he single-handedly stopped.[381] [382]

A final planned use of biological weapons by Unit 731 came in the final days of World War II. A recently discovered hand-written memorandum by General Ishii shows that Unit 731 intended to transport "PX"[383] to the mainland of Japan after the surrender of Japan.[384] The memorandum included the date American troops were expected to land ("American troops arrive on 25th.") and Ishii's plans to "scatter (the weapons) across the country." A later entry in the notebook from August 26 included instructions by General Yoshijiro Umezu and General Torashiro Kawabe, chief of staff and deputy chief of staff

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[381] On March 26th, 1945, Operation PX was canceled by General Umezu. As an alternative the staff considered bombing San Francisco, Panama, Washington or New York, and decided to launch a surprise air strike against the Panama Canal's Gatun Locks. Destroying these locks would empty Gatun Lake and block the passage of shipping for months.

While the submersible carriers were perfecting their tactics to cripple the Panama Canal, the capability of the Japanese Navy was steadily deteriorating. Before the submarines could set sail for Panama more than 3000 Allied warships and transports had reached the Pacific for *Operation Olympic*, the forthcoming invasion of Japan. This growing threat forced Tokyo strategists to reconsider the attack on distant Panama, which now appeared to be only a questionable diversion. Over his strong objections, Captain Ariizumi was ordered to abandon his squadron's carefully rehearsed canal strike and attack instead American naval forces at Ulithi Atoll. In his account of this period, Captain Orita relates how Japanese Sixth Fleet staff in Tokyo told the fulminating ComSubRon One: *A man does not worry about a fire he sees on the horizon when other flames are licking at his kimono sleeve!* Paine, The Transpacific Voyage of H.I.J.M.S. I-400. The attack on Ulithi Atoll was a failure. The ship carrying reconnaissance aircraft was sunk and the I-400 went to the wrong rendezvous point. National Air and Space Museum, Aichi M6a1 Seiran (Clear Sky Storm). Captain Ariizumi committed suicide in quarters aboard ship rather than surrender the boat to the Americans at the end of the war. Sakaida, Nila and Takaki, I-400: Japan's Secret Aircraft-Carrying Strike Submarine -- Objective Panama Canal..

[382] P. 92, Gold, Unit 731 Testimony.

[383] "PX" – pest bacillus-infected fleas. This ostensibly refers to *Y.pestis*. There is no known connection between the code word "PX" and ""Operation PX."

[384] Japan Economic Newswire, "Unit 731 Planned Germ Warfare against U.S. Forces after End of War," Japan Economic Newswire 2006.July 21, 2006 (2006).

for the Imperial Japanese Army, respectively, telling Unit 731 "Don't die in vain" and "Wait for next opportunity calmly."

After the war there was an immediate push to rescue Allied prisoners in Japanese concentration camps. One of the plans for rescuing the POWs reveals some of what the U.S. already knew about Japan's biological warfare program.[385] The Office of Strategic Services developed "Operation Flamingo" ostensibly to liberate American POWs in Manchuria, specifically from Harbin. Harbin, however, did not have a POW camp, the nearest such camp being Camp Mukden, 300 miles to the south. It is believed that the OSS suspected American POWs would be found at the Unit 731 facilities at Harbin – possibly as victims of Japan's BW experiments. One other possibly telling statement in Operation Flamingo was the instructions to "secure immediately all Japanese documents and dossiers, and other information useful to the United States government."[386] Experiments on American prisoners were indeed carried out, but at Mukden, not Harbin, as the U.S. learned during the Khabarovsk war crimes trial in 1949 and were later reminded during Congressional hearings in 1982 and 1986.

American scientists and intelligence analysts desperately wanted to get access to the Japanese scientists and data from the BW experiments. General Douglas MacArthur began planning for the occupation of Japan in spring 1945, prior to the use of the atomic

[385] Chapter 8, Barenblatt, A Plague Upon Humanity.
[386] Operation Flamingo was never carried out. Soviet troops invaded Manchuria and captured Harbin prior to V-J Day. Soviet troops also liberated the POW camp at Mukden, freeing 1,000 Allied troops.

bombs on Hiroshima and Nagasaki. Lieutenant Colonel Murray Sanders, a physician and microbiologist working at Camp Detrick, was summoned by MacArthur in Manila. MacArthur wanted Sanders to conduct an on-the-ground assessment of Japan's BW threat to U.S. troops – by being part of the planned first day assault on the main island of Japan. To Sanders' good fortune, the bombs were dropped before an assault had to be attempted. Sanders' mission was then changed to locate Shiro Ishii and identify and interview the top Japanese BW scientists.[387]

The problem of getting the Japanese data was conveniently solved when Ryoichi Naito (the same Naito who had tried to get the Yellow Fever strains from Rockefeller University in 1939) met Lt. Col. Sanders, as Sanders landed in Japan. The purpose of Naito's meeting was apparently to seek clemency and immunity from war crimes for the Unit 731 researchers. Naito told Sanders that he was there to be an interpreter, but his real role was to be a barrier between Sanders and any other Unit 731 personnel.[388] Naito held out the promise of a secret cache of documents to be provided to the U.S. in exchange for the scientists' lives. Once threatened that he would be turned over to Soviet interrogators, Naito produced an English-language organizational chart of the entire Japanese BW program including medical institutes and military detachments (Unit 731 was the only unit identified by its Japanese name: the Boeki-Kyusuibu[389] of the Kwantung Army.).[390] It is highly probable that identifying Unit 731 this way was either

[387] P. 203, Barenblatt, A Plague Upon Humanity.
[388] P. 96, Gold, Unit 731 Testimony.
[389] Water Purification Unit
[390] P. 205, Barenblatt, A Plague Upon Humanity.

an attempt at deception or, at least, obfuscation. Other information in the accompanying manuscript suggests the Japanese deliberately tried to conceal their complicity in war crimes. The text denies that Japan used biological warfare ("General Head Quarter has had no attempt to begin active BW attack to his enemy, before the enemy begin any illegal warfare. As none of the fighting nation [enemy] began such an attack, Japanese Head Quarter had no chance, no reason to use BW."[391]), nor does the text mention human experimentation. General MacArthur personally reviewed the data from Naito and his cronies and decided to grant them complete immunity from prosecution as well as concealment from public disclosure of their activities in exchange for the documentation of the experimentation and field operations conducted in Manchuria.

Despite the blanket immunity, General Shiro Ishii stayed in the background, fearing prosecution, until February 1946 when he, too, contacted Lt. Col. Sanders. Ishii may have miscalculated the U.S.'s largesse and he was immediately arrested and put under house detention. By early 1947, Norbert Fell, a division chief from Camp Detrick, had traveled to Japan to interview Ishii about his role in the Japanese program.[392] Fell's conclusion was that it was "evident that we [U.S.] were well ahead of the Japanese in production on a large scale" but that the Japanese experimentation with human subjects was invaluable and added to "data we and our Allies have on animals."[393] Instead of a trial and almost certain execution, Ishii was placed under protective custody and received

[391] P. 206, Barenblatt, A Plague Upon Humanity.
[392] P. 77, Guillemin, Biological Weapons -- from the Invention of State-Sponsored Programs to Contemporary Bioterrorism.
[393] P. 193, Harris, Factories of Death.

a large retirement pension. The information received from Ishii was placed into intelligence channels, thus making it unavailable for the War Crimes Tribunal and protecting Ishii from prosecution.[394] It was apparently believed by the U.S. interrogators that keeping the information in intelligence channels was necessary to get full cooperation by Ishii.[395] The personal assessments of Ishii by U.S. Intelligence debriefers reveal something of the mutual admiration apparently manifest in the debriefings: "Studious, sincere, benevolent and kind" and "pro-American and respects the mental culture and physical science of the U.S.."[396]

A second goal of U.S. intelligence debriefers in Japan was to collect information from former Japanese Prisoners of War returning from captivity in the Soviet Union as well as information on the Soviet nuclear weapons program, reportedly as part of Project Venona.[397] The U.S. used two teams of Japanese Intelligence officers to assist in the debriefings. One of the Japanese debriefers, Colonel Maeda Mizuho, had run a detention center in Manchukuo and had identified prisoners to be sent to Unit 731 for biological

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[394] P. 38, Endicott and Hagerman, The United States and Biological Weapons -- Secrets from the Early Cold War and Korea.
[395] P. 214-215, Harris, Factories of Death.
[396] P. 40, Endicott and Hagerman, The United States and Biological Weapons -- Secrets from the Early Cold War and Korea.
[397] Venona was an effort to detect Soviet espionage of U.S. atomic secrets between 1939 and 1957. It's not clear what they expected to learn from debriefing prisoners of war. Robert Louis Benson and Michael Warner, eds., Venona: Soviet Espionage and the American Response, 1939-1957 (Washington, D.C.: National Security Agency
Central Intelligence Agency, 1996).

experiments.[398] Did Maeda serve a similar purpose with the U.S., diverting BW experts to (or away from) U.S. debriefers?

In contrast to the U.S., the Soviet Union conducted war crime trials at Khabarovsk, Siberia in 1949, indicting twelve Japanese officers for plotting to employ BW during the war. General Ishii was indicted *in absentia* but was not named as a defendant.[399] The Soviets were aware General Ishii was in U.S. hands and called upon the U.S. to conduct similar investigations and trials. In response the U.S. termed the Khabarovsk trials as a "show trial", "a lot of baloney", "a dead issue", and a stage for propaganda purposes.[400] (The Khabarovsk trials are discussed in greater deal in the section on the Soviet Union)

It has been claimed that the Japanese Army had destroyed evidence of biological weapons development in China in 1945.[401] When the Soviet Union belatedly entered the war on August 8, 1945 the Japanese tried to destroy all evidence of its activities, including poisoning the surviving Maruta prisoners. Personnel of Unit 731 were reportedly given priority evacuation out of Manchukuo back to Japan to avoid capture by the Soviets.[402] The former personal documents of Seiichi Niiduma, a former Imperial Japanese Army officer, included his record of the Army ordering Unit 731 on August 15,

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[398] P. 216, Mercado, The Shadow Warriors of Nakano -- a History of the Imperial Japanese Army's Elite Intelligence School.
[399] P. 226, Harris, Factories of Death.
[400] P. 42, Endicott and Hagerman, The United States and Biological Weapons -- Secrets from the Early Cold War and Korea.
[401] Xinhua, "Newly Found Documents Show Japan Destroyed Germ Warfare Evidence in 1945," Xinhua May 31, 2006 2006.
[402] P. 188-189, Saburo Ienaga, The Pacific War 1931-1945 (New York: Pantheon Books, 1978).

1945, to destroy evidence of the Unit developing germ weapons. (This puts an interesting light on the previous discussion of Shiro Ishii deciding a day later, on August 16, to transport "PX" back to Japan for use against the U.S. occupation troops.)

The likelihood of Japan destroying all evidence of BW is diminished, though, based on the actions of the United States government to bring Unit 731 scientists to the U.S. and offer them clemency from war crime trials. The United States government may have covered up its role in protecting the Unit 731 scientists, thus keeping the scientific data for itself and its allies. However, as late as January 1946, George Merck was apparently unaware of the United States possessing Japanese data as he asserted in a Report to the Secretary of War: "There is no evidence that the enemy ever resorted to this means of warfare. Whether the Japanese Army could have perfected these weapons in time and would have eventually used them had the war continued is of course not known."[403] This Report, from the most senior civilian expert on biological warfare in the U.S. government would argue that any intelligence known at the time on enemy BW programs and research and development was not being shared with officials in a position to respond to the information.

In fact, the interrogators of the Japanese scientists questioned the creativity of the Unit 731 scientists, concluding:

> "General Ishii and his assistants also exhibited a curiously limited imagination insofar as the virus/rickettsial agents were concerned. Why this group of

[403] Army, U.S. Army Activity in the U.S. Biological Warfare Programs.

pathogens was not even considered in the selection of agents is not clear. This is especially puzzling since rickettsiae in mass production were available at the typhus vaccine plant. It is, of course, quite possible that fear of retroactivity was the important brake in the policy of agent selection."[404]

Despite that doubt, Karl T. Compton, American physicist and leader of the early interrogations conducted by the Far Eastern Commission, commented in a letter to President Truman that bacteriology was the only field in which the mission "uncovered any Japanese scientific work which added anything to out own state of knowledge or art." Compton was skeptical of the Japanese claim that the research was only for defensive purposes. Remarkably, Compton concluded that, despite 4,000 bombs being used in tests at Pingfan, "the Japanese at no time were in a position to use BW as a weapon."[405]

A declassified 1948 CIA study on the importance of Japan to the balance of power in eastern Asia gave no mention of Japan's residual military capability or its remaining scientific base.[406] Rather, the study focused on the ability of Japan to counter Soviet attempts to influence politics and economics in the Asiatic sphere. U.S. concerns about Soviet hegemony of Japan were at least a partial factor in bringing Japan's BW infrastructure to the United States.[407] Although the Japanese program has been called

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[404] P. 122, Robinson, The Rise of CB Weapons.
[405] P. 536, Home and Low, "Postwar Scientific Intelligence Missions to Japan."
[406] Central Intelligence Agency, Strategic Importance of Japan (Central Intelligence Agency, 1948).
[407] Central Intelligence Agency, The Japan Peace Treaty -- Problems, Issues, and Reactions (Central Intelligence Agency, 1947).

"uncoordinated, often amateurish, and highly compartmentalized,"[408],[409] it potentially was also a valuable treasure trove of the effects of biological warfare on human subjects.

It is quite likely that in the 1950s Canada was given access to the records of the notorious Unit 731 of the Japanese Imperial Army. It is known that they were briefed about Japan's program during some of the joint Canada-UK-U.S. meetings during the war. A secret report written in December 1947 by Canada's Defence Research Board began: "With the exception of some isolated incidents in China, bacteriological warfare has not been used as weapon of war." Later versions of the report omitted all reference to China. It is suspected that the omitted references were a result of being handed the debriefing records of the Unit 731 officers by U.S. military officials.[410] More than just a historical anecdote, this is important because of Canada's role as judge and associate prosecutor to the International Military Tribunal for the Far East (the Japanese "Nuremburg" war crimes trial). Did the provision of the Unit 731 data sway any balance of justice? Some believe that it did but, more importantly to this inquiry, what did Canada do with the Unit 731 data?

At any rate, the activities of Unit 731 came to light after the war in many different ways. Confessions by many of the former researchers were published, sometimes anonymously,

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[408] Sheldon Harris points out that after fifteen years of "arduous efforts and enormous expenditures" Unit 731 had failed to develop a viable biological weapon. Harris, "The Japanese Biological Warfare Programme: An Overview," p.140.
[409] P.151, Harris, "The Japanese Biological Warfare Programme: An Overview."
[410] John Price, "Conspiracy of Silence: Canada and Biological Warfare (1942-1952)," Preventing Crimes Against Humanity: Lessons from the Asia Pacific War (1931-1945) (University of Victoria: University of Victoria, 2003).

sometimes quite publicly in a sort of "soul cleansing." The USSR published captured Kwantung Army documents. Naruchi Hideo, an inspector for the Tokyo Metropolitan Police Agency, investigated former Unit 731 personnel in 1948 in connection with a famous bank robbery and mass murder – the Teikoku Bank case.[411] [412] And, as previously reported, a traveling exhibit exposing Japanese war atrocities has recently made the rounds of Japan and the neighboring islands.

Assuming the evidence of the Japanese BW program still exists, much of the real data remains unavailable to researchers. As Dr. Erhard Geissler lamented in 1999: "The Japanese Government still refuses to open its biological warfare military archives to researchers. The U.S. military and intelligence archives may contain further revealing data; but, despite the 1966 Freedom of Information Act, several government agencies refuse to accede to information requests from researchers. . . . The complete story of Japanese biological warfare may never be known unless the governments involved in the control of information open their holdings to public view."[413]

In the year 2000 relief should have come to researchers when Congress passed the Japanese Imperial Government Disclosure Act (Public Law 106-567). This law ordered

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[411] In 1948 during the American Occupation, former members of Unit 731masterminded a robbery of the Teikoku Bank involving the mass murder of bank personnel and customers using potassium cyanide. The case was cracked by Naruchi Hideo, who later wrote a book about it. The Japanese public, which was horrified and outraged by the brutal callousness of the bank robbers, was further horrified when the perpetrators were arrested and the details of Unit 731's activities were also revealed.
[412] P. 188, Ienaga, The Pacific War 1931-1945.
[413] P. 152, Geissler and Moon, eds., Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945.

the Nazi War Crimes Interagency Working Group[414] "to locate and disclose, subject to the statute's exceptions" any classified U.S. Government documents pertaining to Japanese War Crimes and to recommend their declassification and public release. However, compared with the release of documents pertaining to Nazi Germany war crimes, the disclosure law resulted in a mere trickle of data. An estimated eight million pages of documents were released pertaining to Germany; 100,000 pages were released under the Japanese Imperial Government Disclosure Act. According to the Interagency Working Group, this was because fewer records existed and the records that did exist had already been released.[415] This answer will hardly address or assuage the suspicions of the skeptical researchers who suspect a cover-up of the U.S. role in saving the Japanese from war tribunals. However, since some information had been released and published in the West since the early 1980s, one can argue that there was little incentive for the U.S. to continue to conceal the data in the 21st century. In 2006, the National Archives released an extensive database containing many (if not all) records uncovered by the Interagency Working Group pertaining to Japanese War Crimes during the war period.[416]

Wang Xuan, a lawyer and head of the Chinese plaintiffs suing Japan for the actions in occupied China during World War II, recently claimed at an international seminar on the Nazi Holocaust and Nanjing Massacre that 270,000 Chinese fell victim to Japanese

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[414] The Working Group was subsequently renamed as the Nazi War Crimes and Japanese Imperial Government Records Interagency Working Group.
[415] P. 8-9, Edward Drea, Greg Bradsher, Robert Hanyok, James Lide, Michael Petersen and Daqing Yang, eds., Researching Japanese War Crime Records: Introductory Essays (Washington, D.C.: The National Archives and Records Administration, 2006).
[416] William H. Cunliffe, Select Documents on Japanese War Crimes and Japanese Biological Warfare, 1934-2006 (Washington, D.C.: National Archives and Records Administration, 2006).

biological warfare from 1932 to 1945.[417] That figure is echoed by official statements of the Chinese Embassy.[418]

As a sort of denouement, it was reported in March 2006 that the ruins of Unit 731's command center at Harbin will become a "world famous ruins park of the World War II."[419] Twenty million yuan (about U.S. $2.5 million) is planned to be invested to rescue, protect, and develop the ruins. An additional 30 million yuan was allotted by the National Development and Reform Commission to dismantle two residential buildings across the street from the Unit 731 ruins.

[417] Renmin Ribao, "Some 270,000 Chinese Fell Victim to Japanese Germ Warfare in WWII," Renmin Ribao 2005.
[418] Embassy of the People's Republic of China in the United States of America, Scholar: 270,000 Chinese Civilians Victimized by Japanese Germ Warfare.
[419] China View, Unit 731 Command Center to Become Ruins Park, 2006, China View, March 24 2006 2006.

The Allies

Canada

"Canada has never had, and does not possess biological weapons (or toxins) and has no intention to develop, acquire or stockpile such weapons in the future." The Canadian delegate to the United Nations' Conference of the Committee on Disarmament, 24 March 1970[420]

The above statement is, quite simply, false. It is not clear if the Canadian delegate intended to deceive the Committee on Disarmament in the run-up to the completion of the Biological and Toxin Weapons Convention. It is always possible that the Canadian Ministry of Defence did not communicate with the Ministry of Foreign Affairs about its activities. It is possible that the statement is actually an incredibly ingenuous turn of phrase – truthful in its broadest sense but disregarding over a decade of research and development. But, no matter, it is false.

Despite the protestations of innocence, the record shows that the Canadian BW effort actually predates that of the United Kingdom and the United States. As early as 1937, a correspondence is recorded between Sir Frederick Banting, Nobel Prize Winner in Medicine or Pharmacology and the co-discoverer of insulin, and General Andrew

[420] P. 190, Donald Avery, "Canadian Biological and Toxin Warfare Research, Development and Planning, 1925-45," Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945, eds. Erhard Geissler and John Ellis van Courtland Moon, vol. 18, SIPRI Chemical & Biological Warfare Studies (Oxford: Oxford University Press, 1999).

McNaughton, then of Canada's National Research Council, where Banting presents his prescient view of the future of modern warfare. Banting argues in the seven-page letter that "the airplane had enormously increased the danger of chemical weapons and the same applied to the spreading of bacteria. Open water reservoirs could be the targets of diseases like Typhoid, Cholera and Dysentery which could be grown in large quantities in laboratories. Projectiles could be poisoned with the germs of Tetanus, Rabies or Gangrene, or possibly with the toxins of snake venom or botulinus bacteria (food poisoning). Psittacosis (parrot fever) could be made into "dust bombs" and Anthrax and Foot and Mouth disease used against animals."[421]

Banting's concern about the potential threat of bacteriological weapons against the allies led him to an unusual conclusion: "Bacterial warfare must be explored fully because it is not beyond possibilities that it will be used by our unscrupulous enemy. . . .the only safe defensive position against any weapon is afforded by *a thorough understanding which can only gained by a complete preparation for the offensive use of that weapon*." (Emphasis added)[422] [423]

By October 1938, Canada had decided to begin exploring the potential problems of bacteriological weapons, but as a national issue not specifically concerned with the

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[421] P. 22-23, Bryden, Deadly Allies - Canada's Secret War 1937-1947.
[422] P. 197, Avery, "Canadian Biological and Toxin Warfare Research, Development and Planning, 1925-45."
[423] This concept of "offence for defence" carried over after World War II in the official policy of the United Kingdom, which in October 1945 issued a directive approving the continuation of BW research in peacetime. Implicit in the directive was offensive research and, according to one analyst, was in accordance with the "no first use" rule of the 1925 Geneva Protocol. Balmer, Britain and Biological Warfare p.60.

military aspects of BW. The Department of Pensions and Health was instructed to establish a sub-committee to investigate the defensive aspects of BW. Similarly, the Department of Agriculture was told to protect the nation's livestock from animal disease such as Foot and Mouth, Rinderpest, and Pleurapneumonia.[424]

While Canada's scientific base was busy exploring the capabilities of both chemical and bacteriological weapons, the Canadian military was sounding a note of caution. Colonel Wally Goforth of the Canadian General Staff claimed that biological weapons, "to a military mind, were unpredictable, 'unsoldierly' and would 'tend to upset his careful staff tables and logistical calculations.'"[425] Lacking the support necessary to conduct full scale research, Banting continued his research at universities throughout Canada and continued his lobbying of experts in the United Kingdom and the United States to begin a true BW program. Banting called BW one of the gravest dangers and charged that "a very great responsibility rests upon the scientists who have so advised the British Government concerning bacterial warfare. It seems to me they fail to realize that upon their advice may rest the security and safety, and even the lives, of the civilian population and fighting forces."[426]

By June 1940, the war situation in Europe had changed significantly. Banting was convinced that Germany's early tactical successes in France and the Netherlands were at

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[424] P. 195, Avery, "Canadian Biological and Toxin Warfare Research, Development and Planning, 1925-45."
[425] P. 51, Balmer, Britain and Biological Warfare.
[426] P. 32, Balmer, Britain and Biological Warfare.

least partially a result of the use of BW[427] (there is nothing in the reading to suggest what drove Banting to this conclusion). But it is clear that by 1940 Banting had pulled in several fellow researchers throughout Canada, as well as supporters in the U.S. and UK. R&D work was done at Canadian universities, notably Banting's home department at the University of Toronto, where the university's President, H.J. Cody, had given Banting assurances that the top secret BW research could be conducted at the university[428], at McGill and Queens University, where microbiologist E.D.G. Murray had already been conducting research on gangrene[429], and at Connaught Laboratory.

An alliance between Canada, the United Kingdom, and the United States in biological research resulted from something later known as the "Tizard mission." Sir Henry Tizard was the first chairman of the UK's Defence Research Policy Committee (DRPC).[430] Tizard was a non-believer in the future of BW, but in 1940 he traveled to Washington to take part in discussions with U.S. and Canadian researchers on two new technologies: uranium-based weapons and aircraft radar. The Tizard mission was intended to be an exchange of UK technological secrets for a commitment by the U.S. to join the war effort. Banting used the opportunity to cement the BW bonds with U.S. researchers.[431] Four months later Banting was informed of the creation of a secret ad hoc committee in

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[427] P. 196, Avery, "Canadian Biological and Toxin Warfare Research, Development and Planning, 1925-45."
[428] P. 194, Avery, "Canadian Biological and Toxin Warfare Research, Development and Planning, 1925-45."
[429] P. 197, Avery, "Canadian Biological and Toxin Warfare Research, Development and Planning, 1925-45."
[430] P. 60-61, Balmer, Britain and Biological Warfare.
[431] P. 45, Bryden, Deadly Allies - Canada's Secret War 1937-1947.

the U.S. “to consider the possibilities of the use of bacteria and other similar substances in warfare.”[432]

In 1940, Banting also came across an unusual source for funding the still nascent Canadian BW program. In his role as chairman of the Aviation Medicine Committee, Banting had occasion to meet with James Duncan, then Deputy Minister for National Defence for Air. Duncan was a former vice-president of Massey Harris, the international farm machinery manufacturer. He listened as Banting related the current poor condition of funding for Canadian R&D and then offered a unique source of funding for Canada’s war effort: private industry. Through Duncan’s contacts and efforts, the NRC suddenly had several hundreds of thousands of dollars pledged to wartime R&D. Among Banting’s benefactors was John David Eaton, head of the T. Eaton Co. department store chain, Sir Edward Beatty, president of the Canadian Pacific Railway, and Sam Bronfman, head of the Seagrams distillery.[433] Within eighteen months the privately donated funds totaled about $1.3 million.[434] Four programs were funded from this largesse: RDF (the codeword for radar), ASDIC (the acoustic detection of submarines), Uranium-235 as “a potential super-explosive”, and bacteriological warfare.[435]

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[432] P. 198, Avery, "Canadian Biological and Toxin Warfare Research, Development and Planning, 1925-45."
[433] P. 40-41, Bryden, Deadly Allies - Canada's Secret War 1937-1947.
[434] Worth about $17,092,000 in 2008 Canadian dollars. http://www.bankofcanada.ca/en/rates/inflation_calc.html
[435] P. 42, Bryden, Deadly Allies - Canada's Secret War 1937-1947.

In October 1940, Banting and Charles Mitchell, a Canadian Department of Agriculture pathologist, petitioned the government in an effort to obtain an island in the West Indies where they could conduct research on Rinderpest for use against the Germans.[436] While the island was never obtained, it was about this time that Banting began aerial dispersal experiments at Balsam Lake, northeast of Toronto using various grades of sawdust as the potential carrier for BW pathogens.

In November 1940 Banting was given permission to establish a pilot plant for the production of BW. From this authorization was established something called the M-1000 Committee.[437] Experts came from the University of Toronto's Bacteriological Department, the Banting and Best Department of Medical Research, the Ontario Research Foundation, the Department of Agriculture and the Connaught Laboratory.

The notes of the M-1000 researchers are instructive concerning the wide variety of thought and planning underway. It included the use of arthropods as vectors in urban areas, the use of break-apart containers dropped from aircraft, food service workers deliberately contaminating food, the use of poisoned envelopes being sent through the mail, and the use of multiple pathogens in a single attack to complicate symptomatology.[438]

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[436] P. 49, Bryden, Deadly Allies - Canada's Secret War 1937-1947.
[437] The date of establishment of the secret M-1000 committee is not definite. SIPRI dates its establishment a full year later in November 1941.
[438] P. 199, Avery, "Canadian Biological and Toxin Warfare Research, Development and Planning, 1925-45."

On 21 February 1941, a major setback to the future of Allied BW R&D occurred when Frederick Banting was killed in a plane crash en route to the U.K. where, reportedly, he was planning to ask, among other things, for accelerated research on biological warfare.[439] The facts of Banting's death are surrounded in mystery. Obituaries at the time differ on the reasons for Banting's flight to the UK. One book alleges that the aircraft crash was the result of Nazi sabotage.[440] The author also states the official records of the aircraft accident commission are absent from the Canadian Archives – strikingly reminiscent of John Bryden's claim that records of Canada's biological weapons program are also missing from the Archives. But most newspaper accounts of the plane crash in Newfoundland embraced Banting as a hero: "Only when he had done all he could both as a doctor and as a man did he leave the plane – to die,"[441] even if, in many cases, they weren't knowledgeable of why he was flying to the UK in the middle of winter. One newspaper claimed, firstly, that he was involved in wartime medical research, and secondly, that he was flying to observe firsthand some of the problems with winter aviation.[442]

The surviving scientists, mostly medical doctors and university professors, had, apparently, little heart for the potential for mass death and the BW effort dwindled. For example, a potential breakthrough in the dissemination of typhoid using Banting's

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[439] P. 197, Avery, "Canadian Biological and Toxin Warfare Research, Development and Planning, 1925-45."
[440] Callahan, The Banting Enigma -- the Assassination of Sir Frederick Banting.
[441] "Report Banting Tended Injured Pilot before His Own Life Ebbed Away," Toronto Evening Telegram February 26, 1941 1941.
[442] "Sir Frederick Banting Is Victim of Plane Crash," The Alliston Herald February 27, 1941 1941.

sawdust occurred in May, 1941 but was never pursued further by the Canadians.[443] E.D.G. Murray, for one, realized that the U.S. was going to be the linchpin for the Allies BW effort, not the UK and certainly not Canada[444].

By December 1941, Murray traveled to Washington to begin exchanging data on BW matters. The Canadians provided data on the mosquito *Aedes Aegypti*, the vector for yellow fever and malaria. In exchange, they received information on botulinum toxin, malaria, plague, psittacosis, tularemia, typhus, and yellow fever.[445]

The real breakthrough for Allied BW research, though, was the appointment in August 1942 of George Merck as chairman of the U.S.'s War Research Services. Merck pushed for greater allied cooperation in biological weapons and traveled both to Porton Down in the UK and to Canada to observe personally the research being conducted there. Within a year of Merck's appointment, the research facility at Camp Detrick, Maryland was established and field tests were planned at Horn Island, Pascagoula, Mississippi, and at Dugway, Utah.[446]

There were two key facilities in Canada for BW research, development and testing: Grosse Isle and Suffield. In 1942, Dr. Murray (who had taken over stewardship of the

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[443] This research, using *salmonella typhimurium*, may have been the first truly offensive BW work done by the Allies. Bryden, Deadly Allies - Canada's Secret War 1937-1947 p.82.
[444] P. 201, Avery, "Canadian Biological and Toxin Warfare Research, Development and Planning, 1925-45."
[445] P. 199, Avery, "Canadian Biological and Toxin Warfare Research, Development and Planning, 1925-45."
[446] P. 46, Balmer, Britain and Biological Warfare.

Canadian BW program after the death of Dr. Banting) recommended the creation of the War Diseases Research Station on Grosse Isle, Quebec.[447] Murray believed the island to be perfect for joint experiments on "Rinderpest, Plague, and Enemy Agents"[448] and recommended it be used for joint Canada-U.S. research on rinderpest[449], codenamed GIR-1 (for Grosse Isle Rinderpest). Grosse Isle became Canada's primary R&D facility.[450] But Dr. Merck was already pressing for more joint Canada-U.S. research in anthrax, because of "its hardiness, the fact that it killed animals with regularity, was stable, could be produced in quantity, and because dissemination was not an impossible product", and in botulinus toxin.[451] (Anthrax was already being explored by Canada because of successful weaponization research being conducted by Porton Down on Gruinard Island, off the coast of Scotland.[452])

By November 1942, Canada had funded an anthrax program, codenamed GIN, to support the U.K., although Murray termed the project ". . . entirely Canadian. It is designed to provide 'N' for the British authorities immediately and in suitable quantity."[453] [454] The project was never adequately supported and may have had an accidental release in

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[447] Grosse Isle is infamous for its role in the Irish diaspora after the Potato Famine of 1847-48. Over 12,000 immigrants are buried at Grosse Isle, the victims of typhus and cholera.
[448] P. 97, Bryden, Deadly Allies - Canada's Secret War 1937-1947.
[449] P. 200, Avery, "Canadian Biological and Toxin Warfare Research, Development and Planning, 1925-45."
[450] P. vii, Bryden, Deadly Allies - Canada's Secret War 1937-1947.
[451] P. 202, Avery, "Canadian Biological and Toxin Warfare Research, Development and Planning, 1925-45."
[452] Much like Gruinard Island in the United Kingdom, Grosse Isle is being remediated from the effects of anthrax and is planned to become a national park.
[453] "N" was the British code designation for anthrax.
[454] P. 203, Avery, "Canadian Biological and Toxin Warfare Research, Development and Planning, 1925-45."

August 1943 when several staff members were hospitalized with "an unexplained fever."[455] By August 1943 the project had been shut down, the equipment shipped off to Camp Detrick or Suffield and the scientists transferred to the Suffield Experimental Station.

The Suffield facility had been created in 1941 for joint Canada-U.K. chemical weapon tests and in 1944 Section E was created for testing of biological materials.[456] [457] Testing using anthrax simulants began in December 1943, mostly for fear that live anthrax testing could be spread by the local population of gophers and antelope.[458]

Additional testing at Suffield in 1944 was of "Agent X" – botulinus toxin. Canadian and U.S. scientists had developed a particularly lethal Type A, and a less lethal Type B. The strains were developed under two tracks: one track was to develop a vaccine against suspected German strains; the second track was to develop large quantities of Agent X for retaliation. A 500 lb. aerial bomb loaded with 30,000 X-tipped cluster projectiles (most likely flechettes) was successfully tested against sheep with coverage over 10,000 square yards with one to five darts per square yard.[459]

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[455] P. 204, Avery, "Canadian Biological and Toxin Warfare Research, Development and Planning, 1925-45."
[456] P. 96, Ed Regis, The Biology of Doom -- the History of America's Secret Germ Warfare Project (New York: Harry Holt and Company, 1999).
[457] It is now known as Defence Research & Development Canada – Suffield (DRDC Suffield).
[458] P. 205, Avery, "Canadian Biological and Toxin Warfare Research, Development and Planning, 1925-45."
[459] P. 206, Avery, "Canadian Biological and Toxin Warfare Research, Development and Planning, 1925-45."

Additional Canadian testing in 1944-1945 included two more offensive agent weapons: brucellosis and tularemia. Tularemia was regarded as most promising because of its infectivity, its stability, and the fact that it incapacitated rather than killed.[460]

According to most records, the Canadian BW program was terminated in 1947 and all records of its existence were destroyed.[461] At least two sets of microfilmed records remained in the Canadian archives, however, and John Bryden (for one) gained access to these records for the writing of his book, Deadly Allies.[462]

However, reports of research continued for at least the next decade, albeit mostly on allegedly defensive research.[463] British records indicate BW testing at Suffield in 1950 of something known as "the baby 4 lb. bomb." These tests used *Brucella suis* and were intended to determine why the lethality of the bomb was reduced 100-fold from laboratory tests.[464] Another series of tests were apparently conducted at Suffield in 1957 under the joint Large Area Concept (LAC). LAC was based on the theory that conventional weapons limit the effectiveness of BW, but that "off-target" BW attacks by a single aircraft could have a marked force multiplier effect. Canada was to conduct field

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[460] P. 206, Avery, "Canadian Biological and Toxin Warfare Research, Development and Planning, 1925-45."
[461] William Sheridan, Chemical and Biological Weapons, Available: http://www3.sympatico.ca/cypher/cbw.htm, January 7, 2007.
[462] Bryden was able to get access to files despite the efforts of Canadian government officials' attempts to restrict the files from him. Some files were restricted from access by National Defence archivists but could be located in the files of the National Research Council. Sheridan, Chemical and Biological Weapons, Bryden, Deadly Allies - Canada's Secret War 1937-1947 p.viii-ix.
[463] P. 164, Robert Harris and Jeremy Paxman, A Higher Form of Killing, Trade Paperback Edition ed. (New York: Random House, 2002).
[464] P. 88, Balmer, Britain and Biological Warfare.

tests with live avirulent strains over a range of 10,000 square miles (calculations had been made of potentially up to 40,000 square miles coverage under "undesirably restricted" conditions.).[465]

There are some fascinating aspects of Canada's BW program that need understanding by any student of nascent WMD programs of developing nations. The Canadian BW program was not the result of obvious military requirements or of a clear-cut national policy. Rather the program was the brain-child of a single person, Sir Frederick Banting. The Canadian BW program was not even initiated at military facilities; it began, in fact, in Banting's university laboratory.

Secondly, it is important to recognize that Canada's program only contributed tangentially to Canada's defense. It was effectively a "sub-contracted" program funded initially by private donors and subsequently by the United Kingdom and the United States. Canada's biggest contribution may have been the availability of R&D centers and testing facilities for developing BW weapons for the Allies. Clearly, the BW analyst looking for a country's program needs to be aware of and look at places beyond the regular military facilities and possibly beyond a country's borders for evidence of its BW program.

[465] P. 160, Balmer, Britain and Biological Warfare.

The moral equivocation inherent in the decision-making of Dr. Banting[466] should not escape notice. He was a medical doctor and a Nobel Prize winner who discovered and isolated insulin, one of the most important life-saving advances of the twentieth century. Yet he saw no problem dabbling (albeit "expertly") in the world of biological weapons, nor did he see any qualitative distinction between defensive preparations and offensive weapons.

[466] One article described Banting as "a simple country doctor", neglecting the fact that he was also a Nobel Prize winner in Medicine. This was, however, a trait that may have been Banting's strength, although he certainly didn't recognize it as such. He described himself, on the eve of his Nobel award ceremony, as being "as ignorant as a peasant" (p. 34, Bryden, Deadly Allies - Canada's Secret War 1937-1947. But, it was clearly this self-perception of his that drove his curiosity to such limitless bounds.

United Kingdom

The inception of the United Kingdom's BW program can be directly attributed to the writings of Wickham Steed. Concerns about the possibility of a German BW program led the War Department to seek advice from the Chemical Defense Experimental Station at Porton Down, as well as from the Medical Research Council and deans of various academic institutes and faculties.[467] In November 1936, the Committee of Imperial Defence established a Bacteriological Warfare Subcommittee, thereby formalizing the United Kingdom's interest in biological warfare. The committee's mandate was to "report on the practicability of bacteriological warfare and to make recommendations as to the countermeasures which should be taken to deal with such an eventuality." The committee was chaired by Colonel Sir Maurice Hankey and included representatives from the medical services of the Army, the Royal Navy, the Royal Air Force, the Home Office, the Medical Research Council (MRC), as well as the Chief Superintendent of the Chemical Defence Research Department.

An Emergency Bacteriological Service was established in 1938. At the same time, the Bacteriological Warfare Subcommittee was renamed the Committee of Imperial Defence Subcommittee on Emergency Bacteriological Services, ostensibly to reflect its defensive nature. But the name was almost immediately changed to The Emergency Public Health

[467] P. 44, G.B. Carter, Chemical and Biological Defence at Porton Down 1916-2000 (London: The Stationery Office, 2000).

Laboratory Service because Sir Edward Mellanby[468], Secretary of the Medical Research Committee, found the "Service" title "too disturbing to the public mind."[469] The "Emergency" was eventually dropped from the title and the Public Health Laboratory Service remains in existence today, although its biological warfare beginnings are now a mere historical footnote. That said, the similarity must be noted between the UK's Public Health Laboratory Service and Imperial Japan's Water Purification Units, at least in terms of misleading organizational titles.

The UK's interest in BW, however, can be traced back to World War I, an interest that grew in the years between the Armistice and 1936. War Office intelligence reports from the period indicated interest in biological weapons by Germany, Czechoslovakia, Italy and the Soviet Union.[470] German plans to use anthrax, cholera, and glanders in various sabotage attempts on livestock in neutral countries during World War I were also known to British intelligence.[471]

If one must be named, the founding father of the UK's BW program would likely be Colonel Sir Maurice Hankey (later Lord Hankey) Secretary of the Committee of Imperial Defence and the earliest recipient of the Wickham Steed papers on German research (Steed reportedly showed the papers to Hankey prior to publication). Hankey established

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[468] Mellanby is also responsible for the arrival of Sir Paul Gordon Fildes and his group at Porton Down to engage in war work. Carter and Pearson, "British Biological Warfare and Biological Defence, 1925-45," p.171.
[469] P. 45, Carter, Chemical and Biological Defence at Porton Down.
[470] P. 169, Carter and Pearson, "British Biological Warfare and Biological Defence, 1925-45."
[471] P. Balmer, Britain and Biological Warfare.

the Biological Warfare Subcommittee and remained a member of the Biological Research Advisory Board until the mid-1960s.

A group of prominent bacteriologists were also instrumental in the birth of the UK BW program. John Ledingham, Director of the Lister Institute and member of the MRC, William Whiteman Carlton Topley, Professor of Bacteriology at The London School of Hygiene and Tropical Medicine, and Captain Stewart Ranken Douglas, Deputy Director of the MRC's National Institute for Medical Research, teamed up to write three important memoranda to Sir Maurice concerning BW.

The first was a "faintly suspicious and cautious" memorandum analyzing the Wickham Steed allegations. Their analysis is interesting. It did not challenge the veracity of the Steed papers but examined the intent of the experiments. Thus, they argued that the use of a bacterial agent (*Micrococcus prodigiosus*) was perhaps intended to simulate a chemical release, not a biological attack. Or the biological release may not have been a simulation at all, they additionally argued, but rather was a tool in measuring air movements for possible chemical weapons release.[472] All in all, the spirit of the memorandum was not to reject the accuracy or the importance of the Steed documents but, in fact, to raise more, not less, concern about the potential threat.

[472] P. 170, Carter and Pearson, "British Biological Warfare and Biological Defence, 1925-45."

The two other memoranda from the team to Hankey suggested that the BW "issue was uncertain owing to the multiplicity of factors concerned" but that the psychological effects of threatened or actual BW attack would be considerable.[473]

Once again, though, we find a distressing absence of official records in the archives. The unofficial historian for Porton Down, Gradon Carter (himself, a long-serving staff member), laments that "the instructions and plans which inevitably must have been promulgated by the London headquarters and by the Commandant are no longer preserved at Porton. Some files of the period lie in the Public Records Office but clearly much of domestic and parochial interest disappeared long before such archives left the Departmental Records Office for the Public Record Office. Many orderly room files of interest were destroyed when the military presence left Porton in 1957."[474] In the absence of an accurate historical record, we are unfortunately dependent on conjecture and second-hand reporting.

At any rate, within a year of the onset of World War II, the British biological warfare program had begun in earnest at the Chemical Defence Experimental Station (Porton Down) with the arrival of bacteriologist Paul Fildes[475] and other scientists in October

[473] P. 172, Carter and Pearson, "British Biological Warfare and Biological Defence, 1925-45."
[474] P. 45, Carter, Chemical and Biological Defence at Porton Down.
[475] Besides being one of the founding researchers at Porton Down, Fildes is considered the founder of the study of bacterial nutrition and one of the leading microbiologists of the 20th century. He continued to be associated with Porton Down after World War II until 1968 when his wartime role was revealed to the public. Fildes saw the revelation "as a breach of confidentiality and distanced himself from the establishment thereafter." Carter and Pearson, "British Biological Warfare and Biological Defence, 1925-45," p.174. This shunning of Porton Down by Fildes is not mentioned in the official history of Porton

1940. By 1942, Fildes was recognized as "the guiding genius" behind the work at Porton Down.[476] At the beginning, their work was defensive in nature, designed to counter "on short notice" a germ attack.

In December 1941, Lord Hankey wrote to Prime Minister Churchill arguing for the development of anthrax "cakes:" "The experiments which have been made give good ground for supposing that considerable numbers of animals might be killed by this method if it were used on a sufficient scale at the time of year when cattle are in the open." Churchill approved of the plan, called Operation Vegetarian.[477] By 1943 the UK had a stockpile of cattle cakes laced with anthrax to use against livestock and a prototype anthrax bomb for use against human populations[478] in a retaliatory mode. Interestingly, the retaliatory nature of the British program apparently was never reviewed by the established Biological Warfare Committee or the War Cabinet. The shift was a unilateral action by Minister without Portfolio Lord Hankey to prepare a "further steps" strategy of "offence for defence."[479]

There are at least three references to the alleged use of BW by the UK during World War II. British secret agents reportedly used a botulism-spiked grenade in order to assassinate Nazi Secret Service Chief (and architect of the "Final Solution" plan to exterminate the

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Down. One would conclude, in fact, that Fildes had no association with the facility after Word War II. Carter, Chemical and Biological Defence at Porton Down.

[476] P. 148, Guy Hartcup, The Effect of Science on the Second World War, Paperback ed. (Houndmills: Palgrave Macmillan, 2003).

[477] P. 440, Baker, Human Smoke: The Beginnings of World War Ii, the End of Civilization.

[478] This was most likely the results of the Canadian "Project GIN".

[479] P. 11, Balmer, Britain and Biological Warfare.

Jews[480]), Reinhard Heydrich.[481] This report is so rarely corroborated that it may be a false charge. After the War, the UK's Biological Research Advisory Board advised that botulism was not a suitable weapon because insufficient research had been carried out for large-scale production or storage.[482] In the mid-1950s, however, the BRAB suggested to the Chiefs of Staff[483] that the U.S. had not considered "the potentiality" of using rapidly acting botulinum toxin as a tactical weapon – i.e., for assassinations.[484] Additionally, as reported in the Germany section, Walter Hirsch, in his study of Soviet BW and CW Preparations, repeated the charge that the UK had dropped potato beetles over western Germany.[485]

A third report[486] alleged that Winston Churchill had advocated using anthrax against Nazi Germany in response to the 1944 V-bomb attacks. This report has been denied by, among others, Dr. Julian Lewis, a conservative Member of Parliament, and R.V. Jones, an expert in WWII scientific intelligence in the UK and the "father" of technical intelligence in both the UK and the U.S.. Lewis "clarifies" the problem by explaining that Churchill had "pressed for consideration of the use of poison gas," not for anthrax. This clarification, however, goes against the evidence of the previously-mentioned

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[480] P. 351, Cornwell, Hitler's Scientists -- Science, War, and the Devil's Pact.
[481] Max Boot, War Made New -- Technology, Warfare, and the Course of History - 1500 to Today (New York: Gotham Books, 2006).
[482] Balmer, Britain and Biological Warfare.
[483] Not clearly defined by Balmer, the "Chiefs of Staff" are most likely the Chiefs of the UK's military services.
[484] P. 134, Balmer, Britain and Biological Warfare.
[485] P. 113, Hirsch, Soviet BW and CW Preparations and Capabilities.
[486] R. V. Jones, Julian M. Lewis and Barton Bernstein, "Churchill's Anthrax Bombs - a Debate," Bulletin of Atomic Scientists 43.9 (1987).

Operation Vegetarian. Additionally, there is a February 1945 "Most Secret[487]" memorandum from Lord Cherwell, Britain's Chief Science Advisor at the time, to Prime Minister Churchill arguing the case for airborne deployment of anthrax and urging that Britain obtain the anthrax bombs from the United States.[488] "We cannot afford not to have N bombs," Cherwell's letter concluded.

But, apparently, the UK erred in its analysis of the German BW program during WWII. The decision by the UK not to employ anthrax weapons was made in the mistaken belief that Germany's biological weapons program was advanced far enough to retaliate against Allied use of anthrax.[489] Barton Bernstein takes a different tack, however. He argues that there was no Allied BW deterrence factor because the program was shrouded in secrecy and, therefore, "It is unclear how and why, given this strategy of secrecy, Germany was to be deterred by a weapon that the British chose not to acknowledge they were developing."[490]

UK Intelligence and the BW Threat

As stated earlier, the UK certainly was aware of Germany's attempts at sabotage using biological agents in the waning days of World War I. British Naval Intelligence had, in fact, intercepted German communications in 1916 planning attacks against livestock

[487] The equivalent of today's "Top Secret" classification.
[488] Barton J. Bernstein, "Churchill's Secret Biological Weapons," Bulletin of Atomic Scientists 43.1 (1987).
[489] Bernstein, "Churchill's Secret Biological Weapons."
[490] P. 42, Jones, Lewis and Bernstein, "Churchill's Anthrax Bombs - a Debate."

Norway, Romania, and Argentina.[491] All three planned attacks were thwarted. The UK also analyzed the Wickham Steed "secret" papers as one would analyze information from a human intelligence source – analyzing the data separate from a second analysis of the source of the data. The Subcommittee on Bacteriological Warfare also analyzed "a small but increasing number" of other intelligence reports on foreign BW programs.

Intelligence reports, mostly hearsay, on foreign BW programs continued throughout the 1920's, such as a report of German BW research on the use of bacteriology for war purposes at the Chemical Society at Berlin and Leipzig.[492] In 1934, the UK received intelligence about Germany's program from a source "who has proved reliable in the past" reporting that a German gas course for advanced gas specialists had been divided into parts dealing with bacteriological and gas warfare.[493] (There was apparently no mention if the course was offensive or defensive in nature.) Other pieces of intelligence on Germany's intentions were collected and analyzed and eventually a report summarizing the intelligence *in toto* was prepared for the Subcommittee. Hankey dismissed the summary on German activities as "probably scrappy." Very little of the intelligence that came before the Subcommittee constituted information that would be considered "actionable" by modern standards. Rather it was largely second-hand information describing possible levels of interest (or disinterest) in BW.

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[491] P. 200, Patrick Beesly, Room 40 -- British Naval Intelligence 1914-18, First ed. (London: Hamish Hamilton, 1982).
[492] P. 169, Carter and Pearson, "British Biological Warfare and Biological Defence, 1925-45."
[493] P. 25, Balmer, Britain and Biological Warfare.

One detailed report claimed that anthrax was being investigated by the Germans at the Military Bacteriological Institute in Berlin under the leadership of Dr. Hugo Stolzenberg. The report repeated the Wickham Steed claim that the anthrax was liquefied and put into glass capsules "to be dropped at any altitude." The report also described a "detonation-less bomb" which consisted of a parachute container opening at about 25 meters above the ground to spread the "liquid-combined spores." The report was dismissed by the Subcommittee as "doubtful" and was issued "under strong reserve."[494]

In 1925 it was reported in UK intelligence channels that in the USSR "Bacteriological warfare is receiving some attention and 50,000 gold rubles were allotted for experiments which have been carried out on a fairly extensive scale against animals such as cattle, pigs and dogs. Shells or bombs loaded with the bacteria of plague typhus, smallpox, cholera, anthrax, and tetanus have been suggested but while many of the experiments have been unsuccessful, a few have given promising results."[495]

One enticing tidbit about the Allied program is a single reference to Operation Toledo, reportedly the intelligence code-name for the joint allied biological warfare program. On May 11, 1944, Moe Berg, an OSS operative, former major league baseball player[496], and all-around raconteur, met with a U.S. Navy captain, William Moore, at the headquarters of the European Theater of Operations and reportedly discussed "Toledo". Moore

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[494] P. 26, Balmer, Britain and Biological Warfare.
[495] P. 169, Carter and Pearson, "British Biological Warfare and Biological Defence, 1925-45."
[496] It was once said of Berg's baseball life: "he can speak twelve different languages and can't get a hit in any of them."

reportedly told Berg that "the British were so skittish on the subject of, say, being bombarded by disease-bearing rats that they 'take the view that Toledo is never to be discussed.'"[497] A search for more information on Operation Toledo thus far has been to no avail.

In the mid-1950s there was an interesting debate within the UK's military and policy communities over the continued significance of biological weapons, especially in light of the new overwhelming destructive force of nuclear weapons. The United Kingdom conducted a review of the significance of biological and chemical weapons as weapons of deterrence in 1957 "against the background of use of the megaton bomb and the possible limitation of nuclear tests.[498] The UK's Chief of the Air Staff called chemical and biological weapon research "relatively cheap insurance" and, therefore, not worth terminating. (Only six years earlier, a new laboratory has been built at Porton Down to house the Microbial Research Department, reflecting "the contemporary importance of biological warfare."[499])

The Defense Research Policy Staff, though, took a more doctrinal position, arguing that "direct attack on population centers is inefficient." Others argued that offensive BW research could lead to the development of an incapacitant, "a powerful weapon which is

[497] P. 170, Dawidoff, The Catcher Was a Spy: The Mysterious Life of Moe Berg.
[498] P. 162, Balmer, Britain and Biological Warfare.
[499] P. 79, Carter, Chemical and Biological Defence at Porton Down.

far more humane than existing weapons."[500] Offensive biological weapons research continued at Porton Down although the research began to wane around 1957. The Cabinet Defence Committee under the leadership of Sir Anthony Eden decided on July 10, 1956 to pursue a solely defensive policy with regards to chemical and biological weapons.[501],[502] It has been surmised that this decision was taken, at least in part, because of Britain's adherence, albeit belatedly, to the 1925 Geneva Protocol (the UK ratified the Protocol in April 1930).[503]

[500] P. 121, Brian Balmer, "The Drift of Biological Weapons Policy in the UK, 1945-1965," The Journal of Strategic Studies 20.4 (1997).
[501] Records of the minutes of this meeting indicate the policy was only with regard to chemical weapons but offensive BW research had already begun to be curtailed.
[502] P. 79, Carter, Chemical and Biological Defence at Porton Down.
[503] P. 116, Balmer, "The Drift of Biological Weapons Policy in the UK, 1945-1965."

United States

Despite having been targeted for the use of agricultural biological weapons by Germany during the First World War, the United States had demonstrated little interest in pursuing biological weapons during the period between the two World Wars. The U.S. Army Chemical Warfare Service had maintained "a passing interest" in BW since the 1920s, but did not initiate research work until August 1941.[504] Lectures at the Chemical Warfare School at Edgewood Arsenal, Maryland, in the early 1930s "reflected the general attitude of both the scientists and military men of the period, which was to minimize the potentialities of biological warfare."[505] In 1933, Major Leon A. Fox, chief of the medical section of the Chemical Warfare Service, argued in a paper that problems with delivery and with the ability to immunize the populations of scientifically advanced countries ruled out the use of biological warfare.[506] The late 1930s brought about a marked change of perspective, partly because of the improvements in both the science of bacteriology and in the utility of airpower.[507]

The National Defense Research Committee

On 27 June 1940, the Council of National Defense issued an order, with the approval of the President, establishing a National Defense Research Committee (NDRC) to "correlate and support scientific research on the mechanisms and devices of war" and to "conduct research for the creation and improvement of instrumentalities, methods, and materials of

[504] P. 120, Robinson, The Rise of CB Weapons.
[505] P. 46, Brophy and Fisher, The Chemical Warfare Service: Organizing for War.
[506] P. 27, Endicott and Hagerman, The United States and Biological Weapons -- Secrets from the Early Cold War and Korea.
[507] P. 46, Brophy and Fisher, The Chemical Warfare Service: Organizing for War.

warfare." It had been determined that a national focus was needed and the NDRC "was making many of the scientists in the country work on various urgent military problems. Scientific personnel were limited although this was not fully realized at the time."[508]

In the fall of 1940, Dr. Vannevar Bush, chairman of the NDRC, urged Dr. Lewis H. Weed of the Health and Medical Committee of the Council of National Defense that consideration be given to the offensive and defensive aspects of biological warfare.[509] The National Institute of Health also began examining biological warfare a few months later. By the summer of 1941, the Surgeon General and the Chief of the Chemical Warfare Service both recommended to the NDRC that a committee of experts be established to survey all phases of biological warfare. Thus was established the WBC Committee.[510]

The WBC was headed by Edwin Broun Fred, dean of the University of Wisconsin. The Committee members were appointed by the National Academy of Sciences.[511] The group was chartered to make a survey of the potentialities of biological warfare when (*n.b.*, not if) the United States became involved in the war. The Committee had experts on human, animal, and plant pathology and bacteriology. In February 1942 the Committee concluded that bacteriological warfare was feasible and recommended that both defensive

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[508] P. 44, Henry DeWolf Smyth, Atomic Energy for Military Purposes (Stanford: Stanford University Press, 1945).
[509] P. 47, Brophy and Fisher, The Chemical Warfare Service: Organizing for War.
[510] WBC being a reversal of the initials for "committee on biological warfare." The acronym may have been an attempt to disguise the purpose of the group.
[511] P. 6, Rosebury, Peace or Pestilence.

and offensive capabilities be explored.[512] In June 1942, the WBC Committee turned in a report to the Secretary of War recommending that the President form a civilian agency to supervise all aspects of biological warfare. The War Research Service (WRS), headed by George Merck, was established in the Federal Security Agency in the summer of 1942.[513] The organization included Dr. Edwin B. Fred as director of research and development and the author John P. Marquand as director of information and intelligence. The WRS drew on the facilities, personnel, and expertise of a number of government agencies and departments, including the medical services of the Army and Navy, the Chemical Warfare Service, the U.S. Public Health Service, the Department of Agriculture, G-2 (Intelligence) of the Army, the Office of Naval Intelligence, the Office of Strategic Services, and the Federal Bureau of Intelligence.[514] The WRS was supported by a group of scientific advisors, known as the ABC Committee.[515] This group later changed its initials to the DEF Committee, demonstrating either a great sense of humor or a perfect example of bureaucratic inertia.

Congressional review of the Executive Branch and the War Department's efforts in biological warfare research and development was, at best, cursory. Key Congressional leaders were kept "generally aware" of advances by Secretary of War Stimson and Dr.

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[512] P. 29, Endicott and Hagerman, The United States and Biological Weapons -- Secrets from the Early Cold War and Korea.

[513] The Federal Security Agency was part of the U.S. social infrastructure and managed among other things, Social Security. Placing the WRS under the Agency rather than in the War Department was apparently another effort at hiding the activity. Endicott and Hagerman, The United States and Biological Weapons -- Secrets from the Early Cold War and Korea p.29.

[514] P. 107, Brophy and Fisher, The Chemical Warfare Service: Organizing for War.

[515] P. 7, Rosebury, Peace or Pestilence.

Merck but because of the need for "strict secrecy and urgency imposed during World War II", little of value was probably shared.[516]

The possibility of enemy forces using biological weapons against United States or Allied forces does not seem to have registered in the military's mind until 1943 when intelligence suggested Germany might be considering the use of biological rocket attacks against Britain. The War Department decided then that defensive measures against biological weapons were warranted and a two-week course in technical measures of defense against a biological attack was established at Camp Detrick, Maryland. A total of five classes were held between February and July 1944, attendance limited to senior and specially qualified chemical and medical officers and naval counterparts. The graduates were assigned to the various theaters of operations as sort of "coaches" in anti-BW procedures for the wider chemical defense cadres. A total of 217 officers graduated from the course.[517]

Since there is little evidence of intelligence-derived information being made available, or used, in a timely manner during the war[518], it is rather surprising to see that Dr. Merck pointedly included the use of intelligence resources as part of the overall U.S. BW

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[516] p. B-1, Annex B, Army, U.S. Army Activity in the U.S. Biological Warfare Programs.
[517] P. 356-357, Brophy and Fisher, The Chemical Warfare Service: Organizing for War.
[518] Consider, for example, the failure of intelligence resulting in the Japanese attack on Pearl Harbor (see Roberta Wohlstetter, Pearl Harbor -- Warning and Decision (Stanford: Stanford University Press, 1962).and Joseph E. Persico, Roosevelt's Secret War -- FDR and World War II Espionage, Random House Trades Paperback ed. (New York: Random House, 2002).)

program. His 1946 letter to Secretary Stimson[519] references "an extensive program for the collection of intelligence on biological warfare" utilizing the collection agencies of the Armed Forces, the OSS, and the FBI.[520] Notably, he refers solely to collection, not analysis nor sharing of any resultant assessments. It is possible that Merck was referring to the data collected via the ALSOS Mission; information we now know to be inaccurate and largely overblown (see the Germany section).

There were four principal installations associated with the United States' BW program during World War II. Camp Detrick (later called Fort Detrick) at Frederick, Maryland was activated in April 1943 and at President Roosevelt's direction, in June 1944, came under direct control of the U.S. Army's Chemical Warfare Service (CWS) with continuing cooperation of the Navy and the Public Health Service. At that time George Merck was elevated to become Special Consultant for Biological Warfare to the Secretary of War and Chairman of the United States' Biological Warfare Committee, which advised the Secretary of War on BW policy matters and maintained liaison with the British and Canadian efforts in BW.[521]

Horn Island, off the coast near Pascagoula, Mississippi, was selected as a field test site in early 1943. The island was so sandy that it was not possible for roadways to be prepared, so an eight-mile long narrow-gauge railroad was laid by the "Seabees."

[519] This is the letter referred to in the popular literature as "the Merck Report."
[520] P.A3, Annex A, Army, U.S. Army Activity in the U.S. Biological Warfare Programs.
[521] P. 7, Rosebury, Peace or Pestilence.

Administratively, Horn Island was a sub-station of Camp Detrick until June 1944 when it became a separate installation under the Special Projects Division, OC CWS.[522] Belatedly, the Army discovered several problems with the island as a choice for a BW field test site. First, it was only ten miles off the Mississippi coast. Secondly, two-thirds of the year the prevailing winds blew toward the mainland.[523]

Since Horn Island was so close to the coastline for many BW tests, a more secluded facility was needed in short order. Granite Peak, a 250-square-mile area at Tooele, Utah was activated in June 1944. It was administratively subordinate to the Dugway Proving Ground, a chemical weapons test facility, thirty miles away.[524] All major field studies were conducted at the "relatively safe area" of Granite Peak[525].

The Vigo Plant, near Terre Haute, Indiana was an Ordnance Department plant which was turned over to the CWS in May 1944. It was officially a pilot plant for proving operations for production of biological agents that were developed at Camp Detrick.[526] Safety testing of the plant and training of employees was still on-going at the end of the war and it never was used for large-scale production runs.[527]

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[522] P. 139-140, Brophy and Fisher, The Chemical Warfare Service: Organizing for War.
[523] P. 108, Brophy, Miles and Cochrane, The Chemical Warfare Service: From Laboratory to Field.
[524] P. 140, Brophy and Fisher, The Chemical Warfare Service: Organizing for War.
[525] P. 109, Brophy, Miles and Cochrane, The Chemical Warfare Service: From Laboratory to Field.
[526] P. 140, Brophy and Fisher, The Chemical Warfare Service: Organizing for War.
[527] P. 109, Brophy, Miles and Cochrane, The Chemical Warfare Service: From Laboratory to Field.

The United States' offensive BW program during World War II was primarily focused on anti-personnel and anti-crop agents and delivery means, and less on anti-animal agents (despite the production of over five million cattle anthrax cakes for use against German livestock).[528] Research efforts were aimed at "selection and preservation of the most virulent strains, establishing human dosages, enhancing storageability, and survival when released as an aerosol."[529] But Camp Detrick scientists studied a wide variety of potential agents, including: anthrax, brucellosis, botulinus toxin, plague, ricin, *Selerotium rolfoil* (southern blight of grains, potatoes, and sugar beets), late blight, late blast, brownspot of rice, plant growth inhibitors, rinderpest, glanders, melioidosis, tularemia, mussel poisoning, coccidioidmycosis, rickettsia, psittacosis, neurotropic encephalitis, Newcastle disease, and fowl plague.[530]

Determining the costs of the U.S. biological weapons program during WWII is extremely difficult. There are no budget line items identifying the BW program. Information about the program must be derived from other information. One such information source is a Status of Chemical Warfare Service Facilities as of 30 June 1945. Even this table does not identify activity as being related to biological weapons but is only listed as a "special project[531]." Since chemical weapons facilities' status was enumerated in great detail, the "special project" identification is immediately identifiable. Similarly, the special projects

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[528] C-1, Annex C, Army, U.S. Army Activity in the U.S. Biological Warfare Programs.
[529] C-1, Annex C, Army, U.S. Army Activity in the U.S. Biological Warfare Programs.
[530] P. 31, Endicott and Hagerman, The United States and Biological Weapons -- Secrets from the Early Cold War and Korea.
[531] In January 1944 the Special Projects Division was established in the Office of the Chief, Chemical Warfare Service, to administer the BW program. P. 108, Brophy, Miles and Cochrane, The Chemical Warfare Service: From Laboratory to Field.

are also funded by "cost plus fixed fee;" again, all CW facility costs are by other types of contracts.[532]

Table 2 Status of Chemical Warfare Service Facilities[533]

Facility	**Authorized Amount**	**2008 Dollars[534]**
Camp Detrick	$ 13, 951, 503. 59	$160, 674, 816. 34
Granite Peak, Tooele, Utah	$ 1, 474, 885. 00	$ 16, 985, 758. 92
Horn Island	$ 454,592. 90	$ 5, 235, 384. 53
Vigo Plant	$ 29, 777, 851. 97	$ 342, 941, 584. 02

At its maximum strength, the Special Projects Division comprised 396 Army officers, 2,466 Army enlisted men, 124 Navy officers, 844 Navy enlisted men, and 206 civilians.[535] Personnel costs are not available.

It has been reported that the United States considered the use of bacteriological weapons after General Rommel had beaten U.S. forces at Kasserine Pass in North Africa in February 1943. The plan was that "mixtures including grains attractive to houseflies

[532] P. 436, appendix A, Brophy, Miles and Cochrane, The Chemical Warfare Service: From Laboratory to Field.
[533] P. 441, Appendix A, Brophy, Miles and Cochrane, The Chemical Warfare Service: From Laboratory to Field.
[534] Current dollar costs based on 11.52 inflationary factor as determined by U.S. Federal Reserve Bank, http://woodrow.mpls.frb.fed.us/Research/data/us/calc/index.cfm
[535] P. 111, Brophy, Miles and Cochrane, The Chemical Warfare Service: From Laboratory to Field.

would be molded into the shape of goat dung, infected with psittacosis and tularemia bacteria, and dropped from planes." The plan was apparently abandoned when Rommel was forced into a retreat.[536]

What *is* known is that by the end of World War II, the U.S. BW program "surpassed most, if not all, others in ambition and size.[537] George Merck identified six key accomplishments of the WW II U.S. BW research and development effort:

- Fundamental contributions had been made regarding nutrition and conditions of growth of micro-organisms, as well as safe procedures for their quantity production;
- Methods had been developed for accurate detection of small numbers of minute quantities of micro-organisms;
- Many contributions were made to the knowledge of control of airborne diseases;
- Significant contributions had been made to the knowledge concerning the development of immunity against certain infectious diseases of humans and animals;
- Important advances were achieved in the treatment of certain infectious diseases of humans and animals; and,

[536] P. 35, Endicott and Hagerman, The United States and Biological Weapons -- Secrets from the Early Cold War and Korea.
[537] P. 119, Robinson, The Rise of CB Weapons.

- Important information had been secured on the production and control of certain diseases in plants and on the effectiveness of over 1,000 different chemical agents on a variety of plant life.[538]

The Rosebury Papers[539]

Two important documents reveal a good understanding of the U.S. BW program from somebody who was a participant, first on one of the planning committees and later as a researcher at Camp Detrick – Theodor Rosebury. The first significant paper was published in 1947 in the Journal of Immunology. The paper, Bacterial Warfare, was originally written by Theodor Rosebury and Elvin A. Kabat from the College of Physicians and Surgeons, Columbia University in 1942.[540] Despite being derived solely from freely available open source material available before 1942, it was kept from publication during the war because of its sensitive nature and was later published only after wartime restrictions were lifted. Its subtitle easily captures the essence of the paper: "A Critical Analysis of the Available Agents, Their Possible Military Applications, and the Means for Protection Against Them."

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[538] P. 120, Brophy, Miles and Cochrane, The Chemical Warfare Service: From Laboratory to Field.
[539] A third essential study was written in the early days of the U.S. BW program, Biological Warfare Research in the United States: History of the Chemical Warfare Service in World War II, by Rexmond C. Cochrane was written in 1947. Robinson, The Rise of CB Weapons p.120. It has never been declassified although Cochrane did contribute to another study The Chemical Warfare Service: From Laboratory to Field, (1959) using portions of the original monograph and much of the same source material. Brophy, Miles and Cochrane, The Chemical Warfare Service: From Laboratory to Field.
[540] Rosebury, Kabat and Boldt, "Bacterial Warfare."

It's interesting that Rosebury and Kabat used the term "bacterial warfare" for the title. They admit the title is a misnomer and was used for convenience rather than accuracy. The study was much more comprehensive than just a review of bacteria and included "microscopic and submicroscopic agents of infection as well."[541] This is later broken down to "the bacteria proper and the filterable viruses; but spirochetes, rickettsiae, pleurapneumonia organisms, fungi and protozoa also require consideration; and insects and other arthropods, which serve as vectors for some of the infective agents, must also be examined." In all, some seventy different agents are reviewed in the journal study.

The paper could be the introductory text to any college-level course on biological weapons. It begins with:

- The Principles of Bacterial Warfare, including the properties of infective agents of warfare;
- The Dissemination and Spread of Infection in General. Epidemiology in Public Health and in Bacterial Warfare;
- The Transmission of Disease with Special Reference to Bacterial Warfare;
- The Means of Offense in Bacterial Warfare; and,
- The Means of Protection and Defense Against Bacterial Warfare.

More important to the budding BW specialist is the next section, The Potential Agents of Bacterial Warfare. This section includes The Criteria for the Selection and Application of Agents. Rosebury and Kabat attempted, using publicly available documents to

[541] P. 11, Rosebury, Kabat and Boldt, "Bacterial Warfare."

identify the agents most applicable to a nascent BW program. Their work must have proved invaluable to many other countries (in fact, researchers in the Soviet Union claimed to have used the documents in establishing the Soviet program). The criteria used were:

- Infectivity;
- Casualty effectiveness;
- Availability;
- Resistance;
- Means of transmission;
- Epidemicity;
- Specific immunization;
- Therapy;
- Detection; and,
- Retroactivity.

(See Appendix 3 and 4 for the list of diseases identified as qualified for consideration as BW agents, as well as the list of agents considered, but rejected for various reasons.)

The second significant publication on biological weapons from the hand of Theodor Rosebury was Peace or Pestilence – Biological Warfare and How to Avoid It, published in 1949.[542] This book re-plowed the ground covered earlier in the Journal of Immunology paper, except written now for a more general audience. The chapter titles

[542] Rosebury, Peace or Pestilence.

(for example, "What is a BW Agent?" and "Bacteriology for Beginners") underplay the contents of the book. Somewhat presciently, Rosebury presents the problem of a BW homeland defense scenario. Rosebury claims to be writing a book on the scale of the nuclear weapons classic, Atomic Energy for Military Purposes.[543] In reality, Peace or Pestilence does not reach the technical detail which caused Atomic Energy for Military Purposes to be classified for several years. Nonetheless, the book has hidden treasures revealing some of the issues a budding BW scientist must be aware of before attempting to select and produce BW agents.

There is one significant difference between the book and the Journal articles – Rosebury's pedigree had changed. Where he had been a self-described "private citizen" while writing Bacterial Warfare in 1942, by the time he published Peace or Pestilence he had become a researcher at Camp Detrick. What was once theoretical research was now confirmed, known practical applications. This is an important fact for nascent BW programs. It is much easier to be the second one to attempt something; the second person has the advantage of knowing that the feat can be accomplished, as well as how to accomplish it and, frequently, how *not* to accomplish it.

Intelligence and Biological Weapons

Intelligence on the enemy is vital, especially when trying to understand technical intelligence. If, as was claimed, the U.S. and the allied programs were solely in response

[543] Smyth, Atomic Energy for Military Purposes.

to the actions of Germany[544], it would have been critical to know what was taking place in Germany.[545] The Chemical Warfare Service was in charge of intelligence on biological weapons once the War Department took charge of BW research in November 1942. But most intelligence about the programs of Germany and Japan came after the War, not during the fighting and certainly not before the war. In December 1943, the Office of Strategic Services (OSS) reported to the JCS that there was evidence Germany was preparing to use BW.[546] This caused the Army to transfer responsibility for BW programs from the WRS to the CWS, but no other response to the possible threat has been identified. Defense against BW may have been a different matter, though. The CWS assigned officers to all Army units to educate the troops in BW defense. A War Department observer reported in April 1945 that the Pacific theater was "quite BW conscious" and that intelligence information and defensive plans met the standards.[547]

In 1944, Major General William Donovan, head of the OSS, proposed a plan to place peacetime intelligence resources underneath the President, rather than under the military. Under Donovan's plan, there would be a director of the central intelligence service and an advisory board consisting of the Secretaries of State, War, and Navy. This plan was

[544] Interest in Japan's program was virtually non-existent in the early days of the War and, even after it was apparent that Japan had a program, interest or concern barely seemed to register in the U.S. Germany and the war in Europe was the number one focus.
[545] P. 112, Brophy, Miles and Cochrane, The Chemical Warfare Service: From Laboratory to Field.
[546] P. 108, Brophy and Fisher, The Chemical Warfare Service: Organizing for War.
[547] P. 234, Kleber and Birdsell, The Chemical Warfare Service: Chemicals in Combat.

later proposed as an "intelligence directorate" headed by a Department of State official with deputies from the Army and Navy and a joint intelligence service.[548]

Prior to World War II, intelligence collection and analysis was a much more impromptu and disorganized affair in the United States[549]. There were four intelligence "agencies." The Army and Navy did signals collection and exploitation. The Department of State collected and analyzed diplomatic reporting. The Federal Bureau of Investigation did espionage counter-intelligence.[550] Prior to World War II, the four agencies did little communication or sharing of information between each other. Part of the cause of the Japanese surprise attack on Pearl Harbor was the fact that the Army and Navy alternated weekly collection and analysis of Japanese operational signals and did not share the results of the collection on a timely basis.[551]

President Roosevelt did little to improve the situation. On June 26, 1939 he attempted to coordinate the counter-espionage actions of the FBI, the Army, and the Navy in a memorandum tasking the Assistant Secretary of State for Administration, George S. Messersmith, to centralize activities. The attempt failed when J. Edgar Hoover, Director of the FBI, refused to attend the first get-together at Messersmith's Georgetown home.[552]

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[548] Jr. Thorne, C. Thomas and David S. Patterson, Emergence of the Intelligence Establishment, Foreign Relations of the United States -- 1945-1950, ed. Glenn W. LaFantasie (Washington, D.C.: U.S. Government Printing Office, 1996).
[549] P. 47, Kelly McClanahan, "The Need for a Perception-Based Model for Comparing Intelligence Communities: An Historical Case Study," American Intelligence Journal 25.2 (2008).
[550] Thorne and Patterson, Emergence of the Intelligence Establishment.
[551] Wohlstetter, Pearl Harbor -- Warning and Decision.
[552] P. 17, Persico, Roosevelt's Secret War -- FDR and World War II Espionage.

But to add to the confusion of an uncoordinated intelligence apparatus, Roosevelt also recruited friends as intelligence collectors, notably the wealthy scion of an industrialist fortune, Victor Astor.[553] The American intelligence "establishment" prior to, during, and immediately after World War II was haphazard, poorly managed, and, to a great extent, a haven for individuals who preferred working outside the system than within one – a clear example being William "Wild Bill" Donovan, head of the OSS, the forerunner of the CIA.[554] But, the United States that emerged from the war was suddenly the most technologically-advanced and technocratically-demanding of any country of that era. Eventually, in 1947, the essence of what is now understood as the national intelligence establishment and the Central Intelligence Agency was created by the National Security Act of 1947 and this basically remained the structure until the recent reorganization creating the Director of National Intelligence.[555] Bureaucracy was now a necessity. This bureaucratic necessity has been termed the first "Revolution in Intelligence Affairs."[556] From this revolution was created the Intelligence Community.

A significant leg up on developing the post-World War II U.S. BW program may have been the information gained from the interrogation of former Nazi scientists as well as from the doctors of Japan's Unit 731. But, again, the intelligence gathering from these

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[553] P. 4-18, Persico, Roosevelt's Secret War -- FDR and World War II Espionage.
[554] R. Harris Smith, OSS -- the Secret History of America's First Central Intelligence Agency (Berkeley: University of California Press, 1972).
[555] This sentence significantly simplifies a political process that took over two years of bureaucratic in-fighting and is better reviewed in the Department of State book: Thorne and Patterson, Emergence of the Intelligence Establishment.
[556] P. 83, Deborah G. Barger, Toward a Revolution in Intelligence Affairs (Santa Monica: the Rand Corporation, 2005).

once-enemy scientists appears to have been "myopic." Four years after the war in 1949, the Soviets conducted their own Japanese war crimes tribunal at Khabarovsk. It is instructive to see what the Soviets learned compared with what the U.S. believed.

The U.S. apparently accepted statements by Japanese scientists and military officials that the Japanese program was defensive in nature and was stimulated by "the conviction that Russians had practiced BW in Manchuria in 1935, and that they might use it again."[557] The U.S. was convinced that Japan had never produced a workable offensive BW weapon.[558] "The principal reasons for this perceived Japanese failure were: (a) Limited or improper selection of BW agents; (b) Denial (even prohibition) of co-operated scientific effort; (c) Lack of co-operation of the various elements of the Army (e.g. ordnance); (d) Exclusion of civilian scientists, thus denying the project the best technical talent in the empire; and (e) A policy of retrenchment at a crucial point in the development of the project.[559]

At the Khabarovsk trial, on the other hand, there was evidence presented arguing that the Japanese had developed the use of infected insect vectors to spread disease.[560] The U.S. government never identified Japan's vector delivery techniques, despite the fact that, as was related earlier, the use of animal and insect vectors had been described in the popular

[557] P. 113, Robinson, The Rise of CB Weapons.
[558] P. 536, Home and Low, "Postwar Scientific Intelligence Missions to Japan."
[559] P. 113, Robinson, The Rise of CB Weapons.
[560] P. 115, Robinson, The Rise of CB Weapons.

press in the United States during the war.[561] The U.S. also failed to identify the use of BW for sabotage, despite the U.S.'s supposed focus on potential Japanese sabotage efforts on the west coast; the Khabarovsk trials revealed that a large range of sabotage techniques of proven efficacy were developed.[562] In addition, three different bomb designs were described during the Khabarovsk trials: the Uji bomb, a porcelain bomb designed to create airborne bacterial clouds; the Ha bomb, a fragmentation and anti-animal ground contamination weapon; and, the Ro bomb, a base-ejection, air-burst bomb that was never tested.[563]

The United States' actions at the end of World War II with regard to the Japanese scientists of Unit 731 caused reverberations which continue to this very day. Revelations of the deal the United States made with Unit 731 researchers did not become known in the West until the 1980s;[564] and those revelations may not be the complete story. Japanese researcher Kondo Shôju laments that several key documents outlining U.S. acquisition of Unit 731 research are still missing.[565]

In 1950, as part of its semi-annual report to the President, the Department of Defense asked the National Security Council to prepare a study of unconventional weapons. The

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[561] Newman, Japan's Secret Weapon.
[562] P. 113, Robinson, The Rise of CB Weapons.
[563] P. 115-116, Robinson, The Rise of CB Weapons.
[564] Jing-Bao Nie, "The United States Cover-up of Japanese Wartime Medical Atrocities: Complicity Committed in the National Interest and Two Proposals for Contemporary Action," The American Journal of Bioethics 6.3 (2006).
[565] P. 37, Daqing Yang, "Documentary Evidence and Studies of Japanese War Crimes: An Interim Assessment," Researching Japanese War Crimes Records: Introductory Essays, eds. Edward Drea, Greg Bradsher, Robert Hanyok, James Lide, Michael Petersen and Daqing Yang (Washington, D.C.: The National Archives and Records Administration, 2006).

then-classified report addressed nuclear, radiological, chemical, biological weapons, and civil defense. The purpose of the report becomes clear in reading the section on biological warfare: "It is necessary that the American people understand the nature and scope of BW so as to appreciate the actual dangers which might arise from the use of BW and to participate effectively in defense measures against it *as well as to dismiss exaggerated notions and fear of the threat of BW*."[566] [emphasis added] Ironically, the NSC then explains that "it would be unwise from a security viewpoint to publish these studies."

This would not be the first time, or the last, that information necessary for the American people to understand a threat would be determined to be too dangerous to be shared! (See the chapter "Through The Looking Glass – The United States 'Program' Today" for details) For example, a Freedom of Information Act (FOIA) request (F-2007-01854) by this author to the Central Intelligence Agency FOIA Office to fully declassify a 1949 Intelligence Memorandum[567] remains unresolved to date. In the CIA's eyes, the FOIA request was answered because the document was released "in segregable form with deletions." The deletions removed 12 pages of a 14 page document, leaving the same text already available on the unclassified CIA website! Professor Julian Perry Robinson claims to have FOIA requests to the CIA outstanding since the mid-1980s[568].

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[566] P. 13, National Security Council, Unconventional Weapons (Washington, D.C.: National Security Council, 1950).
[567] Central Intelligence Agency, Intelligence Memorandum No. 163 -- Foreign Activities in the Field of Biological Warfare (BW) (Washington, D.C.: Central Intelligence Agency, 1949).
[568] Personal Discussion with Dr. Robinson, 1 October 2007, Wilton Park, UK.

Soviet Union

The Soviet Union's biological warfare program was most likely initiated in the mid-1920s with the establishment of the Ministry of State Security's mysterious "Laboratory X."[569] During 1930-40, research on gas gangrene, tetanus, botulism, and plague was conducted at the Red Army Bacteriology Institute in Vlasikha, near Moscow.[570] Recent Russian media reports allege that planning for secret Soviet biological experimentation with political prisoners began as early as 1921, with actual experiments being reported as early as 1929.[571] German intelligence made reference to extensive Soviet BW R&D underway by at least 1934.[572] The Central Intelligence Agency reflects the German analysis, believing that the Russians began BW research "some time in the middle 1930's."[573] [574] Others, however, place the beginning of "serious work" in the Soviet program much later. Igor Domaradskij, for example, places the beginning of work into the early 1940s at Kirov and "credits" the impetus for the program to Thedor Rosebury and his book Peace or Pestilence.[575] However, since the Rosebury book was not published until 1948, after the end of the war, it is highly unlikely that the book had a significant effect on the beginnings of the Soviet program.

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[569] P. 25, Alexander Kouzminov, Biological Espionage -- Special Operations of the Soviet and Russian Foreign Intelligence Services in the West (London: Greenhill Books, 2005).
[570] P. 452, R. Roffey, A. Tegnell and F. Elgh, "Biological Warfare in a Historical Perspective," Clinical Microbiology and Infection 8.8 (2002).
[571] Sergey Kozhushko, "Human Rabbits," Sekretnyye Materialy 2007.
[572] P. 112, Robinson, The Rise of CB Weapons.
[573] Central Intelligence Agency, Intelligence Memorandum No. 163 -- Foreign Activities in the Field of Biological Warfare (BW).
[574] It was apparent from this memorandum that at that time the CIA was reliant on German and Japanese information for their analysis.
[575] P. 125, Domaradskij and Orent, Biowarrior -- inside the Soviet/Russian Biological War Machine.

Germany had a secret co-operation agreement with the Soviet Union for chemical weapon research dating from about 1921 until 1933[576], when Hitler terminated the agreement, but cooperation in biological weapons research was reportedly minimal.[577] It is less clear when the West began to know about, or worry about, the Soviet BW program (see appendix 4 for a list of suspected pre-World War II USSR BW facilities). The United Kingdom had an intelligence report from 1925 suggesting the Soviet Union was conducting research on a number of BW agents, but it is not clear if the UK considered the report valid or not.[578]

The Hirsch Report

In 1945, two Germans with intelligence information about the Soviet program were captured by Allied forces. Colonel Dr. Walter Hirsch[579] and Dr. Heinrich Kliewe reportedly provided information to U.S. Army intelligence about the Soviet program.[580] (While the U.S. may have received information from Hirsch at that time, it would have come courtesy of the UK, since Hirsch was a UK prisoner from May 1945 until March 1946, and was then released.) If this was the first insight into the Soviet program (and the lack of intelligence suggests it very well may have been the first insight), it suggests a

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[576] Walter Hirsch dates the cooperation as from 1928-1935 and states that German researchers remained in the Soviet Union until about 1937 as "civilian employees." Hirsch, Soviet BW and CW Preparations and Capabilities.

[577] P. 154, Valentin Bojtzov and Erhard Geissler, "Military Biology in the USSR, 1920-1945," Biological and Toxin Weapons: Research, Development, and Use from the Middle Ages to 1945, eds. Erhard Geissler and John Ellis van Courtland Moon, vol. 18, SIPRI Chemical & Biological Warfare Studies (Oxford: Oxford University Press, 1999).

[578] P. 169, Carter and Pearson, "British Biological Warfare and Biological Defence, 1925-45."

[579] Hirsch, head of the German Wa-Prüf 9, was Austrian, not German, until the 1938 Anschluss – the annexation of Austria.

[580] P. 134, Guillemin, Biological Weapons -- from the Invention of State-Sponsored Programs to Contemporary Bioterrorism.

period of nearly a quarter century of BW activity was underway by the Soviets before it was known to the West, including its purported allies during the war.

The Hirsch information was able to fill in a good amount of the picture, although some of the information remains uncorroborated to this day. Hirsch reported on a January 1941 Soviet publication, *Informatsionni Sbornick*, which purportedly claimed that the Soviet Union had to be prepared to defend against bacteriological attack and "be able to strike back with telling effect."[581] The magazine, however, has never been found by historical researchers. Hirsch also claimed that in 1939 "an unconfirmed leak" had the Soviet Union contemplating military use of its "recent bacteriological discoveries."[582]

There is, however, much reason to question Hirsch's information. It is not clear from the report how it came to be or how and when it came into the possession of the U.S. Army. The U.S. Army Chemical Corps provided a short introductory comment to the report but only identified it as a translation of a report written in 1945 by "Dr. Walter Hirsch, the late head of the German Wa-Prüf 9 – Heeres Waffenamt, Amstgruppe Prüfwesen 9, Army Ordnance Office, CW Proving Ground." It is clear that Hirsch was a chemist, not a biologist, if one considers that the bacteriological section of the report was only 13 pages out of a nearly 700 page report."[583] The U.S. Chemical Corps comment

[581] P. 163, Bojtzov and Geissler, "Military Biology in the USSR, 1920-1945."
[582] P. 101, Hirsch, Soviet BW and CW Preparations and Capabilities.
[583] Remarkably, at 700 pages the report was not complete at the time of Hirsch's death in late 1950. He had planned additional sections on: Collective Protection against CW, Gas Detection; Gas Alarm; Collective Decontamination; Civilian Defense; Soviet Chemical Troops, their equipment and capabilities; the State of CW Defense Preparations of the Soviet Army during the war; CW schools, Training Grounds, Training

(presumably written in 1951) provides a caveat: "His conclusions as to Soviet capabilities and intentions are subject to interpretation, confirmation and rejection in the light of current information." The "current information" was not described. That caveat aside, Hirsch identified 15 different categories of information used in the preparation of the report[584], including captured manuals, documents and equipment, debriefs of prisoners of war and other experts; intelligence reports; as well as details of the joint Russian-German CW R&D program from 1928-1935. The report is well-sourced and documented.

Hirsch identified the Soviets as conducting research in several different agents. The afore-mentioned *Informatsionni Sbornick* claimed that the Soviets had followed up on "foreign research" with Anthrax, Glanders, and Foot and Mouth Disease. The U.S. Army concluded in a footnote that the foreign research referred to was likely to have been the French experiments from 1936-1940. Other foreign-researched diseases reportedly identified in the journal article were relapsing fever (recurrens), spotted typhus (exanthemata), meningitis and the plant disease *Tinea glanella* (grain rot). The Soviets researched dissemination techniques for three agents "under the code name of 'the golden triangle.'" The three agents were designated A, B, and C. A was *Bacillus pestis*, B was *Bacillus anthracis*, and C was *Vibrio cholerae asiaticae*.

Aids; Tactical and Strategic Doctrines of the Soviet Army on Gas Warfare and the use of Smoke, employment of gas by air forces, tanks and armored units; Appraisal of future technical and military developments, atomic weapons and gas warfare; What important German developments did the Soviet [sic] obtain; Technical and Tactical considerations on the use of Chemical Agents against the Soviet Army; Survey of the Russian Literature, Bibliography, and Table of Contents. Hirsch, Soviet BW and CW Preparations and Capabilities.

[584] It appears that only three sources were used for the bacteriological warfare section: the *Informatsionni Sbornick* article, a Soviet prisoner of war, and Captain von Apen, a defector from the Soviet Air Force.

Hirsch, reporting information allegedly received from a Soviet prisoner of war in 1942, identified several Soviet facilities involved in BW. These included the Scientific Medical Institute of the Red Army in Moscow, near the town of Vlashchikha. Research was then deemed potentially too dangerous to be conducted in the Moscow environs and the laboratory was moved to the island of Gorodomliya in the Seliger Lake near the town of Ostashkov.[585] Practical trials were conducted at the Volsk Polygon at Shikhany (the CW proving ground) on the Volga. The Foot and Mouth Disease Institute of the USSR People's Health Commissariat was created to study the carriers of leprosy, plague, and foot and mouth disease. In addition, secret work was to be conducted at the Velikonovski Institute, code named No. V/2-1094. In 1935/36 it was decided that the Volsk Polygon at Shikhany was not safe for experimenting with dangerous pathogens and a new proving ground was created on Vozrozhdeniya (Rebirth) Island in the Aral Sea for the exclusive use of V/2-1094. By the fall of 1936, the Velikonovski Institute was renamed the Biotechnical Institute of the Red Army.

Hirsch also reported on a second source, Captain von Apen , a Soviet Air Force pilot who deserted by flying his plane to Germany, provided more information about the Soviet program. His debrief apparently worried German Intelligence and they suspected him to be a Soviet agent for a while. Some of his claims "at first appeared incredible" and were believed to have been given to ingratiate himself with the Germans. But some of his

[585] It has been suggested that a laboratory-caused plague outbreak in Moscow was the cause of this discontinuation. P. 128, Domaradskij and Orent, Biowarrior -- inside the Soviet/Russian Biological War Machine.

information checked out with German experts and he appeared to have good technical information on Soviet dissemination devices. Von Apen claimed the Chkhalov Institute (formerly Orenburg) conducted "practical test" experiments in Mongolia and allegedly caused an extensive plague epidemic to occur.

The defector, von Apen, identified several experiments conducted by the Soviets on human subjects. First was the apparent plague outbreak in Mongolia in about 1939. In 1941, a Professor Klimoshinski carried out experiments in Ulan Bator using pest [*sic*, presumably *Y.pestis*, the causative agent of plague], anthrax, and glanders against prisoners of war as well as "political prisoners". Supposedly one such subject infected with bubonic plague escaped and caused a plague epidemic among the Mongolian populace in the summer of 1941. In trying to check the spread of the epidemic the Soviets *killed, disinfected, and burned some 3,000-5,000 Mongols*. Reportedly an experiment (codenamed "war college") with prisoners of war in 1939/40 was conducted in Moscow using infected food to cause anthrax. He also alleged that other experiments were conducted, including one with tularemia and the use of ticks to cause encephalitis.

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Japanese Suspicions of Soviet BW

Japanese prisoners, interrogated after the end of World War II, curiously enough blamed the Soviet Union for Japan's BW program. A Colonel Masuda claimed that in 1935 'the Kwantung Army was informed that many Russian spies, carrying bacteria in ampules or in glass bottles, had crossed into Kwantung Territory. . . .The containers revealed the

presence of dysentery organisms (Shiga and Flexner) and bacteria – spore mixtures of B. anthracis and V. cholerae."[586] This predates the Von Apen allegations of Mongolian experiments by nearly four years. It must be noted that Colonel Masuda was speaking immediately prior to the Tokyo War Crimes Tribunal.

A second allegation of Soviet possession and use of BW against Japan was made in 1950 by Major T. Iinuma, then a recent repatriate from a Soviet prison camp. The major accused the USSR of using anthrax against the Japanese army in Manchuria at a place called Shenho in 1944 (Prior to USSR declaring war on Japan). Iinuma related what Colonel Torajiro Kitamura had told him in prison: "the Russians threw cans containing anthrax germs into Japanese-occupied Manchuria." This story was picked up by the New York Times.[587] Allegations of Soviet use of BW in Manchuria were often cited as justification for the Japanese BW program in Japanese-controlled China.[588]

A Japanese intelligence document, Defence and Security Intelligence Report no. 8: Chinese Employment of Chemical and Bacteriological Warfare against the Japanese" also charged the Soviets with BW use:

> "According to recent reports it appears that the Soviet Consul at Harbin, acting on instructions from his home government, has sent to agents who have infiltrated into the chief cities of Manchukuo, bacteria to be used in launching

[586] P. 222, Robinson, The Rise of CB Weapons.
[587] P. 222, Robinson, The Rise of CB Weapons.
[588] P. 222, Robinson, The Rise of CB Weapons.

bacteriological warfare immediately should hostilities break out between Russia and Japan. The main targets include:

Military – Commanders and technicians, while traveling and at garrisons.

Local areas – Factories, government schools, trains, ships, laborers, and domestic animals, especially military horses."[589]

But it is also the case that the Soviet Union likely knew of the Japanese activity in China very soon after Unit 731 was established. Georgy Permyakov, chief translator at the Khabarovsk war crimes trial (see below), claims the Soviet consulate in Harbin lofted a small, clear-plastic hydrogen balloon carrying a tiny camera that secretly photographed the entire Pingfan complex in the 1930s.[590]

The Khabarovsk Tribunal

In December 1949 the Soviet Union conducted a war crimes trial in the city of Khabarovsk. The accused party was 12 former scientists of Unit 731, researchers at the facility near Harbin, China. The group included the former Commander in Chief of the Japanese Kwantung Army under which Unit 731 operated, the Chief of Medical Administration of the Kwantung Army, and heads of various Unit 731 divisions, including those responsible for research and development down to laboratory orderlies.[591] The twelve were accused of manufacturing biological and chemical weapons following

[589] P. 222, Robinson, The Rise of CB Weapons.
[590] Russell Working, "The Trial of Unit 731," The Japan Times June 5, 2001 2001.
[591] P. 34, Jing-Bao Nie, "The West's Dismissal of the Khabarovsk Trial as 'Communist Propaganda': Ideology, Evidence and International Bioethics," Journal of Bioethical Inquiry 1.1 (2004).

experiments on human guinea pigs. While General Shiro Ishii was not tried *in absentia*, his name was consistently raised during the trial and his role was well-known and documented. Unlike the ten-month-long Nuremberg trials and the two-year-long Eastern War Crimes Tribunal, the Khabarovsk Tribunal was an example of Soviet efficiency (or lack of due process); it lasted five days.[592],[593]

Compared with the grisly photographs of the gallows in the aftermath of the Nuremberg trials, the Khabarovsk trials were the model of compassion. One convict received a sentence of two years imprisonment, a second got three years, and most received imprisonment terms of 20 to 25 years. One prisoner committed suicide behind bars several years later. The rest of the prisoners were quietly returned to Japan and freed in 1956, each having served a total of seven years for their crimes against humanity.[594]

Information obtained from the trial might have influenced western thinking except for the general western derision of the trial as Soviet propaganda. Still, some of the findings are important. General Yamada Otozoo, former Commander in Chief of the Kwantung Army, testified that Unit 731 “was formed for the purpose of preparing for

[592] The trial began on December 25 and had to end before the end of the year. On January 1, the death penalty was to be reinstated in the Soviet Union and Stalin feared Soviet prisoners of war still in Japan might be killed if the physicians in Khabarovsk were found guilty and hung. Working, "The Trial of Unit 731."
[593] Working, "The Trial of Unit 731."
[594] Working, "The Trial of Unit 731."

bacteriological warfare, chiefly against the Soviet Union, but also against the Mongolian People's Republic and China."[595]

Kajitsuka Ryuji, a Lieutenant General and former Chief of the Kwantung Army's Medical Administration, described the results of tests in 1940 using aerial bombs containing "bacteria". The bombs had "little effect because, as a consequence of strong air pressure and excessively high temperatures, the germs of dysentery, typhoid, paratyphoid, cholera, and plague, being frail, perish almost 100 percent."[596] But, added Ryuji, Shiro Ishii had told him that anthrax was more hardy and tests were continuing in 1940.

Lieutenant General Takahashi Takaatsu, former Chief of the Veterinary Service of the Kwantung Army, admitted to ordering Detachment 100 to develop "the bacteria of glanders and anthrax and of cattle plague and mosaic disease, with a view to their employment in bacteriological warfare and bacteriological sabotage against the Soviet Union."[597]

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[595] P.11, Materials on the Trial of Former Servicemen of the Japanese Army Charged with Manufacturing and Employing Bacteriological Weapons.
[596] P. 101, Materials on the Trial of Former Servicemen of the Japanese Army Charged with Manufacturing and Employing Bacteriological Weapons.
[597] P. 108, Materials on the Trial of Former Servicemen of the Japanese Army Charged with Manufacturing and Employing Bacteriological Weapons.

Other witnesses provided stark details of human experiments which they witnessed or were told about.[598] But, in the west, there was little regard expressed for the trials or the evidence presented. The Soviet Union published the testimony in several languages, including English, but the world took little notice of the Japanese activities in China until the 1980s.

Perhaps it was because the Soviets were the victims of their own previous behavior. Obviously, a culture that had spent many years mastering the techniques of propaganda and the art of the "big lie" could not be expected to be truthful and forthcoming. In the eyes of many in the west, anything coming out of the Soviet Union was to be mistrusted – this was a philosophy that remained true until the fall of the Soviet Union and, to a great extent, remains a part of our policy with the Russian Federation today. Analytic preconception is as much a problem as analytic misperception.

The Battle of Stalingrad

One final case of possible BW use during World War II that bears examination was the possible employment of tularemia during the siege of Stalingrad in 1942-43 by the Soviet Union against the advancing Nazi forces. The Battle of Stalingrad is widely considered to have been the largest and bloodiest battle of World War II and was clearly a turning point in Nazi Germany's fortunes. Estimates of up to two million casualties have been posited for the 199-day siege, including over 40,000 Soviet civilians who died in a single

[598] P. 227, Harris, Factories of Death.

week of aerial bombing of the city. It has been estimated that the Axis powers lost one-fourth of their total manpower fighting on the Eastern Front.[599]

The alleged biological weapons incident was made known to a wider western audience in Ken Alibek's book, Biohazard[600] and later in a news article in Pravda.[601] The evidence as related by Dr. Alibek is compelling at first glance. Rates for human tularemia infection in the Soviet Union in 1941 were about 10,000 cases. In 1942, during the siege of Stalingrad, the number of cases rose to over 100,000.[602] In 1943 the cases dropped back to about 10,000 cases. Reportedly 70% of the cases in 1942 came down with a pneumonic form of tularemia – evidence, according to Alibek, of intentional exposure. Finally, Alibek reports "an elderly Lieutenant Colonel" at the BW facility at Kirov told Alibek that the Soviet Union had developed a tularemia weapon in 1941, the year before the siege of Stalingrad. But can the rise in human cases be attributed solely to a deliberate exposure of *F.tularensis?*[603]

Regrettably, there are not reliable public health records for the Soviet Union (or most other parts of the world) to determine rates of incidence of tularemia. Even today, the worldwide incidence is not known and the disease is probably underrecognized and

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[599] Thefreedictionary.com, The Battle of Stalingrad, 2006, Available: http://encyclopedia.thefreedictionary.com/Battle+of+Stalingrad?p, 23 August 2006 2006.
[600] P. 29-31, Alibek and Handleman, Biohazard -- the Chilling True Story of the Largest Covert Biological Weapons Program in the World -- Told from inside by the Man Who Ran It.
[601] Pravda, "Soviet Army Used 'Rat Weapon' During WWII," Pravda 05.02.2001 2005.
[602] Pravda does not cite numbers, except to quote archive documents that 50 % of German prisoners captured during the battle of Stalingrad were suffering from classic symptoms of tularemia.
[603] *Francisella tularensis* is the causative agent of tularemia. It is a Gram negative intracellular bacterium.

underreported.[604] Prior to the development of the International Health Regulations, the World Health Organization, for example, did not require reporting on tularemia. It would be desirable to build a regression analysis and determine statistically the probability (or improbability) of a ten-fold increase in the number of tularemia cases. But in the absence of reliable data, that cannot be done. However, it is possible to evaluate ranges of incidence in other parts of the world and assess with some confidence the likelihood of the Stalingrad numbers. In the United States, for example, the average number of cases of tularemia reported each year is between 100 and 200, but the peak number of cases was 2,291 in 1939. Comparing today's mean of 125 annual cases[605] to the nearly 2,300 cases in 1939 Depression-era America is probably not a reliable exercise, though, because of the significant improvements in the public health infrastructure in the United States between then and now.[606] In Sweden, by contrast, the range of incidence is much greater. In the 12 year period between 1973 and 1985 the number of reported cases varied from less than 5 cases to over 500.[607] A ten-fold increase, albeit from 10,000 to 100,000, may not, therefore, be unrealistic for the Soviet Union, particularly during wartime.

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[604] P. 2765, David T. Dennis, Thomas V. Inglesby, Donald A. Henderson, John G. Bartlett, Michael S. Ascher, Edward Eitzen, Anne D. Fine, Arthur M. Friedlander, Jerome Hauer, Marcelle Layton, Scott R. Lillibridge, Joseph E. McDade, Michael T. Osterholm, Tara O'Toole, Trish M. Perl, Philip K. Russell and Kevin Tomat, "Tularemia as a Biological Weapon -- Medical and Public Health Management," Journal of the American Medical Association 285.21 (2001).

[605] P. 561, Richard W. Titball and Anders Sjostedt, "Francisella Tularensis: An Overview," ASM News 69.11 (2003).

[606] It is also possible to assume the number of Americans skinning rabbits without taking safety precautions was probably higher in the 1930s than today, particularly since the U.S. was more agrarian back then and the Depression probably forced more people to get their dinner "on the hoof", so to speak, than with today's hobby hunters. But statistics may not exist for this comparison, either.

[607] P. 631, Jill Ellis, Petra C.F. Oyston, Michael Green and Richard W. Titball, "Tularemia," Clinical Microbiology Reviews 15.4 (2002).

Eric Croddy, a senior analyst at the Monterey Institute of International Studies, rejects Alibek's thesis.[608] Croddy believes the outbreak was a natural occurrence.[609] Croddy claims a lack of understanding of tularemia's pathogenesis caused medical analysts to conclude that 70% of the victims suffered from a pneumonic form. At that time it was not even certain that there was a primary pulmonary form of tularemia, Croddy asserts. Croddy suggests that the rise in tularemia cases was the result of the complete breakdown of the public health system in 1942. Croddy draws an association in the rise of tularemia in field mouse epicenters as evidence of the breakdown in the public health sector, disregarding the possibility that the mice may have also been victims of the intentional tularemia attack. Clearly, the sanitation conditions during wartime are not the same as during a time of peace, and the tularemia incidence rate raises an interesting contrast between the wartime disease results in the Soviet Union and the medical trends in Japanese-controlled Manchuria.

Croddy's thesis is accepted by Erhard Geissler.[610] Geissler does a point-by-point refutation of the claims made in Alibek's book and comes to the same conclusions as Croddy: the tularemia was most certainly naturally-occurring. The halting of the German advance was not, as Alibek claimed, by the use of Tularemia as a weapon, but rather

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[608] Milton Leitenberg also rejects the possibility, but by exception. Leitenberg claims the only uses of BW during WW II were by the Japanese in Manchuria. Milton Leitenberg, "Biological Weapons in the Twentieth Century -- a Review and Analysis," 7th International Symposium on Protection Against Chemical and Biological Warfare (Stockholm, Sweden: 2001).

[609] Eric Croddy and Sarka Krcalova, "Tularemia, Biological Warfare, and the Battle for Stalingrad (1942-1943)," Military Medicine 166.10 (2001).

[610] Erhard Geissler, "Alibek, Tularemia and the Battle of Stalingrad," The CBW Conventions Bulletin.69-70 (2005).

from the decision of Hitler to divert the 4th Panzer Army from Stalingrad to Rostov to support the 1st Panzer Army's crossing of the Don. That decision, according to military expert Basil Henry Liddell Hart, was the true cause of the German disaster at Stalingrad.

Out From the Shadows?

After many months of concerted effort and multiple diplomatic demarches from the U.S. and the UK, in 1990 Soviet Premier Mikhail Gorbachev and Foreign Minister Eduard Shevardnadze finally relented in opening up the facilities of the Soviet BW program to the West. This was not a magnanimous gesture. In October 1989, Dr. Vladimir Pasechnik, the Director of the Institute for Ultra-Pure Biological Preparations in Leningrad[611], defected to the United Kingdom[612], bringing with him extensive details of the current Soviet program much of which was then still unknown to the West.[613] After months of demarches, visits, and negotiations, on April 11, 1992, Russian President Boris Yeltsin issued a formal decree affirming the legal succession of the Russian Federation to the Soviet Union's obligations under the Biological Weapons Convention. The decree also committed the Federation to the elimination of the Soviet Union's BW program.

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[611] Now St. Petersburg

[612] Two years later Kanatjan Alibekov defected to the United States, changed his name to Ken Alibek, and, in 1999, published Biohazard to alert the world to the continuing Russian biological weapons program. Alibek and Handleman, Biohazard -- the Chilling True Story of the Largest Covert Biological Weapons Program in the World -- Told from inside by the Man Who Ran It. At least three other defectors were also responsible for providing information to the West: Igor Domaradskij, V.S. Domcheev, and Alexander Kouzminov. John Hart, "The Soviet Biological Weapons Program," Deadly Cultures: Biological Weapons since 1945, eds. Mark Wheelis, Lajos Rózsa and Malcolm Dando (Cambridge: Harvard University Press, 2006) p.133, Kouzminov, Biological Espionage -- Special Operations of the Soviet and Russian Foreign Intelligence Services in the West.

[613] Christopher J. Davis, "Nuclear Blindness: An Overview of the Biological Weapons Programs of the Former Soviet Union and Iraq," Emerging Infectious Diseases 5.4 (1999).

In January 1991 the U.S. and UK were permitted to visit four suspect Soviet facilities. The first UK/U.S. team visited the Institute of Immunology at Chekhov, the Institute of Applied Microbiology at Obolensk, the Institute of Molecular Biology at Kol'tsovo, and the Institute for Ultra-Pure Biological Preparations at Leningrad. A visit to Leningrad occurred in 1992, then a series of visits occurred in 1993-94. The visits included the Scientific Research Institute of Veterinary Virology and Microbiology at Pokrov, the Berdsk Chemical Plant, the Omutninsk Chemical Plant, and the All-Union Scientific Research Institute of Microbiology at Obolensk. In exchange, a Russian delegation visited the United States Army Medical Research Institute of Infectious Diseases (Ft. Detrick), Dugway Proving Grounds in Utah, the Pine Bluff Arsenal in Arkansas, and the Salk Center in Pennsylvania.[614]

The Soviet BW program was not a complete mystery. The Central Intelligence Agency and its predecessor, the OSS, had both made reports about suspicious biological activity in the Soviet Union. As early as 1961 the Central Intelligence Agency had published a large 190 page classified monograph, The Soviet BW Program, a Scientific Intelligence Research Aid (in the parlance of the day).[615] The now-declassified report decried the lack of documentation on the Soviet program up to World War II.[616] It identified several facilities as being part of the BW program, however. These included the Scientific

[614] P. 227, Alibek and Handleman, Biohazard -- the Chilling True Story of the Largest Covert Biological Weapons Program in the World -- Told from inside by the Man Who Ran It.
[615] Central Intelligence Agency, The Soviet BW Program (Washington, D.C,: Central Intelligence Agency, 1961).
[616] This Report has been occasionally misidentified as the "Hirsch Report." Crockett, "A Historical Analysis of *Bacillus Anthracis* as a Biological Weapon and Its Application to the Development of Nonproliferation and Defense Strategies."

Research Institute of Epidemiology and Hygiene, the Military Medical Academy imeni Kirov, the Lisiy Island Branch of the All-Union Institute of Experimental Veterinary Medicine, the Central Scientific Research Testing Institute of Military Medicine, the Military Veterinary Scientific Research Institute, the Moscow Veterinary Academy, the Military Academy of Chemical Defense, the All-Union Institute of Plant Protection, and Vozrozhdeniya Island. No facilities for production of BW agents were identified then. None of the facilities identified in the 1961 report were apparently visited as part of the trilateral process. It is not known if that was because of a natural evolution of the Soviet/Russian program in the intervening thirty years or if different targets for inspection were since identified as more advantageous.

The 1961 CIA assessment believed four bacterial agents were being pursued by the Soviet Union: anthrax, plague, tularemia, and brucellosis. This conclusion was based on vaccine research being conducted at the Scientific Research Institute of Epidemiology and Hygiene. Two animal diseases, glanders and foot and mouth, as well as botulinum toxin were also believed to be under development, continuing a suspicion first reported by the CIA in 1959.[617]

Naturally, the assessment of the Soviet program changed and was modified as new information became available and new facilities and processes were identified. But the details of the Soviet program remained essentially unknown to the West until Vladimir

[617] Director of Central Intelligence, National Intelligence Estimate 11-6-59, Soviet Science and Technology (Central Intelligence Agency, 1959).

Pasechnik and the others defected to the West and provided first-hand information about the program.[618] Consequently, the role and importance of intelligence analysis to an understanding of the Soviet program was minimal; the West's knowledge was based on an assumed ground truth, but not the truth on the ground. A review of some of the discoveries made during the inspections suggests that the knowledge of the program prior to the visits was quite limited.

An entire biological infrastructure had been developed under the title and cover of Biopreparat (Chief Directorate for Biological Preparations) with intent of hiding offensive biological weapons research and development behind the cover of legal civilian biotechnology research. This secondary infrastructure essentially duplicated the BW program previously maintained in the Ministry of Defense. Eventually, Biopreparat included 52 installations and at least 50,000 people. Production of agents including plague, tularemia, glanders, anthrax, smallpox, and Venezuelan equine encephalitis was conducted at nine facilities.[619]

Among the discoveries was work scientists at Obolensk were doing inserting plasmids to manipulate the genes of the causative agents for plague and anthrax. This research was known to the U.S./UK team only because Pasechnik had told them about it after his defection. Four 20,000-litre fermenters were also discovered at Obolensk – each capable

[618] P. 145, Hart, "The Soviet Biological Weapons Program."
[619] P. 510, Davis, "Nuclear Blindness: An Overview of the Biological Weapons Programs of the Former Soviet Union and Iraq."

of making about 500 liters of agent per week! As Dr. Frank Malinoski, a researcher from USAMRIID put it, the visit was "eye opening and troubling."[620]

The trilateral process with Russia which began in September 1992, a full 20 months after the first visit to the Soviet Union, ended in 1994, stalled by a series of obfuscations by the Russians.[621] As a result, the U.S. and UK now have actually less insight into the Soviet/Russian program now than they had before the visits.[622] Now the Russians understand what the West knows and have developed alternatives to thwart any intelligence collection opportunities – including possibly developing mobile laboratories for BW production. Ken Alibek, for one, argues that there are at least four facilities in the former Soviet Union which have not been visited by the West but must be inspected for evidence of an on-going BW program.[623]

More troubling beyond the scope and magnitude of the Soviet program before and during World War II is the fact that the program apparently expanded *after* the USSR signed the Biological and Toxins Weapons Convention. A decision to violate the Convention was reportedly made by the Soviet Central Committee in 1973 and the program continued at least until March 1992 when Boris Yeltsin acknowledged the violation.[624] Despite Yeltsin's acknowledgement, there are still suspicions that the BW program continues to

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[620] P. 127-128, Mangold and Goldberg, Plague Wars: The Terrifying Reality of Biological Warfare.
[621] P. 358, Dando, Pearson, Rózsa, Robinson and Wheelis, "Analysis and Implications."
[622] P. 210, Mangold and Goldberg, Plague Wars: The Terrifying Reality of Biological Warfare.
[623] P. 35, Eric Croddy, Clarisa Perez-Armendariz and John Hart, Chemical and Biological Warfare -- a Comprehensive Survey for the Concerned Citizen (New York, New York: Copernicus Books, 2002).
[624] P. 133, Hart, "The Soviet Biological Weapons Program."

this day. The official U.S. Department of State appraisal in 2005 said: ”The United States is concerned that Russia maintains a mature offensive BW program.”[625] It demonstrates the folly, once again, of assuming international norms of behavior will inhibit a country committed to a biological weapons program.

[625] P. 27, U.S. Department of State, Adherence to and Compliance with Arms Control, Nonproliferation and Disarmament Agreements and Commitments.

Chapter 8

Through the Looking Glass – The United States "Program" Today

In November 1969 President Richard Nixon announced, in National Security Decision Memorandum 35, that the U.S. would "renounce the use of lethal methods of bacteriological/biological warfare .... [and] all other methods of bacteriological/biological warfare."[626] Despite this grand gesture by the President, research on offensive biological weapons did not end immediately. In fact, there was a large debate both within the Department of Defense research community and other agencies of the Executive branch over what was meant by the phrase "lethal biological agents and weapons." Much of this debate focused on whether toxins were biological agents or chemicals. The Defense Department preferred to consider toxins the chemical by-product of pathogens and not, by themselves, biological agents. By this definition, researchers claimed they were working on something other than biological weapons.

The National Security Council framed the debate for then-National Security Advisor, Henry Kissinger. The NSC argued that the nature of toxins as biological or chemical was irrelevant. Rather, they said, the toxin program should be "considered on its own merits as a separate weapon system" and how that weapon related to the President's decision to

[626] National Security Council, NSD-35 -- United States Policy on Chemical Warfare Program and Bacteriological/Biological Research Program (National Security Council, 1969).

forgo biological weapons. The conclusion to the memo is telling, however: "The question of the extent of the U.S. toxin program should then be decided on the basis of their relative utility as chemical weapons and whether or not their stockpiling contributes to national security."[627]

On February 14, 1970, the debate became moot with the White House declaration that the November announcement had been extended "to military programs involving toxins whether produced by biological means or chemical synthesis" and the order was given for the destruction of all toxin weapons and stocks not required for defensive purposes.[628] Prior to the official pronouncement by President Nixon, the Department of the Army had directed the immediate cessation of all production of toxins and biological agents and filling of dissemination devices with agents on August 15, 1969.[629] The toxin program was at the time admittedly small including a small stockpile of botulinum toxin, staphylococcal enterotoxin and some shellfish poison and snake venom and was limited to R&D.[630]

At about the same time, however, the National Security Council reopened the question of the true meaning of Nixon's original declaration. The issue now was classified biological research. It was evident from the memorandum that the NSC was unaware of the scope of research being conducted within the Department of Defense and possibly at the

[627] Michael Guhin, The Toxins Issue (Washington, D.C.: National Security Council, 1969).
[628] p. L-1-2, annex L, Army, U.S. Army Activity in the U.S. Biological Warfare Programs.
[629] p. L-1. annex L, Army, U.S. Army Activity in the U.S. Biological Warfare Programs.
[630] Michael Guhin, Further Explanations of Proposed Review Re Necessity of Classified Biological Research Program (Washington, D.C.: National Security Council, 1970).

Department of Health, Education and Welfare. There was concern that whatever research was being conducted might "cast doubt on the credibility of the President's policy."[631],[632]

Possibly in response to the NSC's concern, in the summer of 1970 Secretary of Defense Melvin Laird signed a secret memorandum[633] to the President detailing the Defense Department's actions to terminate the BW program.[634] The appendix to the memorandum outlined the biological agents to be destroyed (and presumably the total of the military stockpile). The stockpile included incapacitating anti-personnel agents in liquid suspension (Venezuelan Equine Encephalitis – 4991 gallons; and *Coxiella burnetti* [Q fever] – 5098 gallons); lethal anti-personnel dried agents (*P. tularense* [sic] [rabbit fever bacteria] – 804 pounds; and *B. anthracis* – 220 pounds); incapacitating anti-personnel dried agents (Venezuelan Equine Encephalitis – 334 pounds); and anti-crop biological agents (wheat rust – 158,684 pounds; and rice blast (1865 pounds). Reflective of the debate going on in government at the time, the memorandum also included a list of munitions to be destroyed; including M1 and M2 canisters which the memo listed as being used for toxins, "biologicals", or simulants. Oddly, considering the previous debate within the NSC and DoD concerning the definition of toxins as chemicals or biologicals, no toxins were included on the list of biological weapons.

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[631] Guhin, Further Explanations of Proposed Review Re Necessity of Classified Biological Research Program.
[632] Balmer, Britain and Biological Warfare.
[633] Now declassified by E.O. 12958.
[634] Melvin Laird, National Security Decision Memoranda 35 and 44 (Washington, D.C.: The Secretary of Defense, 1970).

It is not readily apparent if this duplicity in the U.S. BW program had any effect on the suspicions or fears of other countries, but it certainly could not have helped in the development of arguments defending the U.S. posture. It is widely known that the Soviet Union as recently as the 1980s maintained suspicions that the U.S. had never terminated its BW program but continued a covert program, even while conducting negotiations for the BWC and while hosting trilateral visits with the Soviet Union and the UK.[635]

If an analyst was attempting to identify a BW program and its component parts, where should they begin? One must consider a country's capabilities and its intent. Capability should include educational infrastructure, research infrastructure and evidence of advanced R&D. Intent is much harder to measure or evaluate. Words and actions are the simplest ways to weigh intent. Statements from a country's leadership must be considered carefully. Dividing rhetoric from reality can be challenging and may not be necessary. Actions, too, are often difficult to understand when examining a country's program through a "soda straw." Is a test facility offensive or defensive in nature? Are certain laboratory experiments intended to develop vaccines or to develop hyper-virulent strains of a pathogen? This section will evaluate the present day U.S. defensive program as it might be viewed by an outside agency or nation harboring suspicion of malpractice.

This is not a fanciful exercise. The U.S. Department of State prepares such an assessment of other countries' programs on an annual basis in the President's report to

[635] Alibek and Handleman, Biohazard -- the Chilling True Story of the Largest Covert Biological Weapons Program in the World -- Told from inside by the Man Who Ran It.

Congress, "*Adherence to and Compliance With Arms Control, Nonproliferation and Disarmament Agreements and Commitments*," more commonly referred to as the "Noncompliance Report." The purpose of the Report is to verify "compliance with, and detect[ing] violations of, such agreements and commitments – as well as upon ensuring that violators promptly return to compliance and that other would-be violators are deterred from breaking their own promises." The unclassified Report goes on to stress that with regard to compliance with the Biological Weapons Convention (BWC):

> "There are significant challenges in monitoring and verifying compliance with the BWC . . . . Making a judgment about intent is challenging given the dual-use nature of most biotechnology equipment, facilities, and activities. As with other agreements – particularly those involving dual-use technologies that may be used in a variety of legitimate or illegitimate ways – intent is a critical element, and it may have to be inferred from the circumstances, in light of all available information, if direct evidence is not available."[636]

What would be the resultant conclusions if an outside analyst tried to make sense of activities underway today in the United States? Would the analyst find a robust program dedicated to biodefense? Or would the analyst conclude there is something more "through the looking glass"? What would an analyst conclude is the status of the United States' compliance with its international commitments regarding biological weapons? The following might be the elements of the assessment:

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[636] U.S. Department of State, Adherence to and Compliance with Arms Control, Nonproliferation and Disarmament Agreements and Commitments.

It needs to be cautioned that none of the following activities constitute an offensive BW program within the United States. The program was stopped in 1969 and has not resumed. The Department of Defense, for example, manages a rigorous program to ensure that all activities within the Department of Defense and the military services are compliant with U.S. regulations as well as with the Biological Weapons Convention.[637] The regulation, DoD Directive 2060.1, requires a Treaty Manager be identified, a DoD implementation working group be established, and a compliance review group be developed to review and approve activities within the mandate of the BWC.

NBACC

The centerpiece of the U.S. program to counter threats of biological origin is intended to be the National Biodefense Analysis and Countermeasures Center, NBACC, at Fort Detrick, Maryland. The official purpose of NBACC is to "provide the nation with essential biocontainment laboratory space for biological threat characterization and biodefense research."[638] However, then-Deputy Director Lieutenant Colonel George Korch expanded that mandate to include: Aerosol dynamics, novel packaging, novel delivery of threat, genetic engineering, bioregulators/immunomodulators[639], genomics

[637] Department of Defense, "DoDD 2060.1, Implementation of, and Compliance with, Arms Control Agreements," (2001).
[638] Department of Homeland Security, Fact Sheet: National Biodefense Analysis and Countermeasures Center, 2005, Available: http://www.dhs.gov/dhspublic/display?theme=43&content=4377&print=true, October 8 2006 2006.
[639] According to Milton Leitenberg, "Work on bioregulators and immunomodulators in the former Soviet offensive BW program during the 1980s is in retrospect realized to have been among the most dangerous and reprehensible of its numerous nefarious activities, despite having never approached weaponization, staying "safely" at research and development stages. Other than context – a preposterously large offensive BW program – was work on bioregulators and immunomodulators qualitatively different from the work

and proteomics, and "red teaming."[640] It is envisioned to be part of the Homeland Security Biodefense Complex, which includes the Plum Island Animal Disease Center, the Biodefense Knowledge Center, the national laboratories, and the university-based Homeland Security Centers of Excellence. NBACC will comprise approximately 160,000 square feet of building space, including about 60,000 square feet of BSL-2, 3, and 4 laboratory space.[641]

Not surprisingly, the new plans for the NBACC, and for Ft. Detrick as well, have raised local opposition. The opposition was enough that Pat Fitch, the newly-named director of the laboratory felt it necessary to state in public forum that the laboratory would not "create threats in order to study them."[642] This is more transparent approach than that of George Korch, who stated in a briefing in February 2004 that part of the mission of one of the NBACC's components, the National Bioforensic Analysis Center, was to conduct "novel technology assessment and validation."[643]

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now to be carried out in the United States?" Milton Leitenberg, James Leonard and Richard Spertzel, "Biodefense Crossing the Line," Politics and the Life Sciences 22.2 (2003): p.3.

[640] P. 63, Susan Wright, "Taking Biodefense Too Far," Bulletin of Atomic Scientists 60.6 (2004).

[641] BSL = Biosafety levels for handling infectious agents. In general, BSL-1 is for agents not known to consistently cause disease. BSL-2 is for agents associated with human disease. BSL-3 is for indigenous or exotic agents with potential for aerosol transmission. BSL-4 is for dangerous/exotic agents which pose a high risk of life-threatening disease. Jonathan Y. Richmond and Robert W. McKinney, eds., Biosafety in Microbiological and Biomedical Laboratories,, 4th ed. (Washington, D.C.: U.S. Government Printing Office,, 1999).

[642] FAS Strategic Security Blog, NBACC Director Says They Will Not Create Threats at Lab, 2008, Federation of American Scientists, Available: http://www.fas.org/blog/ssp/2208/05/nbacc-director-says-they-will-not-create-threats-at-lab.php, May 14, 2008 2008.

[643] George Korch, "Leading Edge of Biodefense: The National Biodefense Analysis and Countermeasures Center," trans. Washington Armed Forces Pest Management Board Office of the Deputy Under Secretary of Defense (Installations and Environment), D.C., Military Entomology -- Its Global Challenge 2004, DoD Pest Management Workshop (Naval Air Station, Jacksonville, Florida: 2004), vol. 1, 1 vols.

Fort Detrick will support what is known as the National Interagency Biodefense Campus. The campus will include NBACC, Health and Human Services' National Institute of Allergy and Infectious Diseases, the Department of Agriculture's Agricultural Research Service and Foreign Disease-Weed Science Research Unit, and the Department of Defense's U.S. Army Medical Research Institute of Infectious Diseases. Why such a concentration of high containment laboratory space in a populated area? What is the threat the U.S. faces that demands such a facility? Could such a facility and campus serve purposes other than those so openly advertised? Perhaps because Fort Detrick has a fairly long presence in the community, the opposition has been somewhat muted. Such is not the case, however, with DHS plans to establish a National Bio and Agro-Defense Facility.

The National Bio- and Agro-Defense Facility

The laboratory facilities planned for outside the Fort Detrick campus have also raised local opposition. The Tracy, California, City Council organized a citizens' committee to investigate plans for "a bio-warfare research facility" proposed for Lawrence Livermore National Laboratory.[644] One dissenter complained that the facility "would house diseases which have no known cures or vaccines, such as ebola virus and cattle diseases such as mad cow and hoof and mouth." (Tracy has a large cattle and dairy industry.)

[644] Mike Martinez, "Committee Looks into Bio-Warfare Facility," Contra Costa Times 2006.

The planned Lawrence Livermore laboratory was one of 18 different sites chosen to compete to become the next Plum Island Animal Disease Center.[645] The original eighteen sites were:

- Lawrence Livermore National Laboratory (California)
- Georgia Consortium for Health and Agro-Security (2 sites)
- Heartland BioAgro Consortium (Kansas) (2 sites)
- Kentucky and Tennessee NBAF Consortium (Kentucky)
- Mid-Atlantic Bio-Ag Defense Consortium (Maryland)
- Gulf States Bio and Agro-Defense Consortium (Mississippi) (2 sites)
- University of Missouri at Columbia
- North Carolina State University – College of Veterinary Medicine
- Oklahoma State University
- Texas A&M University
- Brooks Development Authority and Brooks City-Base Foundation (Texas)
- Texas Research and Technology Foundation
- Southwest Foundation for Biomedical Research (Texas)
- University of Wisconsin – Madison site at the Kegonsa Research Facility

In July 2007 the original list of eighteen was reduced to a shorter list of five locations. The five remaining locations were the Texas Research Park, The Georgia Consortium, the Gulf States Consortium, North Carolina State University, and the Heartland Bio-Agro

[645] Department of Homeland Security, DHS Completes First Down-Select for Potential Sites to Locate Proposed National Bio and Agro-Defense Facility, August 9, 2006 2006, Available: http://www.dhs.gov/xnews/releases/pr_1158348628795.shtm, October 17 2006 2006.

Consortium.[646] Complaints of politicization of the process were immediate. The selection of the Gulf States Consortium, a facility reportedly scoring lower by government experts than at least nine facilities in six other states. Perplexing was the reported rejection of the Mid-Atlantic Bio-Ag Defense Consortium's Beltsville, Maryland site because "there were too many skilled researchers near [the facility] and the agency worried about competing to hire them." Conversely, Department of Homeland Security Undersecretary Jay Cohen reasoned that skilled researchers would move to Mississippi if the facility was built, accepting the "Field of Dreams" argument that "if you build it, they will come."[647]

The location of the new facility, called the National Bio- and Agro-Defense Facility (NBAF), was originally planned to be named in early FY 2008. Twenty-three million dollars were requested in FY 2006 for the needs assessment and design process for the new facility. The plan, however, is not to replace the fifty year old Plum Island facility as much as enhance new missions in the new NBAF. Three options were proposed:

- keep the scope the same as Plum Island but build facilities required to meet the needs of the first half of the 21st century;
- expand the scope to include agricultural biocontainment laboratories at biosafety level 3 agriculture and possible biosafety level 4 for foreign animal and zoonotic disease as called for in HSPD-8;

[646] Express-News Staff, "S.A. A Finalist for Biodefense Lab," Express-News July 11, 2007 2007.
[647] Larry Margasak, "AP Exclusive: US Disregarded Experts over Biolab," Associated Press August 11, 2008 2008.

- add expanded test and evaluation facilities to support non-clinical testing under the Animal Rule needed to support advanced development of security medical countermeasures by the Department of Health and Human Services.[648]

The NBAF is envisioned to be equipped with "numerous laboratories that will conduct research in high-consequence biological threats involving foreign animal, zoonotic (transmitted from animals to human), and human diseases. As a key part of this, the Department of Homeland Security (DHS) plans to house laboratories that will provide high security spaces for agricultural and animal studies and training. In addition, DHS plans for the NBAF to develop vaccine countermeasures for foreign animal diseases, and provide advanced test and evaluation capability for threat detection, vulnerability, and countermeasures assessment for animal and zoonotic diseases."[649]

One challenger for the NBAF facility, located in the town of Dunn, Wisconsin, and connected with the University of Wisconsin-Madison, also faced local opposition. The *Milwaukee Journal Sentinel* reported the Dane County Board voted to oppose the project at a meeting in May, 2007 despite the potential $450 million investment costs and the opportunity to employ 300 local citizens. (Other estimates put the potential economic

[648] Department of Homeland Security, Fact Sheet: National Bio and Agro-Defense Facility, August 22, 2005 2005, Available: http://www.dhs.gov/xnews/releases/press_release_0719.shtm, October 17 2006 2006.
[649] Department of Homeland Security, DHS Completes First Down-Select for Potential Sites to Locate Proposed National Bio and Agro-Defense Facility.

impact at between $3.5 and $6 billion over twenty years with a staff of 500 scientists.[650]) DHS revised its cost estimate in August 2008, saying the facility will cost "at least $648 million and as much as $939 million, depending on where it is located."[651] A Department of Homeland Security spokesman reportedly admitted that Wisconsin "isn't the only site with opposition."[652] One of the other proposed sites facing large local opposition was the one proposed for the University of Missouri at Columbia. The public face of the opposition was an ominously-titled web site: www.nodeathlab.com.[653]

A Proliferation of Biocontainment Laboratories

A second proposed BSL laboratory for Lawrence Livermore has also faced opposition. The Ninth Court of Appeals in San Francisco blocked construction of the laboratory, saying the Department of Energy "must consider whether terrorists could attack the center, and then decide whether the possible consequences warrant a full environmental review."[654] It is not clear from the article what level of containment the new laboratory is planned to be. However, since Lawrence Livermore already has an active BSL-3 laboratory[655] it is unclear why the new laboratory would present a different or increased level of threat to the surrounding community.

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[650] "Sebelius Signs Bill to Help Land Bio-Defense Facility," Kansas City Business Journal March 28, 2008 2008.
[651] Ken Foskett, "Cost of Planned Biolab Increases $200 Million," Journal-Constitution August 15 2008 2008.
[652] John Diedrich, "UW, Town in Tiff over Lab Turf," Journal Sentinel 21 May 2007 2007.
[653] Ken Midkiff, "Bringing Lab into Community a Life-or-Death Decision," Columbia Tribune June 8, 2007 2007.
[654] Bob Egelko, "Ruling Stalls Lab's Germ Research," San Francisco Chronicle October 17, 2006 2006.
[655] The Sunshine Project, High Containment Labs and Other Facilities of the Us Biodefense Program, February 20 2006 2006, Available: http://www.sunshine-project.org/biodefense, October 17 2006 2006.

The issue of expert analysis comes clearly into play in the debate over the Livermore Laboratory. A recent Op-Ed article in the Alameda Star-Times argued for the need of the new BSL-3 laboratory in order to "conduct more detailed experiments on a wider range of microorganisms than can currently be handled at LLNL."[656] The author, Bill Colston, is identified as the leader of Lawrence Livermore's Chemical and Biological Countermeasures Division. He is, then, presumably an expert, albeit a biased one in this regard. But two items in the article tend to push both Colston's argument and his expert reputation to the limit of credibility. First, he states that there are "several hundred BSL-3 laboratories currently operating in the United States." Even the Sunshine Project, a politicized organization with a strong "transparency in government" agenda, identifies only sixty such facilities.[657]

More troubling is Colston's supporting argument for the defensive work planned for the laboratory. Colston defends the laboratory as using only "small amounts of pathogens (teaspoons to tablespoons)" for its experiments. Disregarding the immediate picture of a laboratory technician conducting experiments on anthrax using common kitchen utensils, to the uninformed this may seem to be a reasonable small quantity of material. But a tablespoon holds over 14 grams of material. Since molecular biology experiments usually involve microgram quantities of material and sensor experiments are usually

[656] Bill Colston, "Livermore Lab to Expand Biodefense," Alameda Times-Star May 21, 2007 2007.
[657] This may be merely a matter of definition of laboratories versus facilities. For example, the Centers for Disease Control in Atlanta are identified only once by the Sunshine Project, yet CDC has multiple BSL-3 rooms. Conversely, the Sunshine Project also identifies BSL facilities inside the Pentagon, where there are none.

involving minute "parts per million" or "parts per billion" concentrations, is it reasonable to assume biodefense research would require such quantities of dangerous pathogens?

These are not, however, the only high containment laboratories planned throughout the country at the moment. The Sunshine Project reports that seven other BSL-4 laboratories are planned throughout the United States. (There are only six active BSL-4 laboratories in the U.S. at present.) An additional eight institutions are identified as wanting to construct a BSL-4 laboratory.[658] In addition, there are twenty-five additional "major" BSL-3 laboratories either planned or under construction. (see Appendix V for a full list of locations) What is the threat that requires such a major infrastructure construction project?

This may be a particularly germane question in light of the recent Government Accountability Office (GAO) investigation concerning the lack of oversight by the Federal Government over the existing BSL -3 and -4 laboratories throughout the United States.[659] The conclusions of the GAO study was that none of twelve Federal agencies knew the exact number of BSL-3 or -4 laboratories in the country, nor did any of the agencies have it in their mission to track the number of laboratories in the country. Despite (or possibly the result of) this lack of oversight, the number of BSL-4

[658]The Sunshine Project, High Containment Labs and Other Facilities of the Us Biodefense Program.
[659] Keith Rhodes, High-Containment Biosafety Laboratories -- Preliminary Observations on the Oversight of BSL-3 and BSL-4 Laboratories in the United States (Washington, D.C.: Government Accountability Office, 2007).

laboratories has increased from two prior to 1990, to three prior to 2000, to a total of somewhere between six and fifteen BSL-4 laboratories today.[660]

Since the "Amerithrax" episode in 2001 there has been no detected terrorist use of biological pathogens against targets in the U.S. As in the past, the vast majority of alleged uses of biological pathogens against individuals have been hoaxes. In the recent past, there have been four disease outbreaks of concern: the continuing West Nile Virus[661] pandemic and the now-controlled SARS outbreak. Avian Influenza is just now reaching the U.S. borders, and the feared human influenza pandemic has not yet become a reality. SARS was studied in a BSL-4 laboratory, but none of the other pathogens require such high containment. Why the expansion of BSL-4 and 3 facilities?

The cynical answer is that money is driving the expansion in what Professor John Mueller calls the "Terrorism Industry."[662] In fact, a recent press release supports Mueller's cynicism by pointing out that $5.2 billion in homeland security-related R&D was expected in FY 2007.[663] BioInformatics, LLC argued that despite this infusion of cash, there are critical tools lacking that prevent development of new prophylactics, diagnostics, and therapeutics. The missing tools include appropriate in vitro and animal

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[660] The Sunshine Project identifies only six operational BSL-4 laboratories. Some of the laboratories identified by GAO are not operational, such as the laboratory at NBACC.
[661] We should not forget, however, the unsubstantiated claims that West Nile Virus was developed as a weapon by Iraq and "delivered" to the East Coast where it began its spread throughout North America. Mikhail Ramadan, In the Shadow of Saddam (Auckland: GreeNZone Publishing, 1999) p. 317-19.
[662] John Mueller, Overblown -- How Politicians and the Terrorism Industry Inflate National Security Threats, and Why We Believe Them (New York: Free Press, 2006).
[663] PRNewswire, Market Opportunities Abound for Life Science Suppliers in Multi-Billion Dollar U.S. Market for Biodefense Research, 2006, Gene2Drug.com, October 18, 2006 2006.

models, validated assays and standardized reagents, and pathogen-specific genomics and proteomics research. Hence, the need for new laboratory space, although the cynic (once again) would point out that all those research requirements would also be of value to a covert weapons program. Such is the dual use nature of biotechnology.

The cost of one such laboratory is staggering; then multiply the figure by the 32 laboratories currently planned for construction. George Mason University was awarded $25 million from the National Institute of Allergy and Infectious Diseases (NIAID) in 2005 for construction of a BSL-3 biocontainment laboratory.[664] The total cost for construction of the 83,164 square foot facility is approximately $42 million. The grant was in response to a 2002 NIAID Regional Biocontainment Laboratories Construction Program Initiative in response to a panel concern that a lack of BSL-3 and -4 laboratories in the U.S. was a significant barrier for progress in biodefense research.[665] It should be noted that the $42 million is construction costs and does not include the annual costs for operating and maintaining such a facility.

In Boston, opposition for a planned 233,000 square foot "high security, biosafety laboratory" forced a state judge to order a new environmental review of the program after construction had already begun.[666] The Boston University-planned laboratory is to conduct research in "finding a new method to detect anthrax, building polyclonal

[664] Jennifer Halpin, University to Break Ground for Biomedical Research Lab (Prince William: George Mason University, 2007).
[665] Patty Snellings, George Mason University Receives $25 Million Federal Award for Construction of a Regional Biocontainment Laboratory (Manassas: George Mason University, 2005).
[666] Gary Dzen, "Library Holds Key to Lab Mystery," Boston Globe September 17, 2006 2006.

antibody libraries for tularemia bacteria, and looking for small molecules to 'block fusion by envelope proteins' of ebola." The laboratory would have "only" 25,000 square feet of BSL-4 laboratory space; the rest would be made up largely of BSL 2 and 3 level laboratories. It is interesting that Rona Hirschberg, a senior program official at the National Institutes of Health had to defend the laboratory by saying "This is not a bioweapons lab. It's a biodefense research lab." A federal judge later ruled that construction of the laboratory could continue but the federal judge said she may "consider blocking dangerous projects" at the $128 million facility in the future.[667]

More facilities make it much more difficult for an outside analyst to "watch" all the locations and obtain an accurate assessment of what is taking place inside the facilities. A dispersed threat is a harder "threat" to understand. Even if all the planned facilities have justified, legitimate research requirements, the increased number of facilities will require a skilled labor force which may not exist in the regions. Can it be safely assumed that all the new staffs have the same understanding and devotion to both biosafety and biosecurity? Or have we simply increased access to dangerous pathogens to a larger network of terrorists and crackpots throughout the nation?

Bacchus

[667] Channel 12 WPRI, Boston University Gets the Ok to Proceed with Bioterrorism Lab, 2006, Available: www.eyewitnessnewstv.com/Global/story.asp?S=5571428&nav=F2DO, October 23 2006 2006.

Project Bacchus[668] was a 1999 program designed to assess how difficult it would be to produce BW agents using only commercially available components. Bacchus (Biotechnology Activity Characterization by Unconventional Signatures) was a program funded by the Defense Threat Reduction Agency.[669] The intent was to set up a working biological production facility that would simulate a BW "factory" producing anthrax. According to Jay Davis, the then-Director of DTRA, the idea was that the Intelligence Community (IC) could then look for signatures of a BW facility. Judith Miller states in the book Germs[670] that the signatures the IC was looking for were the signatures of somebody buying the production equipment. This is unlikely. One would not need to actually buy the equipment to know the process involved in ordering equipment. Project Bacchus cost $1.8 million. The signatures the IC was truly interested in (as Miller later states in her book) were the emissions and other indicators that a relatively small production facility might produce.

But what signatures would an outside observer see? As an example, overhead imagery might have revealed a facility in the middle of the desert. A skilled imagery analyst with quality imagery may have noted venting and piping indicative of some sort of laboratory.

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[668] Bacchus was incorrectly identified as "the god of fermentation" and the codename was reportedly an inside joke at DTRA. Miller, Engleberg and Broad, Germs: Biological Weapons and America's Secret War p.297. The Romans were not so theistically specialized. Bacchus was the god of wine, vegetation, and fertility. There is, however, a god of fermentation in Slavic mythology, Raugupatis, and one in Finnish mythology, Pellonpekko. Godchecker, Godchecker, 2006, Available: http://www.godchecker.com/pantheon, 13 September 2006 2006. Curiously, many critics of the US biodefense program and Project Bacchus have picked up on the "Bacchus = fermentation" formula, some going so far as to misidentify Bacchus as a Greek god, rather than Roman.

[669] Andy Oppenheimer, Genetically Modified Bioweapons: The Threat Posed by "Black Biology", 29 May 2002 2002, September 12, 2006 2006.

[670] P. 297, Miller, Engleberg and Broad, Germs: Biological Weapons and America's Secret War.

If there was repetitive imaging, the analyst may have noted vehicles and trucks coming and going. The analyst may have had additional information from other sources suggesting a biological focus of the facility. A knowledgeable analyst then might identify the facility as a possible biological laboratory – a more forward-leaning analyst might even describe it as suspect BW facility.

But National Technical Means (NTM)[671] would not be able to positively identify the laboratory's role.[672] Nor could NTM determine if it was a real laboratory creating new BW agents for a new offensive program or a test facility for modeling non-pathogenic simulants or especially, as was originally speculated, it was a demonstration facility to see spending patterns for equipping a laboratory. NTM cannot determine intent until it is too late – if at all. And only a skilled analyst using many other cues would be able to locate and identify a facility if the other side decided to employ deception to hide its real purpose.[673]

Clear Vision

A week prior to the tragic events of 9/11, Judith Miller and her team of reporters published in the New York Times a report alleging the U.S. had "embarked on a program of secret research on biological weapons that, some officials say, tests the limits of the

[671] National Technical Means was a term created in the bilateral arms control negotiations between the U.S. and the USSR to characterize overhead satellites and other non-intrusive intelligence collectors. There has been a push to replace NTM with NMM – National Means and Methods – to draw in other countries which may have much more modest collection capabilities. The phrase has not caught on yet.
[672] Burrows, Deep Black -- Space Espionage and National Security.
[673] Dino A. Brugioni, Photo Fakery - the History and Techniques of Photographic Deception and Manipulation, First ed. (Dulles: Brassey's, 1999).

global treaty nabbing such weapons."[674] One of the "secret" programs Miller revealed was Bacchus. A second was Clear Vision. Clear Vision was reportedly a program initiated by the Central Intelligence Agency to build and test a model of a Soviet-designed BW bomb which the CIA feared was being sold on the international black arms market. Miller claimed the bomb was built without a fuse or other working parts. This may have been so the CIA could argue the bombs were not functional and, therefore, did not violate the BWC. This may not have been the first Soviet-style bomb built by the U.S. It has been claimed that a DoD-sponsored bomblet project was managed at Edgewood Arsenal in the late 1990's.[675]

Other scientists reportedly tried to design *in silico*, computer-generated pathogens in order to understand how genes can be inserted into pathogens to make them more deadly or more resistant to vaccines.[676] There were at least three challenges to the legality of the Clear Vision project between mid-1999 and early 2001, the duration of the project. CIA lawyers, however, held that the project was legal under the BWC.

The Jefferson Project

The Jefferson Project was a program of the Defense Intelligence Agency to produce small amounts of genetically modified antibiotic-resistant strains of anthrax to mimic a

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[674] Judith Miller, Stephen Engleberg and William Broad, "U.S. Germ Warfare Research Pushes Treaty Limits," New York Times September 4, 2001 2001.
[675] Barbara Hatch Rosenberg, BWC Special Paper No. 1, Defending against Biodefence: The Need for Limits (The Acronym Institute, 2003).
[676] P. 66, William R. Clark, Bracing for Armageddon? -- the Science and Politics of Bioterrorism in America (Oxford: Oxford University Press, 2008).

strain that Soviet scientists claimed to have constructed in the Soviet BW program.[677] Confusing the true intent of the program are suggestions that the initial analysis of the suspected mobile BW laboratories in Iraq was also a product of the Jefferson Project. If so, what was the scope of the DIA program? If the program encompassed both technical exploitation of equipment as well as reverse-engineering of pathogens, then what else could the program have had responsibility for but that has not yet been revealed to the public?

BARDA

In December 2006, the President approved legislation creating the Biomedical Advanced Research and Development Authority (BARDA), budgeted for $1 billion which is to be directed to biotechnology companies and research centers.[678] Specifically, BARDA is expected to "provide direct investment in medical countermeasure advanced research and development."[679] The legislation was Title IV of the Pandemic and All-Hazards Preparedness Act (P.L. 109-417) passed in December 2006.[680] But the reality has so far not matched the original dreams of BARDA. BARDA's budget is only $100 million a year, not the envisioned $1 billion, and it has been estimated by the University of

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[677] P. 564, Richard Roffey, "Biological Weapons and Potential Indicators of Offensive Biological Weapon Activities," SIPRI Yearbook 2004: Armaments, Disarmament and International Security (2004).
[678] Amy Ellis Nutt, "New Agency to Lead Hunt for Bioterrorism Defenses," The Star-Ledger December 13, 2006 2006.
[679] U.S. Department of Health and Human Services, Strategy and Implementation Plan for Chemical, Biological, Radiological and Nuclear Threats (Washington, D.C.: U.S. Department of Health and Human Services, 2007).
[680] Gigi Kwik Gronvall, Bradley T. Smith, Jason Matheny, Michael Mair, Allison Chamberlain, Shana Deitch, Luciana Borio, Thomas V. Inglesby and Tara O'Toole, "Biomedical Advanced Research and Development Authority (BARDA) Roundtable," Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science 5.2 (2007).

Pittsburg Center for Biosecurity in Baltimore that $3.4 billion a year is actually needed by BARDA.[681]

An earlier version of the legislation was the Biodefense and Pandemic Vaccine and Drug Development Act of 2005, drafted by Senator Richard Burr, a Republican from North Carolina. Burr's draft law would have provided the first blanket exemption from the Freedom of Information Act (FOIA), "apparently in an attempt to protect any and all sensitive information on U.S. counter-bioterrorism efforts or vulnerabilities to biological threats."[682] The public outcry was not surprising. Editorials from both coasts decried the notion of extreme secrecy.[683],[684] Critics pointed out that the FOIA laws already permitted the restricting of information for National Security reasons. So, why the need for more secrecy? Efforts by supporters to make BARDA exempt from Freedom of Information Act laws and other "open government" laws were overcome, although the Secretary of Health and Human Services is given discretion over information that might expose significant public health weaknesses.[685]

Thrips Palmi

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[681] P. 431, Yudhijit Bhattacharjee, "Movers - Biowarrior," Science 320.5875 (2008).
[682] OMB Watch, A New Ultra-Secret Agency, 2005, Available: www.ombwatch.org/article/articleprint/3195/-1/{category_id}, September 4, 2007 2007.
[683] Editorial, "Secrecy Is Unhealthy," San Francisco Chronicle December 5, 2006 2006.
[684] Editorial, "Editorial: Develop a Vaccine against Official Secrecy," The Roanoke Times November 6, 2005 2005.
[685] Jonathan Marino, Bill Creating HHS Bioterror Research Agency on Bush's Desk, December 13, 2006 2006, govexec.com, December 18, 2006 2006.

An international incident occurred in December 1996 when Cuba accused the United States of deliberately releasing a biological weapon, *Thrips palmi*, against the island. In a note of protest given to the U.S. Interests Section in Havana on December 26, the Cuban government said the aircraft "intermittently sprayed or dusted an unknown substance" during an October 21, 1996 overflight of the island.[686]

On 25 August 1997, Cuba lodged an official complaint at the BWC consultative meeting in Geneva charging the United States with violating the Biological and Toxins Weapons Convention and invoking Article V of the Convention.[687] Cuba charged that the U.S. sprayed an insect known as *Thrips Palmi* over western Cuba, causing a widespread infestation of this crop-killing pest. It was the first time the BWC dealt with a complaint under the 1991 provision that allows a nation that believes it has been under attack to call for an investigation.[688]

The U.S. prepared a portfolio of documents to address the Cuban charges.[689] Eleven other countries[690] submitted papers commenting on the allegations. Some of the countries saw no causal link between the insect infestation and the U.S. overflight. Others noted the technical complexity of the allegation, the lack of detailed information

[686] United States Government, Documents in Support of United States Presentation Regarding Cuban BW Allegations (Geneva Switzerland: 1997).
[687] Article V obligates treaty members 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 of the Convention.
[688] Henry L. Stimson Center, "America Accused of Violating the Biological and Toxins Weapons Convention," CBW Chronicle II.3 (1997).
[689] United States Government, Documents in Support of United States Presentation Regarding Cuban BW Allegations.
[690] Australia, Canada, China, South Korea, Denmark, Germany, Japan, Netherlands, New Zealand, Vietnam, and Hungary

provided by Cuba, and the passage of time (almost eleven months after the fact) making it impossible to reach a definitive judgment.[691] Seventy-four members and three signatories to the BWC attended the hearings in Geneva. On 15 December 1997, Great Britain released a final report stating that the Formal Consultative Meeting had not been able to reach a definitive conclusion on Cuba's allegations.

This was, of course, not the first time that Cuba has accused the U.S. of conducting BW against the island. A declassified U.S. Department of State memorandum from 1964 discusses an unspecified charge of bacteriological warfare by Cuba. The memorandum suggests that Cuba request an investigation be conducted by either the World Health Organization or the International Committee of the Red Cross. Cuba declined.[692] The 1964 incident may have been a Cuban claim that the U.S. had sent balloons carrying bacteriological cultures to Cuba. The facts of this apparent incident were never repeated in Cuban charges against the U.S..[693] Curiously, the Cuba Solidarity Project lists 28 different reported cases of biological warfare against the island, but no apparent attack in the 1964 time frame[694]. Radio Havana, citing a 1964 *Granma* newspaper article, claimed that a Cuban-American "terrorist", Eduardo Arocena, admitted before a U.S. Grand Jury that he had introduced biological agents after infiltrating the island.[695] Castro claimed in

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[691] Henry L. Stimson Center, "Investigation of Allegations of U.S. BWC Violation Inconclusive," CBW Chronicle II.4 (1998).
[692] U.S. Department of State, Memorandum -- Action to Counter Cuban Charge of Germ Warfare (U.S. Department of State, 1964).
[693] P. 178, Raymond A. Zilinskas, "Cuban Allegations of Biological Warfare by the United States: Assessing the Evidence," Critical Reviews in Microbiology 25.3 (1999).
[694] Cuba Solidarity Project, Guerre Bacteriologique Contre Cuba (2005).
[695] Radio Havana Cuba, Evidence of US Biological War, rec June 20th 1997, Havana, 1997.

a speech on 12 October 1997 that the United States has engaged in germ warfare against Cuba on at least 22 occasions between 1962 and 1996.

Glanders

In World War I, Germany attempted to use glanders against U.S. livestock in an effort to dissuade U.S. support of the Allies in the war. At the end of the twentieth century, the first case of glanders reported in the Western press since 1949 raised new suspicions of BW research in the U.S..[696] In March 2000, a microbiologist researcher at the USAMRIID came down with fatigue, night sweats, malaise, rigors, and weight loss. The medical problems continued for two months until blood cultures identified a bacterium as *Pseudomonas fluorescens* or *P. putida*. Subsequent phenotyping identified the bacteria as *Burkholderia mallei*. This case demonstrated the difficulty that microbiology laboratories have in recognizing and accurately identifying potential BW agents in a clinical setting. After a six-month course of treatment, CT scans of the liver and spleen showed significant improvement and a year later the patient was reportedly in good health. Less easily cured were the suspicions of covert BW research raised by this incident.

[696] P. 256, Arjun Srinivasan, Carl N. Kraus, David DeShazer, Patrice M. Becker, James D. Dick, Lisa Spacek, John G. Bartlett, W. Russell Byrne and David L. Thomas, "Glanders in a Military Research Biologist," The New England Journal of Medicine 345.4 (2001).

A journal as respected as the New England Journal of Medicine suggested the incident was the result of BW research.[697] The journal suggests that glanders was abolished as a naturally-occurring disease by veterinarian use of a skin test to detect *B.mallei* combined "with draconian agricultural measures to control infection" in the early part of the twentieth century. More troubling, according to the Journal, is that the case may be "a harbinger of the resurgence of nearly forgotten diseases such as glanders, plague, smallpox, and anthrax. Research on these diseases is now being conducted in more laboratories, which increases the risk of occupational exposure. There is also the looming threat that some group will eventually mount a successful campaign of bioterrorism. Resources must be allocated both to prevent and to prepare for these frightening possibilities."[698] Almost presciently, the Journal's conclusion was published on July 26, 2001, six weeks before the Amerithrax anthrax letters were mailed.

Mousepox and cowpox

Recent academic research also raised the specter of questionable judgment, if not deliberate offensive BW research. Perhaps most notable was the publication of research attempting to sterilize mice using a modified mousepox virus.[699] The Australian scientists discovered instead that the modified virus defeated the mouse immune system

[697] P. 256, Srinivasan, Kraus, DeShazer, Becker, Dick, Spacek, Bartlett, Byrne and Thomas, "Glanders in a Military Research Biologist."
[698] P. 258, Srinivasan, Kraus, DeShazer, Becker, Dick, Spacek, Bartlett, Byrne and Thomas, "Glanders in a Military Research Biologist."
[699] Ronald J. Jackson, Alistair J. Ramsay, Carina D. Christensen, Sandra Beaton, Diana F. Hall and Ian A. Ramshaw, "Expression of Mouse Interleukin-4 by a Recombinant Ectromelia Virus Suppresses Cytolytic Lymphocyte Responses and Overcomes Genetic Resistance to Mousepox," Journal of Virology 75.3 (2001).

becoming thereby much more virulent. In November 2003, Mark Buller, a St. Louis University scientist, reportedly repeated the Australian research and then expanded the research to cowpox, which infects humans. His rationale for the research: "To better understand how easy or difficult it would be to apply the same kind of genetic engineering to the human smallpox virus and *make it more lethal."*[700] (emphasis added) Significantly, Ian Ramshaw, one of the Australian researchers in the earlier mousepox discovery, expressed concern about Buller's work, saying "I have great concern about doing this in a pox virus that can cross species."[701] Buller's research was funded by NIAID, whose biodefense budget has gone from $17 million in fiscal year 1998[702] to $1.5 billion in fiscal year 2005.

The 2001 BWC Revcon

Finally, let us consider the United States' behavior and the positions it has taken at the Review Conferences of the BWC. The Fifth Review Conference (Revcon) in 2001 was notable because the assembled states could not agree on a final declaration and the Revcon never officially closed – the delegates simply went home with the conference suspended for a year. The U.S. was noted for its use of two different tactics. First, during the general debate, John Bolton, Undersecretary of State for International Security and Nonproliferation proceeded to "name names" of alleged violators of the BWC. The named violators were Iran, Iraq, Libya, and North Korea (all state parties) as well as

[700] P. 63, Wright, "Taking Biodefense Too Far."
[701] Deborah MacKenzie, "U.S. Develops Lethal New Viruses," New Scientist (2003).
[702] Other columnists claim the figure is closer to $2 billion. Bright B. Simons, "America Steps-up Biodefenses -- Critics Question Rationale, Fear Breaking of Treaties," Ohmynews (2006).

Syria (a signatory). The problem for the Convention was not so much the naming of names, but the fact that the United States did not offer evidence to substantiate the charges or initiate formal procedures against the countries, but expected the language on noncompliance to be included in the final document.[703]

More troubling was the United States' actions to defeat the draft protocol for a BWC verification regime in the so-called Ad Hoc Group and the subsequent "walking out" of the Revcon without a consensus closing statement from the conference. The Protocol was intended to redress the lack of transparency in the Convention as written. Formal talks had begun six years earlier and had finally resulted in a composite text that the chairman, Hungarian Ambassador Tibor Tóth believed had captured the political momentum. The draft protocol, a 210 page tome with 30 articles, three annexes and nine appendices established requirements for declarations, investigations, confidence-building visits, and technology transfer.

The logic behind the U.S. rejecting the protocol was that it would add nothing to U.S. or international verification capabilities.[704] The United States argued that the Convention is not verifiable and, apparently, has decided that this situation serves its interests (or, at least, does not do it harm). U.S. Ambassador Donald Mahley, Deputy Assistant Secretary of State for Threat Reduction, Export Controls and Negotiations and senior

[703] P. 6, Richard Lennane, "Blood, Toil, Tears and Sweat: The Biological and Toxin Weapons Convention since 2001," Disarmament Forum.3 (2006).
[704] Kathleen C. Bailey, Why the United States Rejected the Protocol to the Biological and Toxin Weapons Convention (Fairfax: National Institute for Public Policy, 2002).

U.S. representative to the BWC Review Conferences, announced that the U.S. was "forced to conclude that the mechanisms envisioned for the protocol would not achieve their objectives, that no modification of them would allow them to achieve their objectives, and that trying for more would simply raise the risk to legitimate United States activities."[705] So, in a nutshell, this was the U.S. position at the fifth BWC Revcon: "We don't trust, but we won't verify."

By way of comparison, the sixth Review Conference in 2006 was considered a great success, simply because there was little controversy and few initiatives that could be considered counter to the spirit of the Convention. The highlight of the Convention was the push by several Western states, including the United States, to include in the final declaration language referring to the importance of countries enacting national implementation of BWC obligations in order to keep biological agents and technology away from terrorist groups. Developing countries, on the other hand, emphasized the importance of international cooperation in biotechnology. In general, though, "delegations avoided . . . contentious topics so as not to endanger agreement.[706]

This catalog does not end the list of BW-related activity being conducted in the United States in the name of Biodefense. Edward Hammond lamented that "since the U.S. military's disastrous mission in Somalia in 1993, non-lethal chemical and biological

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[705] Oliver Meier, "Bioweapons: Neither Trust nor Verify, Says U.S.," Bulletin of the Atomic Scientists 57.6 (2001).
[706] Oliver Meier, "News Analysis: States Strengthen Biological Weapons Convention," Arms Control Today 37.1 (2007).

weapons have come back into vogue, leading to research on a huge variety of agents, ranging from synthetic heroin-like drugs and hallucinogens (to be used on rioters) and overhead-exploding chemical mortar rounds, to genetically engineered microbes that eat truck tires, jet fuel, plastics, and other critical military (and civilian) material [sic]."[707]

But if an analyst was weighing all this information in the balance, what conclusion could possibly be reached? Clearly, the United States has both the ability and capacity to rapidly produce biological agents on a large scale. The openly available research and test projects are indicative of a country with an immediate breakout capability. And the BWC clearly permits research for "peaceful and prophylactic purposes." The President's Biodefense Initiative, Biodefense for the 21st Century, illustrates a national intent which has been called by experts as prominent as Ambassador James Leonard, Dr. Richard Spertzel, and Dr. Milton Leitenberg, BW "development in the guise of threat assessment[708]" amid allegations that the national biodefense effort have crossed the line and violated the Biological Weapons Convention. More critical are the reported words of Ambassador Don Mahley:

> "Don't build them to test, because then if you do and you get caught at it, then [other nations are likely to believe] we're building offensive biological weapons delivery systems. How does that look? We're violating the convention, stupid."[709]

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[707] Edward Hammond, "Building the Bio-Bombs," The Texas Observer October 26, 2001 2001.
[708] P. 2, Leitenberg, Leonard and Spertzel, "Biodefense Crossing the Line."
[709] David Ruppe, "U.S. Reputation Undermines BW Nonproliferation Agenda, Official Says," Global Security Newswire (2006).

Chapter 9

Avoiding the Tyranny of Experts

> . . . intelligence collection and assessment are black arts for most presidents and their key advisers, neither adequately understood nor adequately exploited. For intelligence officers, presidential and senior level views of the intelligence they receive and how they use it (or not) are just as unfamiliar . . .”
>
> Robert M. Gates, Deputy Director of Central Intelligence, 1989[710]

The Bolton Problem in Context

One of the significant political “footballs” of the 2005 Congress was the debate surrounding the nomination of John Bolton to be the United States’ Ambassador to the United Nations. A long litany of complaints against Mr. Bolton was lodged. The most significant complaint was the charge by Christian Westermann, a State Department intelligence analyst, that he had been pressured by Mr. Bolton to tailor his analysis to conform with Bush administration views.[711] The pressure reportedly was over two different issues: Iraqi and Cuban biological weapons.

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[710] P. 344, L. Keith Gardiner, "Dealing with Intelligence-Policy Disconnects," Inside CIA's Private World -- Declassified Articles from the Agency's Internal Journal, 1955-1992, ed. H. Bradford Westerfield (New Haven: Yale University Press, 1989).

[711] James Risen and Douglas Jehl, "Expert Said to Tell Legislators He Was Pressed to Distort Some Evidence," New York Times June 25, 2003 2003.

What was not discussed in any of the political fora of the day was whether John Bolton or Christian Westermann was more correct in their individual assessments. Certainly, Bolton's analysis was much closer to the anti-Castro slant of the Bush administration. It can be assumed that Westermann's analysis followed more closely the view of the Intelligence Community[712], at least as perceived by the newspapers. But an open debate of the issues surrounding either Cuba or Iraq would have opened up a large number of collateral issues. A debate on Cuban BW, for example, would likely have raised the question of Cuban allegations of biowarfare directed at the island from the United States. Other issues, such as the embargo on goods going to Cuba might have raised questions about third world access to pharmaceuticals and the need by these countries to develop alternative sources of medicine, including their own bio-industries. A debate on BW in Iraq could have shed much more light on the use and misuse of intelligence analysis by political interests. If such a debate had been held in connection with Colin Powell's ill-fated address to the United Nations in 2003, it could possibly have forestalled the debacle that Operation Iraqi Freedom has since become. But, as pundits frequently say, hindsight is always "20-20."

Rather than be the neo-conservative bully that many accused John Bolton of being[713], it can be argued, perhaps somewhat fancifully, that Bolton was one of the first of the

[712] The Intelligence "Community" is a misnomer. More appropriately, is a "loose confederation of 15 (sic, actually 16) separate intelligence entities." Craig R. Whitney, ed., The WMD Mirage -- Iraq's Decade of Deception and America's False Premise for War (New York: PublicAffairs, 2005).
[713] David Bosco, "The World According to Bolton," The Bulletin of Atomic Scientists July/August 2005 2005.

Information Age intelligence analysts[714], making assessments of the available data without the assistance of so-called expert analysts from the Intelligence Community or elsewhere.

The formulation here is simple: the image of the "green eyeshade" intelligence analyst spending years understanding the tiniest nuance of an arcane foreign behavior pattern has evolved into a (not necessarily) young techno-geek sitting in front of a bank of computer monitors, extracting data from a myriad of databases and attempting to make sense of the bytes in front of him. Today's analyst is weaned on the Internet, just as are many of today's intelligence consumers. Searching for minute pieces of data via the computer is not a foreign process for either consumer or producer of intelligence. The difference, then, between the producer and consumer of intelligence is minimized. Both have access to the same information and, in fact, the consumer may have many more years of expertise in the subject than does the intelligence analyst. This is not simply an issue of conjecture. Studies of policy individuals by George Washington University researchers demonstrated that "the skill level[715] of sampled individuals was found to have increased over several generations by a statistically significant ($P < .001$) average greater than 10

[714] Bruce D. Berkowitz and Allan E. Goodman, Best Truth -- Intelligence in the Information Age (New Haven: Yale University Press, 2000).

[715] The researchers tested the predicted generational changes by analyzing the skills of three types of individuals—elected officials in the U.S. Congress, witnesses at congressional hearings, and contributors to the daily press in three countries—in two widely separated epochs as they evaluated events across three issue areas—foreign affairs, international trade, and human rights. They randomly selected nearly one thousand paragraph-sized statements and coded them according to the methodology prescribed by the Integrative Complexity Coding Manual.

percent."[716],[717] What can an analyst possibly provide the consumer in such an event? Relatively little, except a judgment that either supports the policymakers or one that contradicts the policymakers. If the intelligence analyst can bring nothing of value to the policymakers' table, the likelihood is that the analyst will be quickly marginalized.[718]

Slowly, this realization is being recognized by Intelligence Community (IC) leaders. There is now a recognition that customer "needs and preferences are changing rapidly, as is the environment in which intelligence analysis operates."[719] Carmen Medina, then a senior leader in the Office of Policy Support at CIA, recommended in 2002 a shift in analysis from a focus on day-to day "developments" to long-term conceptual strategic thinking. This shift, however, would move analysis from the one place it provides "value-added" directly to the sphere where the consumer is less needy of information – seeing the big picture. This supposition has been opposed by others in the IC, however, with the counter-argument being made that policy-makers are too busy to understand the nuances of their specific portfolios.[720]

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[716] James N. Rosenau and W. Michael Fagen, "A New Dynamism in World Politics: Increasingly Skillful Individuals?," International Studies Quarterly 41.4 (1997).
[717] That conclusion should be considered in light of the contradictive assertion that U.S. citizens, as a whole, are "woefully ill-informed about international affairs." P. 476, Ole R. Holsti and James N. Rosenau, "The Foreign Policy Beliefs of American Leaders: Some Further Thoughts on Theory and Method," International Studies Quarterly 30.4 (1986).
[718] A notable counter-argument to this view was the Administration's non-response to a National Intelligence Estimate on Yugoslavia, written in 1990. The "experts", notably Deputy Secretary of State Lawrence Eagleburger and National Security Advisor General Brent Scowcroft, both of whom had served in the country, rejected the Estimate which, in hindsight, was an accurate prediction of the fall of the country. Gregory F. Treverton, Reshaping National Intelligence for an Age of Information, Paperback ed. (Cambridge, U.K.: Cambridge University Press, 2002) p.177-8.
[719] Carmen A. Medina, "What to Do When Traditional Models Fail," Studies in Intelligence 46.3 (2002).
[720] Steven R. Ward, "Evolution Beats Revolution in Analysis," Studies in Intelligence 46.3 (2002).

More importantly, as the policymaker and the average citizen becomes more informed; the ability for so-called experts to control the political debate on any range of subjects is lessened. The public is able to participate more fully in the debate and in addressing the issues of the day. In a democratic society, this can only be viewed as being for the better. As J.F. Rischard, Vice President of the World Bank for Europe, argued: "changing the mindset that has allowed excessively compartmentalized subcultures of specialists to sprout around issues like terrorism, peacekeeping, conflict prevention, nuclear nonproliferation, and so on, when what's needed is a more unified approach to global security that better integrates these subissues and subcultures."[721] Conversely, as more sources of information become available, the possibility of misinformation, disinformation, deception, and noise become much more problematic.

The standard criticism accusing policy-makers of trying to politicize intelligence analysis to support an administration's views may, in fact, be false. Richard Betts puts the argument into a paradoxical framework. "For issues of high import and controversy, any relevant analysis is perforce politically charged, because it points to a policy conclusion. Various disputes – about which elements of information are correct, ambiguous, or false; which of them are important, incidental, or irrelevant; in which context they should be understood; and against which varieties of information pointing in a different direction

[721] P. 101, J.F. Rischard, High Noon: Twenty Global Problems; Twenty Years to Solve Them (New York: Basic Books, 2002).

they should be assessed – are in effect, if not in intent, disputes about which policy conclusion stands or falls."[722]

Politicization of the intelligence analyst may occur but, rather than be a policy-driven conspiracy, it is, in fact, endemic to the thinking process. David G. Mueller, Jr. an intelligence community analyst of long-standing described it thus:

> "Intelligence analysts' selection and understanding of information, and their expression of judgments, are profoundly affected by their worldview. This is a mindset bias functionally akin to others that are well known in the profession."[723]

Failure to recognize this fact will needlessly complicate an already complicated intelligence analytic process.

As previous sections demonstrate, any reliance on secret information is fraught with peril. Trying to use intelligence analysis to understand a BW program is even more problematic because of the inherent difficulties in understanding the intent of whatever research is being conducted (see the chapter, Through the Looking Glass"), assuming the analyst is able to observe any of the parts of a program's "machinery".

Despite these problems, there is a *presumed* urgency to responding to policymakers' needs that sometimes goes unheeded within the Intelligence Community. Consider the

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[722] P. 60, Richard K. Betts, "Politicization of Intelligence: Costs and Benefits," Paradoxes of Strategic Intelligence -- Essays in Honor of Michael I. Handel, eds. Richard K. Betts and Thomas G. Mahnken (London: Frank Cass, 2003).

[723] P.1, David G. Muller, Jr., "Intelligence Analysis in Red and Blue," International Journal of Intelligence and CounterIntelligence 21.1 (2008).

revelations former senior CIA official Doug MacEachin made to the 9/11 Commission[724] in February 2004. "It was astounding," MacEachin explained, "but for almost four years before 9/11, the CIA had not issued a so-called national intelligence estimate on terrorism. Even after the bombing of two American embassies in Africa in 1998. Even after the bombing of an American warship, the Cole, in the port of Aden, Yemen, in October 2000, only eleven months before the 9/11 attacks."[725]

Intelligence and Intelligence Analysis

What, then, can be done to improve the analysis necessary to assess the presence or absence of a biological weapons program? Or, to put it another way, how can we improve the ability of analysts to understand what they "see" or don't see when looking for any possible illegal weapons program which an enemy does not want to be known or seen?

A number of factors are at work that can seriously obscure the true facts of a situation and complicate any analysis of a country's potential BW program. Perception, or misperception, plays a major part in the analysis and produces a picture that may not, in fact probably does not, reflect the truth.

[724] The National Commission on Terrorist Attacks Upon the United States
[725] P. 313, Philip Shenon, The Commission: The Uncensored History of the 9/11 Investigation (New York: Hachette Book Group USA, 2008).

We should, of course, begin by examining what is meant by "intelligence" and "intelligence analysis". In the simplest terms, intelligence is knowledge. More specifically, in this dissertation, intelligence means information developed by or analyzed by the members of the U.S. Intelligence Community. To be more accurate (but possibly more obscure), intelligence could be called "high-level foreign positive intelligence."[726] This phrase can be parsed to mean: knowledge, indispensable to our welfare and security, that is foreign-derived in purpose, scope, and substance and is not counter-intelligence or counter-espionage in nature. But intelligence/knowledge is of little use in and of itself; intelligence must be actionable.[727],[728] However this, too, does little to resolve the question of what is meant by intelligence. It may be that the central essence of intelligence is also its easiest definition: "intelligence involves information, yes, but it is secrecy, too."[729]

The secret nature of intelligence demands a smaller production and consumption base. The withholding of information from the general populace is, at least in theory, warranted. But the shield of secrecy can not be the sole factor. Why? Because in the absence of the imprimatur of secrecy, intelligence becomes simply information. And information is freely accessible and does not require the financial investment and

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[726] P. 3, Kent, Strategic Intelligence for American World Policy.
[727] "Actionable" intelligence means intelligence that can be used in decision-making by Policymakers. For example, intelligence-derived information that can be used in a demarche with another country requesting the country to either do something, or stop doing something, would be actionable intelligence.
[728] P. 11, Robert David Steele, The New Craft of Intelligence -- Personal, Public, & Political (Oakton, Virginia: OSS International Press, 2002).
[729] Michael Warner, "Wanted: A Definition of "Intelligence"," Studies in Intelligence 46.3 (2002).

infrastructure of an Intelligence Community. There must be more to intelligence than the element of secrecy.

Intelligence is a process, not a discrete object. Sherman Kent parsed "intelligence" even more finely, defining it as knowledge, organization, and activity.[730] Intelligence should include all the elements of what is commonly referred to as the intelligence cycle. This cycle, according to the Central Intelligence Agency, is:

- planning and direction;
- collection;
- processing and exploitation;
- analysis and production; and,
- dissemination.[731]

But the CIA view of intelligence is incomplete. Producing an intelligence report achieves nothing if it does not support the requirements of the policy-maker. Thus, there needs to be a "consumption" step in the cycle. In addition, at all steps of the cycle, there needs to be feedback to ensure the right data is being collected, processed, exploited, analyzed, reported, and read. Failure to ensure either of these final two elements guarantees a dysfunctional Intelligence Community-Policy Community latch-up.[732]

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[730] P. xiii, Kent, Strategic Intelligence for American World Policy.
[731] P. 3, Jeffrey T. Richelson, The U.S. Intelligence Community, 2nd ed. (New York, New York: Harper Business, 1989).
[732] P. 50, Mark M. Lowenthal, Intelligence: From Secrets to Policy, 2nd ed. (Washington, D.C.: CQ Press, 2003).

There are a number of intelligence sources. The list of sources has expanded and been refined since the beginning of the twentieth century. The basic sources include IMINT (imagery intelligence), SIGINT (signals intelligence), HUMINT (human intelligence), MASINT (measurement and signature intelligence), OSINT (open source intelligence), and TECHINT (technical intelligence).[733] Embedded in these basic sources are various sub-sources, including COMINT (communications intelligence), ELINT (electronic intelligence) and many, many others. These are colloquially known as "the INTs." The list is steadily evolving.

There has been a supposition on the part of many critics that the answer to the intelligence community's problems is a suffusion of technology.[734] What has thus far been ignored in the recommendations for more reorganizations and "intelligence transformation" is that intelligence assessment still remains, to a very large extent, the purview of the individual analyst, sitting in a cubicle in front of a computer screen, sifting through large piles of data. While the tools of the trade have changed, arguably for the better, the skills required remain the same as they were in the beginning of the 20th century, if not since antiquity.

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[733] P. 16, Major Gary H. Mills, The Role of Rhetorical Theory in Military Intelligence Analysis (Maxwell Air Force Base: Air University, 2003).
[734] P. 82, William E. Odom, Fixing Intelligence -- for a More Secure America (New Haven, Connecticut: Yale University Press, 2003).

It is commonly believed that the Intelligence Reform of the early twenty-first century would alter the analytic landscape, eliminating bottlenecks and improving the crossflow of intelligence. This belief may be far overstepping the reality. The Intelligence Reform and Terrorist Prevention Act of 2004, some believe, focused too heavily on counter-terrorism as the chief rationale for intelligence reform.[735] More troubling, the Act was prepared by people with little or no experience working in the Intelligence Community. Consequently, the reforms focused on structure, rather than substance.[736]

There is, however, a recognition by some that there is a need for immediate reform. A 2006 University of Maryland study predicted that, in the absence of reform, "the IC of 2020 will experience an imbalance between the demand for effective overall intelligence analysis and the outputs of the individually-oriented elements and outlooks of its various analytic communities."[737]

Cognitive Dissonance and the Intelligence Analyst

> "The greatest derangement of the mind is to believe in something because one wishes it to be so." Louis Pasteur[738]

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[735] Robert D. Vickers, Jr., "The Intelligence Reform Quandary," International Journal of Intelligence and CounterIntelligence 19.2 (2006).
[736] Arthur S. Hulnick, "U.S. Intelligence Reform: Problems and Prospects," International Journal of Intelligence and CounterIntelligence 19.2 (2006).
[737] William J. Lahneman, The Future of Intelligence Analysis, Volume I, Final Report (College Park: The Center for International and Security Studies at Maryland, 2006).
[738] P. 1, Robert M. Clark, Intelligence Analysis -- a Target-Centric Approach (Washington, D.C.: CQ Press, Inc., 2004).

Cognitive dissonance is the conflict between a person's beliefs and a decision the person has made.[739] Cognitive dissonance was first expressed by Professor Leon Festinger, then Professor of Psychology at Stanford University in his 1957 study, A Theory of Cognitive Dissonance. Festinger's hypothesis, simply put, is:

> "The existence of dissonance, being psychologically uncomfortable, will motivate the person to try to reduce the dissonance and achieve consonance; When dissonance is present, in addition to trying to reduce it, the person will actively avoid situations and information which would likely increase the dissonance."[740]

As Festinger pointed out, dissonance – inconsistency – could be replaced by any number of other "notions" (hunger, frustration, disequilibrium) and still be a valid theory. Festinger defined cognition as "any knowledge, opinion, or belief about the environment, about oneself, or about one's behavior." In short, everything an intelligence analyst must consider in assessing a problem. The application of this theory to the problem of intelligence analysis is then immediately apparent.

Richards J. Heuer tested the theory while working at the Defense Advanced Research Projects Agency (DARPA). He concluded:

- "The analyst who thinks back about how good his past judgments have been will normally overestimate their accuracy;

[739] P. 164, Dixon, On the Psychology of Military Incompetence.
[740] P. 3, Festinger, A Theory of Cognitive Dissonance.

- The intelligence consumer who thinks about how much he learned from our reports will normally underestimate their true value to him;
- The overseer of intelligence production who conducts a postmortem of an intelligence failure to evaluate what we should have concluded from the information that was available will normally judge that events were more readily foreseeable than was in fact the case."[741]

Perception and Misperception on the International Stage

How does one actor understand the actions of another, particularly on the international stage where there so many possible actions and consequences? The decision-maker's perception of the other is derived from "his beliefs about the other that affect his predictions of how the other will behave under various circumstances."[742] But, in order for a decision-maker to accurately predict the actions of which he has no control, he must rely on the behavior of his opposing actor. The outside actor must be behaving in a consistent and coherent manner which can be easily understood by all external observers. The activity must be rational, but the analysis needs to go beyond the apparent and coherent. Deterrence theory is a theory of motivation – "deterrence cannot rest on

[741] P. 333-334, Richards J. Heuer, Jr., "Cognitive Biases: Problems in Hindsight Analysis," Inside CIA's Private World -- Declassified Articles from the Agency's Internal Journal, 1955-1992, ed. H. Bradford Westerfield (New Haven: Yale University Press, 1978).
[742] P. 5, Jervis, The Logic of Images in International Relations.

axiomatic logic alone but must deal with the metaphysics and the psychopolitics of a challenger's calculations."[743]

UCLA political scientist Robert Jervis separates policy-makers' behavior into two categories: signals and indices. Signals are statements or actions the meanings of which are established by tacit or explicit understandings among the actors. Signals are issued mainly to influence the receiver's image of the sender. In trying to analyze a signal, the analyst must determine first what message the sender is trying to convey. Secondly, the analyst must determine whether the signal accurately reflects what the sender intends to do in the future. Indices are statements or actions that carry some inherent evidence that the image projected is correct because they are believed to be inextricably linked to the actor's capabilities or intentions.[744] Information collected by intelligence sources would be considered indices of behavior. The observer does not need to believe there is a perfect correlation between the index and the future behavior, only that the correlation is high enough for the information to be of use. What a "high enough" correlation means is, of course, up to the mind of the perceiver. "High enough" depends on the weighting of the information and the zero-value the decision-maker is using.

It is not enough that decision-makers' perceptions are often wrong. Compounding the problem is the fact that the decision-maker not only doesn't recognize that his

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[743] P. 35, Janice Gross Stein, "Calculation, Miscalculation, and Deterrence I; the View from Cairo," Psychology & Deterrence, eds. Robert Jervis, Richard Ned Lebow and Janice Gross Stein (Baltimore: Johns Hopkins University, 1985).
[744] Jervis, The Logic of Images in International Relations.

perceptions may be incorrect; he often believes his perceptions *are* correct and his behavior perfectly understood. Decision-makers tend to "act on two premises: first, that the other state does not need to be reassured because it can easily tell that the decision maker's own state is not a menace; and second, that the inferences drawn by the decision maker about the other's intentions are almost certainly correct.. In fact, these premises are often incorrect . . ."[745]

The concept of "mirror imaging" also plays a part in how a country's analysts will perceive the threat from its adversary. Thus, prior to World War II the British Air Ministry based its estimates of the size of Germany's air force on the assumption that "the best criteria for judging Germany's rate of expansion were those which governed the rate at which the RAF (Royal Air Force) could itself form efficient units."[746] Mirror-imaging is, of course, not just a pre-World War II phenomenon. The Former Chairman of the National Intelligence Council for Evaluation, Mark Lowenthal, identified the problem as a one of the most frequent flaws of intelligence analysts today.[747] A key difference between today and the above World War II example is that the RAF example identified the source of its analysis as the mirror. Most analysts today fail to recognize the mirror and see only their reflective, and failed, analysis.

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[745] P. 9, Robert Jervis, "Introduction: Approach and Assumptions," Psychology & Deterrence, eds. Robert Jervis, Richard Ned Lebow and Janice Gross Stein (Baltimore: The Johns Hopkins University Press, 1985).
[746] P. 23, Robert Jervis, "Perceiving and Coping with Threat," Psychology & Deterrence, eds. Robert Jervis, Richard Ned Lebow and Janice Gross Stein (Baltimore: The Johns Hopkins University Press, 1985).
[747] P. 92-93, Lowenthal, Intelligence: From Secrets to Policy.

Experts and Dilettantes

There is what Philip Tetlock, Mitchell Professor of Leadership at the University of California, calls "another counterintuitive prediction of radical skepticism."[748] This is a remarkable study demonstrating that "experts on their home turf made neither better calibrated not more discriminating forecasts than did dilettante trespassers."[749] Essentially, Tetlock and others studied the ability of several types of human forecasters to predict outcomes of events. The study involved 284 experts who made their living "commenting or offering advice on political and economic trends[750]" examining over ten thousand forecasts for fifty-seven countries across fourteen years.[751] "Dilettantes" were experts making predictions in fields outside of their expertise. Remarkably, as shown in figure 4 below, the predictive capability of the "experts" and the "dilettantes" is nearly exactly the same.

Why? Tetlock offers several possible explanations. Perhaps the experts weren't really experts. But (he counters himself) more refined statistical comparisons failed to have any significant effects on calibration or discrimination. Perhaps the dilettantes weren't truly dilettantes. The dilettantes were in fact, experts – albeit in different topics and regions of the world.

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[748] P. 54, Philip E. Tetlock, Expert Political Judgment: How Good Is It? How Can We Know? (Princeton: Princeton University Press, 2005).
[749] P. 54, Tetlock, Expert Political Judgment: How Good Is It? How Can We Know?
[750] Louis Menand, "Everybody's an Expert," The New Yorker (2005).
[751] By the end of the study in 2003, 82,361 forecasts were made. Menand, "Everybody's an Expert."

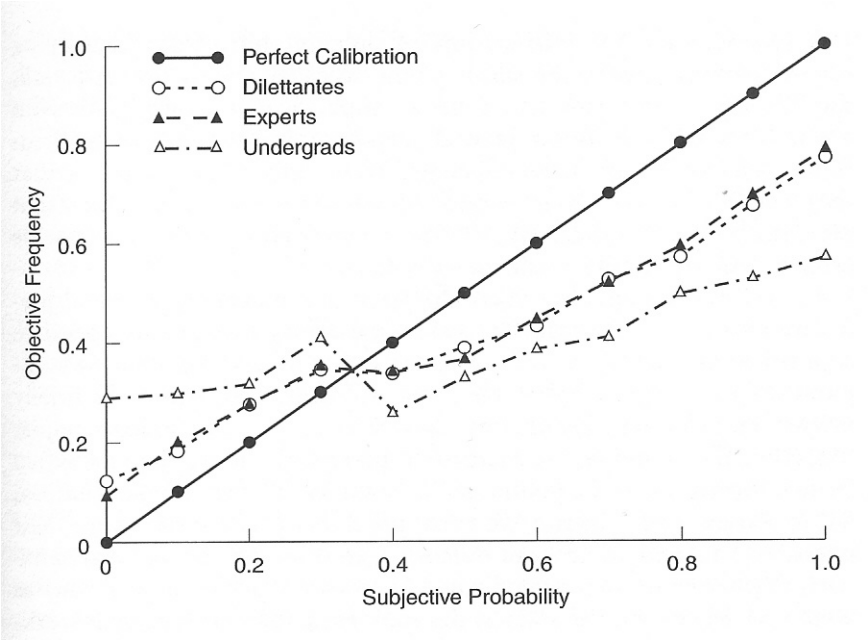

Figure 5: Experts and Dilettantes[752]

There is a third variable on the table: undergraduates. These were students who were provided with a short two or three paragraph précis of an issue and then told to predict the outcome. The calibration curve demonstrates, as one might expect, that the undergraduates were both less calibrated and less discriminating than the professionals. More importantly, the undergraduate curve indicates that subject matter expertise, even if both experts and dilettantes had similar mistake profiles in the study. Both exaggerate the likelihood of change for the worse as well as the likelihood for change for the better. Experts did over-predict change significantly more than dilettantes. But, the cynic may

[752] P.55, Tetlock, Expert Political Judgment: How Good Is It? How Can We Know?

ask, in our scenario of the policy-maker and the IC analyst, which is the expert and the dilettante? The realist, looking at the table, would argue that it doesn't matter.

Reality, or Something Like It

There is an element of simplification that is, in part, a necessity when trying to understand the world around us. Herbert Simon calls it "bounded" or limited rationality.[753],[754] The mind cannot cope with the complexity of the world it faces. Consequently, we construct a simplified model of reality to use everyday. Our behavior is bounded by the limits of that mental model. When information enters the model which we have not previously prepared to accept, we have incongruity, or dissonance, which must be resolved.[755]

A number of theories in "consistency" or "cross pressure" have been developed since Fritz Heider originally approached the topic in the mid-1940s.[756] The general conclusion of all these theories is the same: when there is conflicting or dissonant information, the general response is to either fit the information into the analyst's *weltanschauung*[757], or

[753] Simon made a point of limiting bounded rationality only to "administrative man" and understanding the organization. He specifically excluded "classical economists, game theorists, and statistical decision theorists." Herbert A. Simon, Administrative Behavior, Third ed. (New York: The Free Press, 1976) p.xxxi. That exclusion notwithstanding, bounded rationality applies very directly to the argument.
[754] Simon, Administrative Behavior.
[755] Heuer, Psychology of Intelligence Analysis.
[756] Peter Sperlich, Conflict and Harmony in Human Affairs: A Study of Cross-Pressures and Political Behavior, American Political Research Series, ed. Aaron Wildavsky (Chicago: Rand McNally & Company, 1971).
[757] German: Philosophy of life, world outlook, world view. Harold T. Betteridge and Gerhard Cortes, Cassells Wörterbuch, Sonderausgabe ed. (Compact Verlag, 1984).

reject the information.[758] This has been confirmed in a number of studies; even scientists, often thought to be dispassionate recorders of phenomena, face the same problem: scientists are biased toward confirming their own beliefs.[759] Tetlock, for example, identifies three different psychological perspectives (skeptics, complexifiers, and fundamentalists) and concludes that, while each has components of validity, none are fully useful in predicting activity in international politics.[760],[761] More important in a critique of the analytical process is the fact, as Festinger points out, that the tendency is to continue to hold to beliefs even after they have been proved wrong![762] This tendency is fatal to the notion of intelligence being the fulcrum in any policy-making decision regarding national security. That intelligence failures occur should not be surprising; that the Intelligence Community has sometimes been proved correct may be more of the surprise.[763] Intelligence failure – essentially a "mistaken view of the external world" can be the result of several factors: a subordination of intelligence to policy; unavailability of information when and where needed; received opinion (conventional wisdom); and mirror-imaging are often identified as root causes of intelligence failure.[764] Intelligence

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[758] P. 25, Daryl J. Bem, Beliefs, Attitudes, and Human Affairs, Basic Concepts in Psychology Series, ed. Edward L. Walker (Belmont: Brooks/Cole Publishing Company, 1970).
[759] P. 433, J. Scott Armstrong, Long-Range Forecasting - from Crystal Ball to Computer, A Wiley-Interscience Publication (New York: John Wiley & Sons, 1985).
[760] Skeptics argue that good judgment is extremely rare. Complexifiers argue that good judgment is linked to the ability to avoid cognitive bias and errors. Fundamentalists (also called simplifiers) argue that good judgment is linked to the ability to focus on a few basic processes.
[761] P. 517, Philip E. Tetlock, "Good Judgment in International Politics: Three Psychological Perspectives," Political Psychology 13.3 (1992).
[762] P. 71-72, Festinger, A Theory of Cognitive Dissonance.
[763] Irving L. Janis, Groupthink: Psychological Studies of Policy Decisions and Fiascoes, 2nd, revised ed. (Boston: Houghton Mifflin Company, 1983).
[764] P. 61-67, Abram N. Shulsky and Gary J. Schmitt, Silent Warfare -- Understanding the World of Intelligence, 3rd ed. (Dulles, Virginia: Brassey's, Inc., 2002).

is a profession of cognition.[765] It is, therefore, critical to recognize and respond to the problem of cognitive dysfunction.

But what if the observed phenomenon does not contradict the analyst's belief structure? What happens when all the reference groups (religion, peers, family, teachers, society, etc.) agree? The result is a nonconscious ideology; a set of beliefs and attitudes which is accepted implicitly but remains outside the awareness of the analyst because "alternative conceptions of the world remain unimagined."[766] As the IC continues to pursue the concept of "alternative analyses" it's critical to remind the analysts and the policy-makers that the alternatives are only as good as the imaginations that developed them. The possibility of imagining an alternative outside of an analyst's experience is unlikely, if not impossible.

But, while some in the leadership of the IC recognize the problems of cognition and belief patterns, few seem to realize the fundamental institutional barriers to correcting the problem. If the IC truly wants "alternative analysis", it needs alternative thinkers. This may involve recruiting new analysts who do not fit the mold of traditional IC analysts and may not have the ability to "pass" the traditional security background check to work in the IC. It may, in fact, be necessary to develop an "alternate universe" CIA, working

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[765] P. 117, Douglas J. MacEachin, "Analysis and Estimates -- Professional Practices in Intelligence Production," Transforming U.S. Intelligence, eds. Jennifer E. Sims and Burton Gerber (Washington, D.C.: Georgetown University Press, 2005).
[766] Sandra L. Bem and Daryl J. Bem, "Case Study of a Nonconscious Ideology: Training the Woman to Know Her Place," Beliefs, Attitudes, and Human Affairs, Basic Concepts in Psychology (Belmont: Brooks/Cole Publishing Company, 1970).

away from the traditional CIA headquarters and away from the traditional analytic thinking[767]. Just as Apple Computers and Atari in Silicon Valley reinvented the traditional office in the 1970s and 1980s, CIA may need to reinvent its processes.

Understanding Intelligence Analysis

A surprise attack, such as the Japanese attack on Pearl Harbor or the World Trade Center attacks of 9/11, are considered intelligence failures. Are such failures avoidable? More importantly, were such attacks truly the result of failures in the intelligence process? In general, there are two schools of thought regarding the impact of intelligence analysis. The schools are the "Orthodox School," which argues that "the inherent pathologies and obstacles in the work of intelligence make every attempt of surprise attack an almost certain success," and the "Revisionist School," which argues that "the roots of surprise attacks lie in avoidable failures of certain intelligence people."[768] But there is a flaw in the opening assumption of both schools of thought: both assume the "failures" to be the fault of the intelligence analytic process.

The Intelligence Community does occasionally consider the impact of its analysis and tries to identify and fix the flaws in the analytic process. According to John H Waller, a former senior CIA officer, the most serious experiment to get to the root of the analytic problems was a series of tests conducted between 1973 and 1975. The Director of

[767] P. 85, R.J. Godlewski, "Cultivating Creativity within Intelligence Analysis," American Intelligence Journal 25.2 (2008).
[768] Or Arthur Honig, "A New Direction for Theory-Building in Intelligence Studies," International Journal of Intelligence and CounterIntelligence 20.4 (2007).

Central Intelligence's Community Management Staff conducted a series of "post mortems" of failed intelligence analysis. Seven such post-mortems were conducted before the process was abandoned due to the demoralizing nature of the review.[769] The outcome of the process, though, was the beginning of "competitive assessments", instituted in 1976 by the then-Director, George H. Bush. Two teams would conduct simultaneous, but separate assessments. The result, it was hoped, would be an assessment closer to the truth. "The experiment proved nothing beyond the obvious fact that competitive analyses will reflect the biases of those chosen to make them, and will come no closer to reaching whither truth or consensus."[770]

Despite that failed experiment, the new buzzword within the Intelligence Community is "Analysis of Competing Hypothesis" (ACH) [771] which expects the analyst to explicitly identify all reasonable alternatives and have them "compete" for the analyst's favor. In theory, "it helps an analyst overcome, or at least minimize, some of the cognitive limitations that make prescient intelligence analysis so difficult to achieve."[772]

But there is a long-standing debate within the Intelligence Community as to the definition of "intelligence analysis." The debate centers on whether analysis is a structured

[769] P. 39, John H. Waller, "In Search of Wisdom," The Intelligencer: Journal of U.S. Intelligence Studies 15.3 (2007).
[770] P. 40, Waller, "In Search of Wisdom."
[771] P. 59, Charles Weiss, "Communicating Uncertainty in Intelligence and Other Professions," International Journal of Intelligence and CounterIntelligence 21.1 (2008).
[772] Chapter 8, Heuer, Psychology of Intelligence Analysis.

methodology or intuition – science versus art.[773] Intuition, in fact, has been redefined as "unstructured methodology," perhaps as a sop to those who are concerned about the appearance of the art versus science debate having such a critical role in national security.

In 1949, a scant two years after the establishment of what is now known as the Intelligence Community via the National Security Act of 1947, Sherman Kent authored what is now considered "the most influential book ever written on U.S. intelligence analysis[774]," Strategic Intelligence for American World Policy.[775] Kent attempted to define strategic intelligence as: knowledge (what is known), organization (who knows it), and activity (the work of the intelligence organization). It is, to a large extent, the template used by organizations within the Intelligence Community to this day. It was not, however, without its detractors. Willmoore Kendall, for example, wrote a review of the book in World Politics[776] which challenged most of Kent's arguments and conclusions.[777] Kendall claimed that Kent's study was neither the work of a reformer nor a supporter of the status quo. Rather, Kendall argued that Kent had "not worked out in his own mind what an ideal set of intelligence arrangements . . .would be like, and thus has no standard against which to measure the magnitude of the shortcomings he exposes." Kendall believed Kent had a misguided view of the function of intelligence (as

[773] P. 7, Stephen Marrin, "Intelligence Analysis: Structured Methods or Intuition?," American Intelligence Journal 25.1 (2007).
[774] Jack Davis, "The Kent-Kendall Debate of 1949," Studies in Intelligence 36.5 (1992).
[775] Kent, Strategic Intelligence for American World Policy.
[776] Willmoore Kendall, "Review: The Function of Intelligence," World Politics 1.4 (1949).
[777] Kendall is noted by Kent in his Preface as one of the pre-reviewers with "many kinds of advice."

primarily a wartime activity) and Kent's belief that the analytic process was empirically-based, as opposed to Kendall's predilection for it being a theoretical research process.[778]

Kent's basic concern was the relationship of the intelligence analyst to the policymaker, a relationship he rightly characterized as "one of the utmost delicacy." Kent identified the professional challenge of serving two masters: analytic integrity and policy clients.[779] Obviously, listing two such issues as different masters creates a sort of "Hobson's choice[780]," with no good alternative options. In reality, there needs be no choice between the two alternatives; one should be able to maintain analytic integrity and still support the needs of the policymaker. Kent, however, believed strongly that there was a great chasm between policymaker and intelligence analyst.

Others are not so pessimistic. David D. Gries argues that there is a changing relationship between the analyst and the policy-maker since the time of Sherman Kent. Gries believes there is a growing importance of the oral assessment and a changing role of written assessments. The role has become more casual, less defined, and, as a result, less culpable. "…When a policy officer over time develops confidence in an intelligence officer, that confidence is likely to be transferred to assessments even though they may

[778] This was probably a result of their academic backgrounds as much as any philosophical bent. In 1949 Kent was a full professor in the History Department at Yale; Kendall a Political Science professor at the same school until the university purchased "his tenure rights to have him off their campus." Davis, "The Kent-Kendall Debate of 1949," p.94.
[779] Jack Davis, Sherman Kent's Final Thoughts on Analyst-Policymaker Relations (Washington, D.C.: Sherman Kent Center, Undated).
[780] So-called from Thomas Hobson, an English liveryman who required each customer to take the horse nearest the door – an apparently free choice with no alternative.

not be good ones."[781] Clearly, this cannot be the desired result of the architects of intelligence reform.

Kent believed the analytic process was undermined by either of two alternatives: when the analyst is too removed from the policymaker and, conversely, when the analyst is too close to the policymaker. Kent concluded that being too removed from the policymaker was the greater problem of the two. This, however, Kent found to be an organizational impediment, not the fault of the analyst. Kendall, on the other hand, is even more pessimistic than Kent in this regard. He asks rhetorically "Does it not follow that, as regards the great decisions about foreign policy, it is highly probable that our undertakings will fail and our statesmen plan in ignorance?"[782] But, again, this presents an arrogance that is misplaced. It assumes that the policymaker is ignorant absent the intelligence analyst's input. There is little in the literature to suggest such a situation. The classic case of so-called intelligence failure, Pearl Harbor, was not the result of ignorance by the policymaker, but rather was because the policymaker deemed other factors had greater importance than the resultant "failure."[783]

Kent claimed in the forward to Strategic Intelligence that many of the ideas in the book were not his but rather the ideas of George S. Pettee, a professor at Amherst College and the author of an earlier book, The Future of American Secret Intelligence. Pettee also

[781] P. 358-359, David D. Gries, "New Links between Intelligence and Policy," Inside Cia's Private World: Declassified Articles from the Agency's Internal Journal, 1955-1992, ed. H. Bradford Westerfield (New Haven: Yale University Press, 1995).
[782] P. 545, Kendall, "Review: The Function of Intelligence."
[783] Wohlstetter, Pearl Harbor -- Warning and Decision.

considered the question of the role of intelligence in policy decision-making and recognized the central core of the problem: "the communication of conclusions . . . requires that there be officials or offices in the government competent to act upon the conclusions arrived at."[784] To a great extent, though, Pettee would have opposed the infrastructure of today's Intelligence Community. Pettee believed that "as much work as possible be done within the agency that is the prime customer, and as little as possible should be done by one agency for another."[785] But Pettee, like Kent, had one basic understanding of the role of intelligence:

> "The simple fact remains that the United States cannot have a national policy comparable to its commitments unless it has the means to form such a policy and to base it upon the best possible knowledge of the facts and circumstances."[786]

The analytical "process" is not as organized or process-oriented as one might expect or hope. Richards J. Heuer, in his classic study, Psychology of Intelligence Analysis, identifies four principles of perception that are interrelated and confounding to the analytic thought process:

- We tend to perceive what we expect to perceive;
- Mind-sets tend to be quick to form but resistant to change;
- New information is assimilated to existing images;

[784] George S. Pettee, The Future of American Secret Intelligence (Washington: Infantry Journal Press, 1946).
[785] P. 107, Pettee, The Future of American Secret Intelligence.
[786] P. 117, Pettee, The Future of American Secret Intelligence.

- Limited exposure to blurred or ambiguous stimuli interferes with accurate perception even after more or better information becomes available.[787]

Here the Intelligence Community faces a conundrum. One way to counter having a hide-bound analytical staff unwilling to move from its world-view is to bring in "new blood" with no preset motivations or beliefs. But a young staff has the significant drawback of not having the necessary historical, cultural, and language skills to fully analyze and understand intelligence on a day-to-day basis.[788] And, in light of some of the objections during the Iraq WMD debate, might a novice analyst not be more susceptible to having a conclusion be "pre-cooked" by a superior than a hardened veteran?[789]

Reducing the problem of too-malleable junior analysts, as well as utilizing the expertise of senior analysts while they are still in the employ of the Intelligence Community, is a major concern of senior management throughout the Community. The Director of Central Intelligence, the fore-runner of the Director of National Intelligence, identified the problem in the 2001 Strategic Investment Plan for Intelligence Community Analysis. The plan identified six budget priorities for investment:

- Establish an interagency training program;
- Enhance collaboration by database interoperability;

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[787] Heuer, Psychology of Intelligence Analysis.
[788] P. 13, Steele, The New Craft of Intelligence -- Personal, Public, & Political.
[789] To be fair, the Iraq National Intelligence Estimate that was heavily quoted in the run-up to the second invasion of Iraq was NOT drafted by inexperienced intelligence analysts but by senior analysts in the CIA and the National Intelligence Council. John Diamond, "Compiling an Intelligence Estimate," USA Today February 4, 2004 2004.

- Link analysts through a collaborative working environment;
- Build an agile framework for prioritizing collection and analytic requirements;
- Leverage outside expertise; and,
- Develop an effective open source strategy.[790]

However, as John Gannon, the Assistant DCI for Analysis and Procedure at the time of the Strategic Plan, noted five years later: " . . .the hard research and worthy recommendations of the strategic planners had no institutional means to make it enduring."[791] If the DCI could not transform recommendations into IC policy, what possibility exists for IC reform?

The current Deputy Director of National Intelligence for Analysis, Thomas Fingar, has no less sanguine a view of the immediate future of intelligence analysis in the Community. Speaking before the Council on Foreign Relations, he said it bluntly: "To improve analysis, we need better analysts."[792]

Part of that problem is the lack of experts[793] in analytic positions. Fingar describes the problem as being like the letter "J" – a small group of senior experts, already past (or near) the age for retirement; a dearth of mid-career analysts; and a long leg of new hires.

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[790] Assistant Director of Central Intelligence for Analysis and Procedure, Strategic Investment Plan for Intelligence Community Analysis (Washington: Central Intelligence Agency, 2001).
[791] Lahneman, The Future of Intelligence Analysis, Volume I, Final Report.
[792] Thomas Fingar, Remarks and Q&A by the Deputy Director of National Intelligence for Analysis & Chairman of the National Intelligence Council (New York: The Council on Foreign Relations, 2008).
[793] "Experts" here would include Tetlock's "dilettantes." More properly, "experts" would mean "experienced analysts."

Fingar states that about 55 percent of all analysts in the IC joined after 9/11. Another senior level official in the DNI described it as "40% are within five years of being hired and another 40% are within five years of retirement." It is hard, if not impossible, to maintain currency with that sort of turnover. That fact, coupled with a 25% percent reduction in staff as a result of the so-called Cold War "peace dividend" destined the IC to a tumultuous managerial nightmare from the 1990s until today.[794]

Other critics of the IC are equally pessimistic. Bowman Miller, a professor at the National Defense Intelligence College, echoed Fingar's charge, arguing that "filling intelligence gaps and avoiding 'intelligence failures" (policy decisions , somehow never account for failures) demand more than adding analytic manpower and creating new tools; first and foremost, they require more expertise. Needed are more analysts who can couple analytic depth with conceptual breadth, all the while recognizing and trying to mitigate the perennial problems of cognitive bias and "group-think" pressures to conform."[795]

Belinda Canton, Senior Strategist at the National Counterproliferation Center, recently rejected all the new trends aimed at improving intelligence analysis[796], saying the transformations will have marginal impact and claiming a paradigm shift is needed:

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[794] P. 14, George Tenet, At the Center of the Storm -- My Years at the CIA (New York: Harpers Collins Publishers, 2007).
[795] P. 337-338, Bowman H. Miller, "Improving All-Source Intelligence Analysis: Elevate Knowledge in the Equation," International Journal of Intelligence and CounterIntelligence 21.2 (2008).
[796] Canton listed critical thinking, alternative analyses, and analytic methodologies.

"Analysts, their managers, and the bureaucracies in which they work, must embrace the active management of uncertainty."[797]

A common theme among modern Intelligence Community professionals is to take a consumer market approach to intelligence analysis. Consequently, there is much talk about *customers, product,* and *branding.*[798] The problem with such an approach is obvious: to achieve a customer-based outcome, one must begin with a customer-based focus, or, to put it another way: "The customer is always right." When one begins with such a premise it virtually guarantees a "pre-cooked" solution. Additionally, a customer-oriented IC expands the problem of the inexperienced junior analyst to an "all ranks" dilemma: a palatable product must be served fresh every day, confounding any need for long-term strategic analytic "think pieces." It also presupposes that the producer of information knows what the consumer wants (which also assumes the consumer knows what is available and what is desired or even what he needs.).

Will any of this help in the understanding of biological weapons programs or activities? The evidence says "no." The President's Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction (also known as the Robb-Silberman Report after its two chairmen) reviewed the then-current Intelligence Community and concluded: "Most of the traditional Intelligence Community tools are of

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[797] P. 487, Belinda Canton, "The Active Management of Uncertainty," International Journal of Intelligence and CounterIntelligence 21.3 (2008).
[798] P. 149, James Monnier Simon, Jr., "Managing Domestic, Military, and Foreign Policy Requirements -- Correcting Frankenstein's Blunder," Transforming U.S. Intelligence, eds. Jennifer E. Sims and Burton Gerber (Washington, D.C.: Georgetown University Press, 2005).

little or no use in tackling biological weapons."[799] The Commission recommended three new strategies to address the issue: work with the biological sciences community to "institutionalize outreach to technical experts"; make targeted collection of biological weapons intelligence a priority within the Intelligence Community; and, leverage regulation for biological weapons intelligence.

There are problems with all three strategies. Institutionalizing outreach with experts suggests a roster of on-call experts. Thus, the experts may be chosen for one specific expertise but used for another simply because the expert is available. Secondly, either intentionally or inadvertently, the expert will begin to moderate his or her analysis to fit what is perceived to be the IC desired answer.

To decide that collection on biological weapons should be a priority within the IC raises one interesting conundrum. There are limited intelligence resources. If BW becomes a priority for collection, then something else must be de-prioritized. What becomes of lesser importance if BW is now of greater importance? Who makes that decision? For how long should BW become of greater importance? But the suggested strategy went one step farther. It said *targeted* collection should be a priority. That requires the IC to know where to aim the collection. While that may have been a relatively simple prospect during the Cold War when the U.S. had a good idea of the size and location of the former Soviet Union's BW facilities, there is nothing to suggest that the IC today can identify

[799] P.398, Whitney, ed., The WMD Mirage -- Iraq's Decade of Deception and America's False Premise for War.

any BW targets for priority collection (consider, for example, the Iraqi WMD fiasco). Consequently, one wastes limited collection assets against unidentified and, possibly, non-existent targets.

Leveraging regulation for BW intelligence is a dangerous prospect. The assumption is that the IC will "encourage foreign criminalization of biological weapons development and establishing biosafety and biosecurity regulations under United Nations Security Council Resolution 1540." Encouraging international adherence for UNSCR's is not the purview of the Intelligence Community. In fact, for the IC to be considering its role with the world governance ruling body would be extremely distasteful to many in Congress and elsewhere.

How, then, can it be expected for an analyst to be able to carve a path through all these biases and barriers to (for lack of a better phrase) "free thought"? The analyst must find the balance between the tyranny of "experts" and the tyranny of the lowest common denominator. Secondly, the analyst must find the balance between ignorance of the facts and hardening of the cognitive synapses. And all of *THIS* presumes that the collectors of data from of all of the previously-mentioned INT's have managed to collect information of value to the question at hand and successfully saved the data in a form and location that is retrievable by the analyst.

One can wish for a sudden influx of seasoned intelligence analysts into the IC; but, from where? The desideratum would be for the future analysts to be polymaths, with language background and great flexibility in job assignment capacity.[800] The likelihood of reaching that end goal is small. There is only one way to get experience and it takes time. But a beginning step might be the development of a "Bio-intelligence analyst" career path. This would be a dedicated cadre of analysts trained not only in the intelligence process but also in the specific area of BW and bio-terrorism. The analyst would also be trained in the biological sciences and have a working understanding of the physiological responses to biological pathogens. The analyst will be expected to understand that the Bio-intelligence analyst is a profession, not a stepping stone to other positions in the IC. What does that mean? It is the difference between a job and a career.

The concept of a professional bio-intelligence analyst is the same as the concept of the professional military officer. The characteristics are the same. Those traits are: expertise, responsibility, and "corporateness."

Samuel Huntington defined expertise as "the basis of objective standards of professional competence for separating the profession from laymen and for measuring the relative competence of members of the profession."[801]

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[800] P. 100, Richard J. Aldrich, "Intelligence Test," Foreign Policy.134 (2003).
[801] P. 506, Samuel P. Huntington, "Officership as a Profession," American Defense Policy, eds. Richard G. Head and Ervin J. Rokke, 3rd ed. (Baltimore: The Johns Hopkins Press, 1973).

Responsibility is defined as performing a service essential to the functioning of society. This social responsibility "distinguishes the professional man from other experts who possess only intellectual skills," in Huntington's mind. Certainly the defense of national security by the collection and analysis of intelligence must satisfy the definition of a social responsibility.

Analysts sharing a sense of organic unity and consciousness of themselves as a group was defined as corporateness. This has been, perhaps the greatest failing of the Intelligence Community: the failure to define itself as a unified team. There has been, in fact, a greater feeling of competitiveness and "us vs. them", both within the Community and against its intended customer base. Can this lack of cohesion be addressed?

Part of this lack of cohesion can be readily and easily addressed by the individual agencies of the IC. Consider the DNI complaint of the lack of expertise in terms of Philip E. Tetlock's model of dilettantism. If Tetlock is correct, then the problem is NOT analytic inexperience. Rather, it is a question of leveraging the disparate knowledge resident in the extant analytic pool. Fingar's complaint about the need for better analysts is self-defeating, as well as demoralizing. One cannot grow a ten year oak in five years. One can, however, grow a lot of five year old oaks in the hopes that most will eventually become ten year old oaks. The CIA was recently identified as one of the best places in

the U.S. Government to work for undergraduates.[802] Recruiting the best and the brightest should not be that difficult.

Maximizing that talent pool is the issue and it can be solved. Management must eliminate one of the self-inflicted barriers created in a previous generation. Literally, the barriers are the office walls and cubicles of prevalent in all of the IC and most of the federal government today. To achieve "corporateness" and team-building, the individual analysts must see themselves as part of the team. Office walls achieve just the opposite, identifying each as an individual and, worse, as an individual who's worth can be measured by the quality of wall surrounding the analyst (cubicle "pentagon paneling" or office with a lockable door). The water cooler has largely been eliminated from the current office and with its demise has gone the "water cooler chatter" where new ideas could be tested without reprisal or ridicule.

Desirably, team space should be open so that analysts can see the other team members and talk to them continually throughout the day, exchanging ideas and testing hypotheses in a non-confrontational, supportive atmosphere. Desks would not exist in this space, replaced by one large central work table. Computers, necessary as they are, would have monitors embedded in the tabletop so as not to block the views of the analysts from each other.

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[802] USA Freedom Corps, College Students Rank Peace Corps #5 Behind Google, Disney, Apple and U.S. State Department as an Ideal Undergraduate Employer (Washington, D.C.: Peace Corps, 2007).

This is not a new concept. Most command centers in the U.S. use this concept because the rapid and accurate flow of communication among all participants is crucial. Yet, somehow, the concept that works so well in crisis situations is not used for day-to-day operations. The Government Communications Headquarters (GCHQ) in the UK is changing that, however. In 2004 GCHQ, the UK's counterpart to the U.S. National Security Agency, inaugurated its new headquarters, "the doughnut" (so named due to its circular shape). The design was not just to create a clever name. The British Council for Offices designated it the region's best corporate building in 2004 because the design reflected "a massive change of culture" and one that is "expected to improved productivity in more than 20 business areas."[803] Over fifty different functional areas were integrated into the new building. Most importantly, traditional office spaces have been replaced by open areas which can be configured to support various "action teams." Notable about these teams is the concept that they are formed from expertise throughout the building to address specific issues and disband once the current project is completed. Unfortunately, the doughnut is mostly notable for its uniqueness in form and function. Its work model has not been replicated to any great degree in either the UK or the U.S..

Incredibly, while the need for functional teams has never been more important to national security requirements, the trend in workspace management continues to move further away from such a structure, with new trends such as teleworking and ubiquitous computer connectivity confounding any desires toward team-building. Besides hindering

[803] GCHQ News Release, "Doughnut Scoops Another Award," Government Communications Headquarters, 2004.

the possibility of team-building or corporateness, these trends are counter to any management theory of management and staff coordination.[804] Efficiency is being confused with effectiveness.

The United States Marine Corps is traditionally considered as one of the organizations with the most recognizable and well-defended sense of corporateness in the United States. One of the tools used by the Marines to reinforce its esprit de corps is the use of an all-ranks reading list, so Marines have a good sense of their corporate history.[805] Dependent on the rank of the individual Marine, the list has between five and eight books expected to be read. The books range from Sun Tzu's The Art of War to Thomas Friedman's The Lexus and the Olive Tree. The CIA, on the other hand, has a suggested reading list of 145 books, in topics ranging from "CIA & OSS History," through "Women in History," to specific issues such as the current "War on Terrorism" – and the CIA is quick to point out that identified books do "not imply endorsement by the U.S. Government or its agencies or branches."[806] Contrast that with the Marine Corps Commandant's endorsement of his reading list:

> "our professional reading program is designed to provide Marines with an intellectual framework to study warfare and enhance their thinking and decision making skills. The mind, like the body, grows soft with inactivity. All Marines

[804] Douglas McGregor, The Human Side of Enterprise (New York: McGraw-Hill Book Company, Inc., 1960).
[805] United States Marine Corps, Professional Reading Program Reading List, 2008, U.S. Marine Corps, April 7, 2008 2008.
[806] Central Intelligence Agency, Intelligence Literature: Suggested Reading List, 2008, Central Intelligence Agency, Available: https://www.cia.gov/library/intelligence-literature.index.html, April 7, 2008 2008.

must understand that mental fitness is as demanding and as important as physical fitness, for both require commitment and perseverance. In a world characterized by rapid change and great uncertainty, our reading program will act as a combat multiplier by *providing all Marines with a common frame of reference and historical perspective on warfare, human factors in combat and decisionmaking. In so doing, the program will also strengthen the threads of cohesion that make our Marine Corps unique*."[807][emphasis added]

But are the qualities that make up the modern professional soldier the same qualities necessary to make a good intelligence analysis? Is the concept of a "professional" even understandable in a contemporary lexicon? Sometime in the 16th century the term referred to clerical vows and the training of the clergy but rapidly began to be used in regards to law, some branches of medicine, and the military.[808] In general, though, certain attributes began to be accepted as hallmarks of the professional: abstract, specialized knowledge; autonomy; self-regulation; authority; altruism; and, high status.[809] [810] It can be debated whether or not all of these attributes are necessarily part of the intelligence analyst's psyche, or whether or not IC management has attempted to use any of these traits to motivate the analytic community to "a higher calling."

[807] United States Marine Corps, "MCBul1500."
[808] P.3, Rick Linden, Professions, Professionalism, and the Military, Canadian Forces Leadership Institute, University of Manitoba.
[809] P. 5-9, Linden, Professions, Professionalism, and the Military.
[810] Curiously, this list ignores accountability: a sense of responsibility and ownership for one's actions.

Charles Moskos identified a different trait which may be more appropriately aligned with the intelligence analyst: institutional motives. Institutional motivations include patriotism, love of service, and dedication.[811] The antithesis of the institutional model is the organizational model – with the soldiers (or intelligence analysts) seen merely as employees.[812] That principle, combined with the current view of intelligence analysis as product and policy-makers as consumers, may make the professional intelligence analyst an anachronism.

Why is this focus on professionalism necessary? Because the individual analyst is the only constant in the world of reinvention and transformation which is the reality of the Intelligence Community in the twenty-first century. "The history of the CIA is a record of constantly changing offices and lines of authority."[813] If the individual analyst has some personal responsibility for the quality and importance of the analysis, there may be a higher probability of the product being useful, even in spite of managerial ennui (or worse) in the corporate offices above the cubicle of the analyst.

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[811] John Allen Williams, "The International Image of the Military Professional," African Security Review 4.5 (1995).
[812] P.6, Jeppe Plenge Trautner, Military Culture, Professionalism, and Cultural Limitations to Political Decision-Making, Aalborg University.
[813] P. 385, Thomas Powers, Intelligence Wars -- American Secret History from Hitler to Al-Qaeda (New York: New York Review of Books, 2004).

Realistically, the best answer may be the same answer Hannah Arendt discovered in examining the question of banal evil: "it is very simple: it is nothing more than to think what we are doing."[814]

[814] P. 5, Arendt, The Human Condition.

Chapter 10

Conclusion

The Tyranny of Experts is an inaccurate, or at least a self-limiting, title. The rise of state-run BW programs in the 20th century was likely not the result of tyranny by scientific experts directing research or military strategists motivated by achieving victory. Rather, the rise was the result of self-proclaimed or presumed experts dabbling in fields well beyond their own particular specialty. Whether it was a journalist such as Wickham Steed, a noted physician such as Frederick Banting, or a trained biologist such as Theodor Rosebury, their reputations may very well have exceeded their expertise. To a large extent, then, the title should better be: The Tyranny of So-Called "Experts".

While the title may be inaccurate, the original hypothesis still stands. The development of biological weapons in the early twentieth century likely was based not on military requirements, but rather on other, less concrete, political and possibly (un)ethical considerations.

Why is this conclusion important? It is feckless for the arms controller/policy-maker to argue against a weapon as an armament of war if the other side sees the weapon as something other than a weapon of destruction –mass destruction or not. If one side sees

BW as a tool of deterrence and the other side fails to make that association, is deterrence effective?[815] In the world of international relations, one obviously can not build "from common ground" if there is no common understanding of what is being discussed.

But perhaps more important to our national security is the question of analytic misperception by the Intelligence Community. The ability of the IC to accurately analyze and understand activity underway in other countries is critical to the nation's survival. And, as evidenced by the very public revelations of its failures – from Pearl Harbor to the fall of the Soviet Union to the Iraq WMD conundrum, the IC's inability to accurately assess activity has considerable ramifications for our security

What of the failures of perception by the intelligence organizations in the period prior to the start of World War II as well as through the war years? The record of the Allied intelligence organizations was clearly unimpressive. They "saw" BW programs where none existed, failed to see programs where they truly were a threat, and largely failed to understand the magnitude of the threat after the war when, presumably, they had access to records and could have developed proper responses. Insight into the intelligence groups of the Soviet Union, Japan, and Germany is regrettably limited if not completely non-existent. Anecdotal information from the memoirs of various defectors from the Soviet program is jumbled with myths and cover stories from the Soviet deception

[815] The mere fact that war has not broken out does not mean that deterrence has been effective – other factors are also at play.

programs, making it impossible to tell what was truly known, what was believed, and what was simply a story to deceive foreign intelligence organizations.

It is easy to point fingers and argue that the Intelligence Community did not "get it." But where is the failure? Intelligence is a process, not a discrete activity. Intelligence begins with a requirement, something the policy-maker needs to know. There is nothing to indicate that biological weapons were an issue on the mind of President Roosevelt or his staff until it was raised by the Canadians and the UK. There is no evidence to suggest that the U.S. intelligence organizations were ever tasked to collect on foreign activities in the BW realm prior to World War II. Even during the war, the record is extremely spotty about "what was known and when was it known?"[816]

It is extremely risky to attempt to apply lessons from a half century previous to contemporary events. "Mirror imaging" is seductive, but inappropriate. The circumstances and organizations existent prior to World War II are now long past relevance to today's world. Comparing the activities and short-comings of the current intelligence community to the failings of the previous national security establishment is similarly inappropriate. But some facts stand true. Even accepting the argument of Philip Tetlock and others about the impossibility of being able to make consistently reliable analytic judgments, effective analysis still requires good data and, lacking that data, the analyst must use experience from similar event patterns.

[816] To paraphrase from the Watergate hearings

An inexperienced analyst may come up with the right answer, but the odds are stacked against it happening. Of course, being an experienced analyst does not ensure coming up with the correct answer, either, as evidenced by the debacle of the National Intelligence Estimate on Iraq's Weapons of Mass Destruction. But blaming the so-called "failures" of the Intelligence Community on inexperienced or unseasoned analysts is both disingenuous and ill-humored. Mark Lowenthal got it right in his May 2008 editorial in the Washington Post:

> "The subtext here, as we say in intelligence analysis, is that intelligence needs to be right all the time. But it can't be, no matter how blithely the critics expect otherwise. And it's past time we all got used to that . . . .Intelligence tends to do worse on the 'big events' (Pearl Harbor, 9/11, the fall of the Berlin Wall) because these events, by their very nature, are counterfactual or surprising. Nor can intelligence eliminate the element of surprise."[817]

But, recall the premises regarding Intelligence postulated in the first chapter. First was the inability of intelligence agencies to collect data most useful in understanding an opposing State's program. There are several facets to this inability. There is the need to be able to collect data: both access to data and technological capabilities. This assumes an ability to know where to collect the data as well as a need to know what data to collect. Finally is the ability to understand and explain the collected data.

[817] Mark M. Lowenthal, "The Real Intelligence Failure? Spineless Spies," The Washington Post May 25, 2008 2008.

Second of the "Intelligence premises" was a widespread misunderstanding of the potential of intelligence. The Policy Community, from the President on down, had either a mistrust or a general disregard for the usefulness of intelligence data. Third, particularly in the United States, was a lack of coordination between the various agencies, creating, in essence, a paralysis of analysis. Intelligence "failures" should be expected because of the technical and psycho-social barriers inhibiting both proficient intelligence analysis and the distribution of actionable analysis to policy-makers. Any notion that the situation has improved in the sixty years since the end of World War II must be quickly dispelled.

Worse, in terms of the need to understand biological weapons in the 21st century, is the fact that the problem has become MUCH harder to understand and analyze. States no longer require large infrastructures to produce biological weapons.[818] The massive facilities analysts used to study in the Cold War era simply no longer exist in their earlier form. Programs such as the Cooperative Threat Reduction program and the International Science and Technology Centers have, potentially, redirected scientists in the old Soviet Union program to new, peaceful endeavors. Yet suspicions still remain about the remnants of the old Soviet program. Ken Alibek publicly raised the suspicions in

[818] While the problem has become much harder, it is not a new problem. George Merck recognized the problem in 1946, warning that BW programs did not require vast amounts of money nor large production facilities and could easily take place under the guise of medical or bacteriological research. P. 151, Hartcup, The Effect of Science on the Second World War.

1999.[819] The Department of State continued the suspicions as recently as 2005 in its Noncompliance Report.[820]

But there are still missing facts, data not available in the public archives or lost to the ages. The information presented in these pages is based on available, publicly accessible data sources. Future research, based on newly available information, may produce other conclusions. More work needs to be done to locate and make available the missing files on the BW programs of World War II and the Cold War. Analysis demands evidence, not opinions.

Our national security is dependent on high-fidelity intelligence analysis. If the threat of biological weapons is as great and as significant as has been postulated, the inability of the IC to be able to make reliable intelligence assessments on those programs is of great concern. There are so many barriers, cognitive and institutional, to making such a necessary analytic conclusion. Is it reasonable to expect reliable conclusions? The odds are clearly against the intelligence analyst in today's IC organization. Identifying and predicting trends is clearly a hit-or-miss proposition. Searching for "the low hanging fruit" of easy intelligence targets is clearly a recipe for starvation, if not disaster. The low hanging fruit of yesterday is no longer available. The analyst of today must become creative and innovative if he wishes to remain an analyst tomorrow. Unless and until the

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[819] Alibek and Handleman, Biohazard -- the Chilling True Story of the Largest Covert Biological Weapons Program in the World -- Told from inside by the Man Who Ran It.
[820] P. 27-31, U.S. Department of State, Adherence to and Compliance with Arms Control, Nonproliferation and Disarmament Agreements and Commitments.

IC chooses to reform itself to allow for more creative analytical thinking, the policy makers may remain on their own. Conversely, unless and until the policymakers begin driving the intelligence process, demanding better collection and more "value-added" analysis, we should expect nothing better from the IC.

Appendix 1

A Timeline of Events

The following timeline was developed in the hope that it would be able to show how the actions of one country would cause direct responses by other countries. To the contrary, it appears to demonstrate that there was no noticeable correlation between cause and effect. That finding may, in fact, be more important to this study than if timing demonstrated a positive correlation.

Date	**Germany**	**Japan**	**Soviet Union**	**US – UK – Canada**
1919				John Buchan publishes Mr. Standfast
1920	*Versaillesdiktat*	*Versaillesdiktat*	*Versaillesdiktat*	*Versaillesdiktat (UK)*
1925	Geneva Protocol for the Prohibition of the Use of Gas and of Bacteriological Methods of Warfare (ratified April 25, 1929)	Geneva Protocol for the Prohibition of the Use of Gas and of Bacteriological Methods of Warfare (ratified May 21, 1970)	Geneva Protocol for the Prohibition of the Use of Gas and of Bacteriological Methods of Warfare (ratified April 5, 1928)	Geneva Protocol for the Prohibition of the Use of Gas and of Bacteriological Methods of Warfare (ratified April 9, 1930 UK; April 10, 1975, US; May 6, 1930, Canada)
Jan 1933	Hitler appointed Reich Chancellor			

	Germany	**Japan**	**Soviet Union**	**US – UK – Canada**
Apr 7, 1933	Law for the Restoration of the Professional Civil Service – the first of the *Gleichschaltung* policy			
Aug 1933	Germany allegedly conducts BW aerosol tests in Paris Metro (Steed)			
Oct 1933	Germany leaves League of Nations			
Oct 8, 1933	Frederick Birchall reports in NY Times on Frederick Banse's book, *Wehrwissenschaft*			
July 1934				(UK) Wickham Steed publishes allegations of German BW testing
Sept 1935	the Reich Citizenship "Nuremberg" Law passed – Jewish population deprived of their rights			

Date	Germany	Japan	Soviet Union	US – UK – Canada
Nov 1936				(UK) Committee of Imperial Defence Subcommittee on Bacteriological Warfare
Sept 11, 1937				(CD) Sir Frederick Banting argues for BW with Canada's NRC
Mar 1938	Germany marches into Austria			
Oct 1938				(CD) Canada begins exploring the potential problems of bacteriological weapons as a national issue not specifically concerned with the military aspects of BW
Mar 1939	Germany invades Czechoslovakia			
Aug 1939		Japan attempts to acquire yellow fever virus from Rockefeller Institute in New York		
Sept 1939	Germany invades Poland. World War II begins.			
May 1940				Churchill becomes Prime

Date	Germany	Japan	Soviet Union	US – UK – Canada
				Minister
Jul 26, 1940				(UK) Lord Hankey decides to begin BW program at Porton Down
Aug 1940				(UK) "Tizard mission" to North America
Aug 30, 1940		Japanese planes scatter grain over Nanyang.		
Sept 12, 1940	Germans claim UK drops Colorado potato bugs out of planes			
Fall 1940				(US) NDRC letter to the Council of National Defense that consideration be given to the offensive and defensive aspects of biological warfare.
Oct 4, 1940		Japanese plane scatters grain over Chuhsien.		
Oct 27, 1940		Japanese planes scatter grain over Ningpo		
Oct 29, 1940		Bubonic plague outbreak in Ningpo. 99 victims		
Nov 12, 1940		Bubonic plague outbreak in Chuhsien. 21 deaths		

Date	Germany	Japan	Soviet Union	US – UK – Canada
Nov 28, 1940		Japanese planes drop granules over Kinwa. Possible failure.		
Dec 19, 1940		Chinese government charges Japanese released plague over three cities.		
Feb 21, 1941				(CD) Sir Frederick Banting killed in a plane crash en route to the U.K.
Oct 1, 1941				(US) Henry Stimson writes to National Academy of Sciences to investigate use of BW.
Nov 4, 1941		Japanese plane drops grain and other material over Changteh		
Nov 11, 1941		Plague appears in Changteh. 6 victims.		
Dec 6, 1941		Pearl Harbor		Pearl Harbor. (UK) Churchill approves Operation Vegetarian.
Dec 18, 1941				(US) Ezra Kraus recommends using growth hormone against Japanese rice crops – the precursor to

Date	Germany	Japan	Soviet Union	US – UK – Canada
				Agent Orange.
“early” 1942		Plague appears in Suiyan, Ningsia, and Shensi provinces. Possible “enemy action”		
Jul 1942				(UK) Anthrax testing on Gruinard Island
Aug 1942				(US) George Merck appointed chairman of the US’s War Research Services
Oct 1942				U.S. BW program begins under Edwin B. Fred
Jun 6 1944	D-Day begins		D-Day begins	D-Day Begins
Mar 26, 1945		General Umezu cancels Operation PX, the planned attack on the US mainland with BW		
Apr 30, 1945	Hitler commits suicide			
May 7, 1945	Germany surrenders		V-E Day	V-E Day
Aug 6, 1945		Atomic bomb dropped on Hiroshima		
Aug 9, 1945		Atomic bomb dropped on Nagasaki		
Aug 15, 1945		V-J Day		V-J Day

Date	Germany	Japan	Soviet Union	US – UK – Canada
Aug 15, 1945		Unit 731 ordered to destroy all evidence of BW testing.		
1949				Theodor Rosebury publishes Peace or Pestilence
Dec 25, 1949		Khabarovsk War Crimes Trial begins	Khabarovsk War Crimes Trial begins	
Dec 31, 1949		Khabarovsk War Crimes Trial ends	Khabarovsk War Crimes Trial ends	
Nov 1969				Nixon stops U.S. BW program

Appendix 2

Perverted Science: Some Examples

Lysenkoism[821]

Trofim Lysenko (1898-1976) was an agronomist who rejected the findings of classical Mendelian genetics[822] and Darwinian evolution, arguing instead the theory of acquired characteristics – the belief that environment could change hereditary traits and that those traits would then be passed on to succeeding generations.[823] Thus, for example, Lysenko believed that by freezing wheat he could make future wheat crops resistant to winter freezes.[824]

The theory of acquired characteristics was not Lysenko's, though, but rather was based on the theories of Ivan B. Michurin (1855-1935).[825] Michurin's theory, as defined by Lysenko, maintained two dogmatic assertions. First, changes to the body during the life

[821] In Russian, Lysenkovschchina is used to summarize the theories of Trofim Lysenko and Ivan V. Michurin.
[822] Gregor Mendel (1822-1884) is often described as the discoverer of the laws of heredity. More correctly, Mendel discovered the fact that genes were not blended from the parents but was, rather, discrete particles which either were inherited or were not. This was a central argument in the early debate about natural selection. Mendel, secluded away in his monastery, was not part of the debate and his ideas were not widely accepted until after his death. Richard Dawkins, The Blind Watchmaker (New York: W.W. Norton & Company, 1996) p113.
[823] P. 136, Guillemin, Biological Weapons -- from the Invention of State-Sponsored Programs to Contemporary Bioterrorism.
[824] After World War II, Lysenko convinced Stalin that his failure at "vernalization" of winter wheat by freezing the seeds before planting was the result, not of bad science, but of sabotage by revolutionary biologists – 3,000 of whom were subsequently dismissed.
[825] Michurin has often been called the Luther Burbank of Russia. (Luther Burbank, 1849-1926. U.S. plant breeder, developer of the Idaho potato and the Shasta daisy, among countless other hybrid nuts, berries, and flowers. Nina Fedoroff and Nancy Marie Brown, Mendel in the Kitchen: A Scientist's View of Genetically Modified Foods (Washington, D.C.: Joseph Henry Press, 2004). P. 103, Loren R. Graham, Science, Philosophy, and Human Behavior in the Soviet Union (New York: Columbia University Press, 1987).

of an organism can be transmitted to its offspring (Lamarckism). Second, genes do not exist. Thus, the theory rejects both Darwinian evolution and Mendelian genetics.[826]

Lysenko managed to successfully capture the attention of Josef Stalin and altered the face of Russian and Soviet science until at least the 1960s. Lysenko, in a *Pravda* article in the late 1920s, attacked "bourgeois genetics" as fascist science which undermined neo-Lamarckism principles.[827],[828] In 1948, the government of the Soviet Union officially accepted his theory by condemning genetics as "unscientific."[829] A now-declassified U.S. National Intelligence Estimate, Soviet Science and Technology, described Soviet genetic research as still suffering in 1959 "from the political interference of the late Stalin period" and lamented "the revival of Lysenko's political and popular prestige" as a new threat to research.[830]

Lysenkoism is an example of social construction – a theory which holds that all science, including biology, can be seen as socially formed and the product of the culture in which they resided.[831] Marxist idealogues such as Stalin, Nikolai Bukharin, and Nikolai Vavilov argued that science had become sterile because it lacked contact with "practical"

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[826] P. 62, Domaradskij and Orent, Biowarrior -- inside the Soviet/Russian Biological War Machine.
[827] Neo-Lamarckism – A belief that properties that an individual organism acquires during its lifetime can become part of the genetic inheritance of its offspring. Nils Roll-Hansen, The Lysenko Effect - the Politics of Science, Control of Nature, eds. Morton L. Schagrin, Michael Ruse and Robert Hollinger, Paperback ed., vol. 4, 9 vols. (Amherst: Humanity Books, 2005) p.23. Named after Jean Baptiste Lamarck (1744-1829).
[828] P. 84, Cornwell, Hitler's Scientists -- Science, War, and the Devil's Pact.
[829] P. 12, Roll-Hansen, The Lysenko Effect - the Politics of Science.
[830] P. 25, Director of Central Intelligence, National Intelligence Estimate 11-6-59, Soviet Science and Technology.
[831] Peter L. Berger and Thomas Luckman, The Social Construction of Reality (New York: Anchor Books, 1966).

work.[832] As was the rule in most industrialized countries, the Soviet's confidence in the possibilities of science was boundless in the early years of the twentieth century. Thus, when the early results of agricultural collectivization were seen to be disastrous[833], the conclusion of the policy-makers was not that the science was wrong, but that the way science was administered was wrong. Consequently, the need for centralized planning of scientific programs in the Soviet Union was deemed to be necessary.[834]

Lysenkoism had a "disastrous impact on Soviet science."[835] Opponents of Lysenko's and Michurin's biology were accused of being "idealists and metaphysicians, worshiping foreign ideas." With the rise of Lysenkoism as official Soviet policy, Chetverikov and other brilliant Soviet researchers disappeared from the scene. This was not just the case in the biosciences; physics and physiology were also subject to attack on an ideological basis and Soviet scientists feared the possibility of other scientific fields spawning their own Lysenko's.[836],[837]

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[832] P. 77, Roll-Hansen, The Lysenko Effect - the Politics of Science.
[833] Collectivization resulted in the deportation (and deaths) of hundreds of thousands of peasants in farming camps as well as a famine in the Ukraine which resulted in the deaths of millions. Loren R. Graham, What Have We Learned About Science and Technology from the Russian Experience? (Stanford: Stanford University Press, 1998) p 18-19.
[834] P. 78, Roll-Hansen, The Lysenko Effect - the Politics of Science.
[835] P. 62-63, Domaradskij and Orent, Biowarrior -- inside the Soviet/Russian Biological War Machine.
[836] It should be pointed out, though, that one Soviet physicist, Vladimir Fock, stood strong to prevent a "Lysenko-like" movement in physics in the Soviet Union. Fock defended, among other issues, the theory of relativity against Soviet detractors. Loren R. Graham, Between Science and Values (New York: Columbia University Press, 1981) p 96.
[837] P. 15, Graham, Science, Philosophy, and Human Behavior in the Soviet Union.

What is important here is the influence of bad science on government policy or, in this case, the effect of poorly-informed policy on science.[838] A physics or physiology-based Lysenko was not necessary to stifle scientific exploration in the Soviet Union. Once it was clearly expressed that science must be responsive and supportive of 'progressive' social policy, the ability of science to be value-free was negated.[839] Science became a vehicle for the furtherance of the State and was no longer a commodity for mankind but was simply another tool in the propagandists' portfolio.

Eugenics[840]

Eugenics, the science of encouraging "good" offspring, is associated with Sir Francis Galton, a cousin of Charles Darwin. Galton's book, Hereditary Genius (1869), emphasized the advantages of selection of highly intelligent members of the population for ideal breeding.[841] More importantly, eugenics was directed chiefly at discouraging propagation among the "unfit."[842] Eugenics was not seeking a healthier population as an end in itself but, rather inherently, in a time of rising crime rates and increasing poverty

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[838] A curious contradiction in Soviet policy is apparent, however. While Stalin embraced neo-Lamarckism theory and Lysenkoism as agrarian policy, he also took a solid view of engineering, as shown by his opting for the Red Army's T-4 tank, as well as the Soviet's push for the atomic bomb. Cornwell, Hitler's Scientists -- Science, War, and the Devil's Pact p. 36. If anything, the contradiction may be the value of centralized planning in the industrial economy versus the failure of such centralization in science-based endeavors.

[839] This may, however, be too simplistic a thought process. Robert Proctor points out that there is an "increasing recognition that this dependence on the interests or priorities of science on broader social goals has fostered a rethinking of traditional ideals of academic freedom. . .scientists may divide among themselves their piece of the pie, but only after others have decided how big that piece will be." Robert N. Proctor, Racial Hygiene -- Medicine under the Nazis, Paperback ed. (Cambridge: Harvard University Press, 1988) p. 2.

[840] Eugenics, from the Greek roots *eu* or good and *genics* or origin. Goliszek, In the Name of Science -- a History of Secret Programs, Medical Research, and Human Experimentation p. 76.

[841] P. 85, Cornwell, Hitler's Scientists -- Science, War, and the Devil's Pact.

[842] P. 276, Judith S. Levey and Agnes Greenhall, eds., The Concise Columbia Encyclopedia (New York: Avon Books, 1983).

in cities like London and New York, proponents of eugenics believed that a healthier, more intelligent, better-behaved population would solve the problems of urban living without investments in social services.[843]

Proponents of eugenics were prominent internationally. The delegates at the Second International Congress of Eugenics in 1921 included Alexander Graham Bell, future president Herbert Hoover, and Charles Darwin's son, Leonard.[844] In 1927, Supreme Court Justice Oliver Wendell Holmes used eugenics as the cornerstone of a Supreme Court decision (Buck v. Bell, 274 U.S. 200) calling for the sterilization of a "feeble-minded" woman. The Supreme Court decision found that "It is better for all the world, if instead of waiting to execute degenerate offspring for crime, or to let them starve for their imbecility, society can prevent those who are manifestly unfit from continuing their kind."[845]

In Britain, biometrician Karl Pearson[846] became the first holder of the Galton Chair of Eugenics at University College London. Pearson concluded that the British population

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[843] P. 85, Cornwell, Hitler's Scientists -- Science, War, and the Devil's Pact.
[844] P. 76, Goliszek, In the Name of Science -- a History of Secret Programs, Medical Research, and Human Experimentation.
[845] P. 342, Goliszek, In the Name of Science -- a History of Secret Programs, Medical Research, and Human Experimentation.
[846] Pearson is known to modern day statisticians as the discoverer of Pearson's correlation coefficient, *r*, the measure of the degree of linear association among interval level variables. Theodore H. Poister, Public Program Analysis -- Applied Research Methods (Baltimore: University Park Press, 1978) p. 531. Pearson also was a co-discoverer of the regression coefficient, *t*. Damodar N. Gujarati, Basic Econometrics, fourth ed. (New Delhi: Tata McGraw Hill, 2003) p. 129. Coincidentally, the statistical concept of 'regression' was derived by Galton and Pearson in studying the "regression to mediocrity" of the average height in a population – an issue of eugenics. Gujarati, Basic Econometrics p. 17. Pearson also is noted for his attempt to prove the existence of a Supreme Being by using the laws of probability. Karl Pearson, The Ethic of

was headed for imminent degeneration due to correlations he observed between "intelligence" of parents and family size. Pearson concluded that war had positive eugenic effects as consequences of selection through struggle:

> "This dependence of progress on the survival of the fittest race, terribly black as it may seem to some of you, gives the struggle for existence its redeeming features; it is the fiery crucible out of which comes the finer metal[847]."

Pearson saw war, in fact, as part of nature not just in tempering the steel of a nation, but in eliminating the slag from the crucible. In 1901, responding to a critical review of his book, National Life from the Standpoint of Science, Pearson wrote a 'scientific" view of the nation as:

> "that of an organized whole, kept up to a high pitch of internal efficiency by insuring that its numbers are substantially recruited from the better stocks, and kept up to a high pitch of external efficiency by contest, chiefly by way of war with inferior races, and with equal races by the struggle for trade routes and for the sources of raw material and food supply. This is the natural history view of mankind, and I do not think you can in its main features subvert it."[848]

Freethought and Other Addresses and Essays, Elibron Classics Replica Edition ed. (London: Adam and Charles Black, 1901) p.45-65. Pearson was a prolific writer with over 500 articles to his credit. Bernard J. Norton, "Karl Pearson and Statistics: The Social Origin of Scientific Innovation," Social Studies of Science 8.1 (1978): p16., including a massive biography of his mentor, Francis Galton, Karl Pearson, The Life, Letters and Labours of Francis Galton, 2006, Available: http://galton.org/pearson/2006.

[847] P. 86, Cornwell, Hitler's Scientists -- Science, War, and the Devil's Pact.

[848] Norton, "Karl Pearson and Statistics: The Social Origin of Scientific Innovation."

Similar emotions were being expressed in the United States. Roland Campbell Macfie argued that war would mean an improvement in the "health and beauty of the combatant races."[849]

In the United States, eugenics became a weapon in the racial confusion of the early twentieth century. Eugenicists mixed "the concepts of biological hereditary fitness with those of class and race. Highly educated persons of good social class were considered eugenically superior; the poor, the uneducated, criminals, recent immigrations, blacks, and the feeble-minded were eugenic misfits."[850]

Eugenics was not merely a Western theory. In Japan, eugenics was known as "racial science" and was used as political justification for the expansion of the Japanese empire to Manchuria and the creation of the Greater East Asia Co-Prosperity Sphere.[851] It is not too far of an intellectual leap to wonder what the turn of events in World War II might have been absent the eugenics backstory (see the Japan section of "the "BW Dominoes" chapter).

Before one relegates eugenics to a quaint nineteenth and early twentieth century phenomenon, let us look at the current trend in eugenics. From the sublime to the ridiculous, we have notions such as California's Repository for Germinal Choice – also

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[849] P. 86, Cornwell, Hitler's Scientists -- Science, War, and the Devil's Pact.
[850] Washington, Medical Apartheid: The Dark History of Medical Experimentation on Black Americans from Colonial Times to the Present.
[851] P. 365, Tessa Morris-Suzuki, "Debating Racial Science in Wartime Japan," Osiris, 2nd series 13.Beyond Joseph Needham: Science, Technology, and Medicine in East and Southeast Asia (1998).

known as the Nobel Prize Sperm Bank – as one example. The bank reportedly had the "modest" goal of changing mankind and reversing evolution.[852] More important is research such as the Human Genome Project and the promise it holds out for gene therapy and much more. But the flip-side of the promise of genetic engineering is never too far from the surface. Consider the recent Science magazine article associating intelligence, racial differentiation, and "beneficial brain mutations."[853] And it is this same understanding of the genetic structure of man that is leading some futurists to imagine genetic weapons targeting certain ethnic groups.[854] It has been widely reported, for example, that South Africa explored such a weapon for use against its own people[855] and there are reports that Australia considered developing biological weapons targeting tropical areas (but not Australian climatic conditions) for use against Indonesia and other "overpopulated" countries of Southeast Asia.[856]

Nazi Science and Racial Hygiene

In Germany, eugenics took the form of racial hygiene (*rassenhygiene*). In 1933, the Nazi government adopted the Prevention of Hereditarily Ill Offspring Law (based on the U.S. Supreme Court decision in Buck v. Bell) which provided for the forced sterilization of more than 375,000 people and the banning of marriage and sexual contact between Jews

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[852] P. xviii, David Plotz, The Genius Factory (New York: Random House, 2005).
[853] Michael Balter, "Brain Man Makes Waves with Claims of Recent Human Evolution," Science 314.5807 (2006).
[854] Thom Hartmann, "The Genetically Modified Bomb," Commondreams.org September 10, 2003 2003.
[855] "South African Doctor Accused of Developing Bacteria to Kill Blacks," Malaysia Sun 3 March 2007 2007.
[856] Brendan Nicholson, "Burnet's Solution: The Plan to Poison S-E Asia," The Age March 10, 2002 2002.

and non-Jewish Germans. During the Nuremberg Trials, lawyers referred to America's laws and policies as defense and justification for Nazi science during World War II.[857]

Germany also introduced the concept of "military eugenics" to the lexicon. Professor Ewald Banse argued that "a skillful government and military command must give to warlike individuals particularly favorable conditions to live and procreate, thus grafting their warlike ideal on the less warlike classes."[858]

Much like Lysenkoism in the Soviet Union, "racial hygiene" was the result of an effort to force a scientific conclusion to support a national policy aim. Racial hygiene was first introduced by German physician Alfred Ploetz in the mid-1880s[859] as a way to consider not just the good of the individual but also the good of the race.[860]

Jewish scientists were dismissed en masse from their academic and laboratory positions as one of Hitler's first official policy directives in support of racial hygiene.[861] This was a direct result of the *Gleichschaltung* (literally "bringing into line' or "elimination of opponents'), the subordination of people and institutions to Nazi policies, in this case, depriving German universities of their traditional independence from government control.

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[857] P. 79, Goliszek, In the Name of Science -- a History of Secret Programs, Medical Research, and Human Experimentation.
[858] Birchall, "Reich Is Thinking of War Despite Its Talk of Peace."
[859] Ploetz's followers argued that the term "racial hygiene" was incorrectly translated into English and that "eugenics" should be the term for Ploetz's theory. The American Eugenics Movement combined the two, changing the name of its newsletter from *Eugenical News* to *Eugenical News: Current Record of Race Hygiene*. Edwin Black, War against the Weak -- Eugenics and America's Campaign to Create a Master Race (New York: Four Walls Eight Windows, 2003) p.280.
[860] P. 15, Proctor, Racial Hygiene -- Medicine under the Nazis.
[861] P. 128, Cornwell, Hitler's Scientists -- Science, War, and the Devil's Pact.

The *gleichshaltung* policy was decreed in the Law for the Restoration of the Professional Civil Service of April 7, 1933.[862] The law cleared the path for a centralist unitary state, bringing into line the Federal and Länder administrations as well as the judiciary, the press, and the arts and sciences.[863] The law allowed for the discriminating against and dismissing of persons at universities who were non-Aryan or "married to a Jew" or were otherwise politically undesirable persons employed at academic institutions. Shortly after that, in September 1935, the Reich Citizenship Law, one of the so-called Nuremburg Laws, was passed. This law expanded the list of undesirables to include non-Jews who married Jews – they were considered non-Aryans. The result of these laws was to remove highly skilled academics from the university structure. Ute Deichmann reports that of a total of 337 biologists working in Germany or German-occupied Poland in 1933, 8.9 percent were either dismissed or left because of their non-Aryan or Jewish status.[864]

And, once again, Gregor Mendel was blamed in an effort to justify the Nuremburg Laws and the purge of Germany's scientific elite. Ernst Lehmann, professor of Genetics at Tübingen University, writing in 1942 for a commemoration of Mendel's 120th birthday, said:

> "Anybody who attempted today to survey the impact of what has been done in this country based on the laws of heredity and insights about the human race, would stand quietly in awe before the greatness of what has been achieved and is

[862] P. 11, Deichmann, Biologists under Hitler.
[863] P. 311, Centre, Questions on German History -- Ideas, Forces, Decisions -- from 1800 to the Present.
[864] P. 12, Deichmann, Biologists under Hitler.

being aimed for, Work has begun in countless fields, always based on the laws formulated by Mendel . . . What the wider population could relate to most easily in the beginning were the eugenic efforts, which expanded into racial hygiene and were aimed at protecting human society from the burden and misery of hereditary disease . . . The study of human constitution with respect to the given hereditary base and the recording of the genetic foundation of the traits of different human races were in equal measures a result of these insights. Individuals have worked and are working tirelessly on unraveling the innumerable problems, and where necessary and possible the results that arise from their efforts are being put on a legal foundation [*Judengesetze*, anti-Jewish laws]."[865]

It may be a bit of a stretch, but a useful one, to recognize Nazi initiatives in public health and understand the impact on the policy of racial hygiene. These initiatives included national campaigns against smoking, prohibitions against unnecessary food additives, a push for natural herbal medicines and whole grain breads – the "healthy lifestyle" of the late twentieth century, all in the guise of Nazi fascism. It was a "vast experiment designed to bring about an exclusionist sanitary utopia." Robert Proctor argues that Nazi ideology linked the purification of the German body politic from environmental toxins and the purification of the German body from "racial aliens."[866]

[865] P. 77, Deichmann, Biologists under Hitler.
[866] P. 11, Proctor, The Nazi War on Cancer.

Appendix 3

List of Disease Whose Causative Agents Have Been Selected for Consideration[867]

- Anthrax
- Botulism
- Brucellosis
- Common cold
- Dengue fever
- Dysentery, bacillary;
- Equine encephalomyelitis;
- Foot-and-mouth disease
- Fowl plague
- Glanders
- Hog cholera
- Infectious laryngo-tracheitis of fowls
- Influenza (virus with *H. influenzas*)
- Leptospirosis
- Louping ill
- Malaria
- Melioidosis
- Meningococcus meningitis
- Mumps
- Newcastle disease of fowls
- Pasteurellosis (hemorrhagic septicemia)
- Plague, pneumonic
- Plant disease
    - Bacterial canker of tomato
    - Bean blight
    - Black rot of crucifers
    - Black rot of potato
    - Curcurbit wilt
    - Brown rot of solinaceae
    - Fungous diseases
    - Insect diseases
    - Virus diseases
- Pleuropneumonia, bovine
- Psittacosis
- Relapsing fever, tick-borne

[867] P. 32, Rosebury, Kabat and Boldt, "Bacterial Warfare."

- Rickettsial disease, tick-borne
- Rift Valley fever
- Rinderpest
- Tularemia
- Yellow fever

Appendix 4

List of Diseases Whose Causative Agents Have Been Rejected, with Reasons[868]

- Actinomycosis – endogenous
- Cholera – sanitary precautions, immunization
- Diphtheria – low attack rate in adults
- Dysentery – amebic, availability poor
- Endocarditis – subacute bacterial, endogenous
- Friedländer pneumonia – low infectivity (except in combinations)
- Fungous diseases of man and animals – casualty effectiveness low
- Gas gangrene – ubiquity (except as projectile contaminant?)
- German measles – unavailable
- Gonococcal infections – non-venereal infectivity low
- Leishmaniases – unavailable
- Leprosy – long incubation period, chronicity
- Lymphocytic choriomeningitis – low infectivity (?), insufficient data
- Papataci fever – exacting requirements of vector
- Pertussis – low infectivity for adults
- Plague, bubonic – predisposing social factors, complex epidemiology
- Plant virus diseases – several years required to decrease yield
- Pneumococcus pneumonia – low infectivity (except in combinations)
- Poliomyelitis – unavailable, low infectivity
- Rabies – low attack rate, long incubation period, difficulty of transmission
- Rat-bite fever – difficulty of transmission
- Relapsing fever, louse-borne – availability poor, predisposing social conditions
- Salmonella infections – low infectivity (except animals, or combinations)
- Smallpox – vaccination
- Staphylococcus infections – low casualty effectiveness (except combinations)
- Streptococcus infections – low infectivity (except combinations)
- Tetanus – immunization
- Trench fever – etiology unknown
- Trypanosomiases – unavailable
- Tsutsugamushi disease – epidemiology inadequately known
- Tuberculosis – chronicity, low casualty effectiveness
- Typhoid fever – sanitation, immunization
- Typhus fever – availability poor, predisposing social factors

[868] P. 32- 33, Rosebury, Kabat and Boldt, "Bacterial Warfare."

- Varicella – unavailable
- Venereal disease – dissemination impracticable
- Vincent's angina – endogenous
- Wound infections – anaerobic, ubiquity of agents (projectile contaminants?)

Appendix 5

Identified Soviet Facilities, 1920-1945

Facility	**Hirsch Report**	**CIA**	**Russian Sources**
Laboratory X			X
Red Army Bacteriology Institute in Vlasikha, near Moscow	X		X
Scientific Medical Institute of the Red Army in Moscow, near the town of Vlashchikha.	X		
Gorodomliya Island in the Seliger Lake near the town of Ostashkov.	X		
Practical trials were conducted at the Volsk Polygon at Shikhany on the Volga	X		X
The Foot and Mouth Disease Institute of the USSR People's Health Commissariat	X		
Velikonovski Institute, code named No. V/2-1094, renamed the Biotechnical Institute of the Red Army	X		
Vozrozhdeniya Island in the Aral Sea	X		X
The Chkhalov Institute (formerly Orenburg)			
Scientific Research Institute of Epidemiology and Hygiene, Kirov (Vyatka)		X	X
The Military Medical Academy imeni Kirov		X	X
The Lisiy Island Branch of the All-Union Institute of Experimental Veterinary Medicine	`	X	
The Central Scientific Research Testing Institute of Military Medicine		X	
The Military Veterinary Scientific Research Institute		X	
The Moscow Veterinary Academy		X	

The Military Academy of Chemical Defense		X	
The All-Union Institute of Plant Protection		X	
Zagorsk Military Institute			X
Military Institute, Sverdlovsk (Ekaterinburg)			X

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