

Pathogens for War

Biological Weapons, Canadian Life Scientists, and North American Biodefence

DONALD AVERY



UNIVERSITY OF TORONTO PRESS
Toronto Buffalo London

© University of Toronto Press 2013
Toronto Buffalo London
www.utppublishing.com
Printed in Canada

ISBN 978-0-8020-8971-7 (cloth)
ISBN 978-1-4426-1424-6 (paper)



Printed on acid-free, 100% post-consumer recycled paper with vegetable-based inks

Library and Archives Canada Cataloguing in Publication

Avery, Donald, 1938–

Pathogens for war: biological weapons, Canadian life scientists,
and North American biodefence / Donald Avery.

Includes bibliographical references and index.

ISBN 978-0-8020-8971-7 (bound). ISBN 978-1-4426-1424-6 (pbk.)

1. Biological weapons – Canada – History – 20th century. 2. Bioterrorism – Canada – Prevention – History – 20th century. 3. Communicable diseases – Canada – Prevention – History – 20th century. 4. Life scientists – Canada – History – 20th century. 5. Canada – Military policy – History – 20th century.
I. Title.

UG447.8.A94 2013 358'.3882097109045 C2012-908541-3

University of Toronto Press acknowledges the financial assistance to its publishing program of the Canada Council for the Arts and the Ontario Arts Council.



Canada Council
for the Arts

Conseil des Arts
du Canada



ONTARIO ARTS COUNCIL
CONSEIL DES ARTS DE L'ONTARIO

50 YEARS OF ONTARIO GOVERNMENT SUPPORT OF THE ARTS
50 ANS DE SOUTIEN DU GOUVERNEMENT DE L'ONTARIO AUX ARTS

University of Toronto Press acknowledges the financial support of the Government of Canada through the Canada Book Fund for its publishing activities.

This book has been published with the help of a grant from the Canadian Federation for the Humanities and Social Sciences, through the Awards to Scholarly Publications Program, using funds provided by the Social Sciences and Humanities Research Council of Canada.

PATHOGENS FOR WAR

Biological Weapons, Canadian Life Scientists, and North American Biodefence

Pathogens for War explores how Canada and its allies have attempted to deal with the threat of germ warfare, one of the most fearful weapons of mass destruction, since the Second World War. In addressing this subject, distinguished historian Donald Avery investigates the relationship between bioweapons, poison gas, and nuclear devices, as well as the connection between bioattacks and natural disease pandemics. Avery emphasizes the crucially important activities of Canadian biodefence scientists – beginning with Nobel Laureate Frederick Banting – at both the national level and through cooperative projects within the framework of an elaborate alliance system.

Delving into history through a rich collection of declassified documents, *Pathogens for War* also discusses the contemporary challenges of bioterrorism and disease pandemics from both national and international perspectives. As such, readers will not only learn about Canada's secret involvement with biological warfare, but will also gain new insights into current debates about the peril of bioweapons – one of today's greatest threats to world peace.

DONALD AVERY is an emeritus professor and adjunct research professor in the Department of History at Western University.

*For my four grandchildren – Brendon, Alexander, Olivia, Kaitlyn –
and their furry friend Zep.*

Acknowledgments

This book is the product of approximately twenty years of scholarly work in the fields of biodefence, public health, defence planning, and arms control/disarmament studies. While the focus of this study is Canada's response to the threat of biological weapons, terrorism, and disease epidemics since the Second World War, it also explores the broader dimensions of these themes within the prevailing international context. Of particular importance are the many dimensions of Canadian-American cooperation in dealing with disease as an instrument of war throughout the Second World War, the Cold War, and the more recent war on terror.

In preparing this study for publication I received assistance and support from many sources. I owe a special debt to my wife, Dr Irmgard Steinisch, who provided insightful but compassionate criticism as the manuscript gradually evolved. Scholarly assistance was also forthcoming from my three UWO colleagues Robert Murray, Grant McFadden, and Bhagirath Singh, who patiently explained the complexities of biological agents and disease outbreaks. Equally important were the insights of biodefence scholars John Ellis van Courtland Moon, Mark Wheelis, Brian Balmer, Julian Perry Robinson, and Malcolm Dando, who carefully assessed the author's contribution to the interdisciplinary project *Deadly Cultures: Biological Weapons since 1945* (Harvard University Press, 2006). Because of the nature of this subject, valuable information was often available only through personal reflections, and the author was fortunate in being able to conduct many quality interviews. High on the list of scientific confidants were Clement Laforce, Cam Boulet, Joan Armour, and Kent Harding of DRDC Suffield; Ronald St John, Frank Welsh, and

Marc-Andre Beaulieu of the Public Health Agency of Canada; and Frank Plummer, James Strong, and Yan Li of the National Microbiology Laboratory.

Readers will note that chapter 1 is partly based on sections of *The Science of War* (University of Toronto Press, 1998), while chapters 2 and 3 draw on some of the arguments developed in the author's article "The Canadian Biological Weapons Program and the Tripartite Alliance," in *Deadly Cultures* (2006). Another consideration is the quality and quantity of source material available in different sections of the book. For the first six chapters, most of the information has been drawn from diverse archival collections in Canada, the United States, and the United Kingdom. In contrast, chapter seven, with its focus on biodefence developments since 9/11, draws extensively on contemporary government reports, newspaper accounts, personal interviews, and secondary sources.

Over the years, my research has been facilitated by the staff of many archives and libraries. Within Canada, the following institutions provided special assistance: Library and Archives Canada (Ottawa); Connaught Medical Research Laboratories (Toronto); McGill University Archives; and Queen's University Archives. While the author consulted a number of US archival collections, the most important were located at the National Archives and Records Administration (College Park), the Archives of the American Microbiology Society (Baltimore), and the Archives of the National Academy of Sciences (Washington). Equally valuable were the government records and private papers housed at the National Archives of the United Kingdom (Kew) and the Archives of the North Atlantic Treaty Organization (Brussels).

The broad range of my research would not have been possible without the generous support I received from the Social Science and Humanities Research Council, the University of Western Ontario, the Department of National Defence, and a Hanna history of medicine grant. In addition, assistance in the publication of this book has been provided by the Social Science Federation's Aid to Scholarly Publication Program. I would also like to thank a number of people at the University of Toronto Press: Bill Harnum (retired) for providing the original contract; Len Husband, for shepherding the manuscript through its various stages; and Frances Mundy and James Leahy for their valuable editorial assistance. My grandson Brendon Avery / Quick also enhanced the book by preparing a fine index.

PATHOGENS FOR WAR

Biological Weapons, Canadian Life Scientists,
and North American Biodefence

Contents

Acknowledgments ix

Introduction 1

1 Canada's Role in Allied Biological Warfare Planning in the Second World War 14

2 Bioweapons in the Cold War: Scientific Research, Civil Defence, and International Controversy 56

3 Operational Biological Weapons and Alliance Cooperation, 1955–1969 90

4 Canada and BW Disarmament: National and International Developments, 1968–1975 119

5 Triple Threats: Biowarfare, Terrorism, and Pandemics, 1970–1985 147

6 Preventing Germ Warfare in the Age of the Biotechnology Revolution 179

7 Biodefence after 9/11: Old Problems and New Directions 213

Conclusion 245

List of Biological Agents and Toxins 259

Biographical Profile of Key Biowarfare Scientists 261

viii Contents

Notes 265

Glossary of Terms 379

Note on Sources 383

Primary Sources 387

Index 393

Illustrations follow page 212.

Introduction

Since the tragic events of the 1972 Munich Olympics, there have been fears that terrorist groups might exploit these high-profile international sporting events “to make a grandiose and symbolic statement with a potential for mass casualties.”¹ This was certainly the mindset of Canadian security officials in 1976 when they had to deal with the possibility that radical organizations would attack the Montreal Summer Olympics with chemical, biological, radiological, or nuclear weapons (CBRN).² Fortunately, this did not occur, but fears about such assaults resurfaced during the 1990s with the emergence of ever more ruthless terrorist organizations. This sense of vulnerability about the Olympic milieu was certainly evident in Atlanta (1996), Salt Lake City (2000), and Athens (2008), with more than 50,000 security personnel being involved in the latter event.³ Given this legacy, it is not surprising that organizers of the 2010 Vancouver Winter Games decided to implement elaborative counterterrorist measures while trying “to avoid the appearance of a ‘Fortress BC.’”⁴

Overall, they achieved their goals, and there were no CBRN incidents. But safeguarding the Vancouver Olympics challenged the capabilities of the Integrated Security Unit, composed of specialists from the Royal Canadian Mounted Police, the Canadian Security and Intelligence Agency, the Canadian Armed Forces, and local police forces. Of special importance were the secret BW monitoring activities of the special Microbiological Emergency Response team from the National Microbiology Laboratory, who maintained close contact with the BC Centre for Disease Control and military specialists at DRDC Suffield.⁵ The effectiveness of this integrated threat assessment was enhanced by the use of new CBW technology such as the Vital Point Biological Sentry System, which provided detection, alarm, and identification capabilities for upwards of

one kilometre, allowing its operators an opportunity to differentiate "between local background biological activity and threat activity in real time."⁶ In addition, timely assistance was provided by the US Department of Homeland Security, the Pentagon, and the Centers for Disease Control and Prevention.⁷ Yet despite these elaborate security measures, on 13 January the US State Department advised American sport fans travelling to Vancouver to be aware of the possibility of terrorist activity, given "Al-Qaeda's demonstrated capability to carry out sophisticated attacks."⁸

In reality, this warning was symptomatic of pervasive American concerns about the possibilities of terrorist WMD attacks, and particularly bioterrorism, since 9/11. In January 2010, for example, the United States Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism informed President Barack Obama that his administration deserved failing grades for its inability to provide a "rapid and effective response to bioterrorism."⁹ These deficiencies were deemed particularly serious since the Commission claimed "that a weapon of mass destruction (WMD) will be used in a terrorist attack somewhere in the world by the end of 2013 ... [and] that weapon is more likely to be biological than nuclear."¹⁰

Significantly, the US and Canadian governments were just recovering from another disease related crisis – the global outbreak of H1N1 influenza. Indeed, in June 2009, Dr Margaret Chan, Director General of the World Health Organization, had warned the international community that the Swine Flu pandemic could threaten the lives of millions of people around the world: "For five long years, outbreaks of highly pathogenic H5N1 avian influenza in poultry, and sporadic frequently fatal cases in humans, has conditioned the world to expect an influenza pandemic, and a highly lethal one ... [but] the new influenza A (H1N1) strain, has emerged from another source on another side of the world ... [which] spreads easily from person to person."¹¹

These warnings about mutating strains of influenza assumed a sinister new perspective in December 2011 when the US National Science Advisory Board on Biosecurity, a high-status oversight agency for high-risk scientific research, recommended that two controversial articles on Avian Influenza (H5N2) be substantially revised before publication.¹² Of special concern were several innovative experiments that suggested ways in which this deadly virus, with its 60 per cent fatality rate, could be genetically altered so that it "could potentially spread quickly among humans ... [establishing] a blueprint for the creation of a biological weapon."¹³ Significantly, even the usually restrained *New York Times* was so

concerned about these developments that it published a lead editorial entitled "An Engineered Doomsday."¹⁴

While these four incidents exemplify the types of challenges facing contemporary Canadian and American health security officials, these issues have a long historical legacy. Indeed, one of the major goals of *Pathogens for War: Biological Weapons, Canadian Life Scientists, and North American Biodefence* is to examine the impact of bioweapons, bioterrorism, and pandemics on the global community within the historical and contemporary context. More specifically, it seeks to explain how Canada has responded to the threat of disease as an instrument of war and terror, with special emphasis on the role life scientists have assumed in the country's biodefence strategies since the outbreak of the Second World War.

Adopting the Canadian perspective has a number of advantages. First, throughout these years Canada had a well-developed medical science research community, along with an evolving national health system, which by the 1970s had established medical coverage as one of the rights of citizenship. As a result, the country was able to withstand a series of major infectious disease outbreaks, such as the influenza pandemics of 1957 and 1968, while mobilizing resources for the national eradication of the twin scourges of smallpox and polio by the 1970s. Second, Canada maintained an active involvement in the military aspects of biological weapons during the Second World War and the Cold War, both in terms of its national research and testing programs, and through its ongoing cooperation with the United States and the United Kingdom in developing the offensive aspects of this weapon system.¹⁵ Third, since Canada was forced to deal with the threat of an enemy attack with weapons of mass destruction, civil defence planners developed extensive protective measures that included major biodefence programs, often in cooperation with their counterparts in the United States. Fourth, fear that enemy saboteurs or international terrorists might use biological weapons against Canada's urban centres is another theme that has a long legacy, even if some pundits believed the threat only emerged after the 9/11 terrorist attacks. And finally, despite Canada's important historical and contemporary role in responding to the threat of biological warfare and bioterrorism, this subject remains virtually unexplored in the scholarly literature, in part because of the tendency of Canadian military historians to ignore the subject and, in part, because of the veil of secrecy that has shrouded this aspect of the country's national defence and international relations.¹⁶

Despite its extensive use of government records, *Pathogens for War* is not a narrow institutional study. On the contrary, the main players in this longitudinal analysis of Canada's BW experiences are the defence scientists themselves, many of whom were prominent medical professionals, both in developing national biodefence strategies and in working with their counterparts in the United States and United Kingdom. This diverse group, numbering less than 150, consistently provided high-quality research and testing standards for Canada's own needs and in cooperation with its two major allies. By way of contrast, since 1941 the United States has employed thousands of BW scientists, with 1,800 being involved in BW research at Camp Detrick alone by the end of the Second World War.

Definitions and Conceptual Issues

Biological warfare can be defined as a form of warfare that uses living organisms and natural poisons (toxins) to produce death and debilitation in humans, animals, or plants.¹⁷ While biological weapons are often equated with nuclear and chemical weapons, in reality they are quite different since they are composed of or derived from organisms, which can replicate themselves inside the host, thereby allowing an attacker "to use a small amount of a biological weapon to inflict mass casualties."¹⁸ Another major difference is the diversity of pathogenic microorganisms and toxins that can be used as biological weapons, particularly given the enormous advances in the biosciences during the past forty years. As a result, there has been a major change in the concept of bioweapons, which traditionally meant "a warhead with massive quantities of refined agents that were specifically designed for instant and catastrophic release ... [while] now a biological weapon might be merely a test tube of pathogens that are capable of wide replication or a tiny device that can carry a pathogen through the body."¹⁹

While biological warfare was only integrated into the military strategy of nation states during the Second World War, it has a long historical legacy. Indeed, hostilities between states have always been accompanied by an increase in infectious diseases, because of intensified problems of sanitation, poor nourishment, overcrowding, and the carnage of the battlefield. Indeed, until the twentieth century, deaths from disease usually far exceeded the numbers of killed on the battlefield, a situation that encouraged rival armies to exploit disease outbreaks as part of their military operations. This was evident, for example, during the 1346 siege of

Caffa when the Mongol army catapulted thousands of plague-infected cadavers into the Genoese city, causing a serious outbreak of bubonic plague. Another widely cited example was the 1763 decision of the British commander Sir Jeffrey Amherst to distribute smallpox-infected blankets among a number of Native American tribes who had been involved with the so-called Pontiac Rebellion against European settlers in the Ohio Valley, apparently with devastating results, given their lack of immunity against this dreadful disease.²⁰

Yet despite these and other examples, biological warfare was not regarded as a serious threat by the Hague Conventions of 1899 and 1907, which attempted to establish civilized norms for the conduct of war. Nor did germ warfare occur on European battlefields during the First World War, although German agents engaged in a crude form of veterinary BW when they attempted to use anthrax and glanders against American war horses destined for the western front. Yet according to microbiologist Mark Wheelis, this German activity did establish an important precedent since it was “(a) the first national programme of offensive biological warfare; (b) the first biological warfare programme of any kind with a scientific foundation ... [and] was directed against neutrals not belligerents, and targeted animals not humans.”²¹

Several factors about the strategic and tactical use of biological weapons should be considered.²² Above all is the advantage of achieving surprise through covert first use, since BW agents are very difficult to detect because of their physical properties and the similarity of symptoms with natural disease infections. Another argument in favour of using biological weapons is as a “force multiplier” within the context of a conventional war, as well as a follow-up device after a nuclear exchange, when the enemy’s health care services would be in disarray. Recently, there has been considerable discussion about the possibility that terrorist groups might use bioweapons to attack urban targets, given the relative ease of acquiring BW devices and the capability of causing high casualties. While all of these scenarios are a source of concern, the historical reality is that unlike chemical and nuclear weapons, biological weapons have not been used in a major war. This, of course, could change as ever more deadly biological weapons are created through genetic engineering and genomic synthesis.²³

Research in the life sciences has greatly influenced the development of biological and toxin weapons. This trend has been particularly pronounced since the late 1960s when scientists in Western countries and the Soviet Union were able to utilize new research techniques associated

with recombinant DNA techniques and gene replication.²⁴ As one commentator observed in 1968, “We are now, though we only dimly realize the fact, in the opening stages of the Biological Revolution – a twentieth century revolution, which will affect human life far more profound than the great Mechanical Revolution of the nineteenth century or the Technological Revolution through which we are now passing.”²⁵ Moreover, since the 1970s accelerated advances in the life sciences have influenced the development of new bioweapons and the biodefence technologies to deal with these new pathogens and toxins.²⁶ In many ways, this virtual explosion in biotechnology research has been one of the defining characteristics of modern society, as scientists moved “to the frontier where the outer edges of genetics, biochemistry, and microbiology were merging alongside a flood of new technologies, such as electron microscopy, crystallography, cell culture, and virology ... and steeply rising capabilities for information storage and analysis.”²⁷

Popular and Scholarly Depictions of Biological Warfare and Disease Pandemics

The image of biological warfare has often been equated with the terrible disease outbreaks of the past, notably the Black Death (bubonic plague), the scourge of smallpox (*variola major*), and the 1918 Spanish influenza pandemic, which killed over 50 million people globally. In addition, all these pathogens have been considered as biowarfare agents, along with other deadly diseases such as cholera, typhus, tularaemia, and, above all, anthrax. While *Bacillus anthracis* has not been responsible for global pandemics, the bacterium has certain qualities that make it an ideal biological weapon: its high lethality, its ease of production, its contained application, and its ability to develop a protective spore covering which “could last and penetrate where no bacillus could survive, producing new germs where the conditions were right.”²⁸ Similar arguments have been made for using *Botulium* toxin, an extreme poison, which often became the second most common BW agent in national arsenals

Protecting the military and civilian population against bioagents and infectious disease outbreaks was closely associated with the development of vaccines and antibiotics / antivirals. Indeed, it is often argued that the advent of the antibiotic era began during the 1940s with the discovery of penicillin and related drugs. These developments appeared to usher in a new era of public health whereby infectious disease outbreaks could be prevented and many pathogens eradicated. This did not happen. While

international public health officials enjoyed considerable success in virtually eliminating the twin scourges of smallpox and polio, its record against other pathogens, notably malaria and tuberculosis, has been disappointing. Even worse, emerging infectious diseases such as HIV/AIDS, which began its global rampage during the 1980s, have killed tens of millions of people during the past thirty years. These ominous trends have continued during the first decade of the twenty-first century when pathogens such as severe acute respiratory syndrome (SARS), and avian / swine influenza threatened the global community.

There is a vast body of scholarly literature on the above subjects. Of particular value are Charles Rosenberg's analysis of epidemics, both past and present trends, and the sweeping study by Paul de Kruif of the great microbe hunters of the nineteenth century.²⁹ Equally important are studies on the social impact of disease outbreaks such as the nineteenth-century cholera epidemics, the influenza pandemics of the twentieth century, and the AIDS/HIV saga.³⁰ Closely related are the descriptive accounts written by medical practitioners of their personal involvement in international and national campaigns to eradicate smallpox, polio, malaria, and tuberculosis.³¹ And finally some authors have attempted to explain how disease has influenced global power relationships, as exemplified by Jared Diamond's Pulitzer prize-winning book *Guns, Germs and Steel: The Fates of Human Societies*. As part of his analysis Diamond points out that one of the major reasons why European powers could conquer the Americas was their ability to export "all of history's most lethal killers: smallpox, measles, influenza, plague, tuberculosis, typhus, cholera, malaria and others."³²

In contrast with the large number of publications on natural outbreaks of infectious diseases, there are relatively few scholarly works dealing with biological warfare. Moreover, while much of the earlier work focused almost exclusively on the military dimensions of the subject, during the past twenty years the literature has become increasingly sophisticated and multi-disciplinary.³³ Another major change has been the growing appreciation that germ warfare, while it shares certain characteristics with chemical warfare, has many unique characteristics in terms of tactical use and casualty-causing potential.³⁴ Significantly, during the 1990s there was growing awareness about the formidable killing power of bioweapons, in part because of the biotechnology revolution and, in part, because of the proven ability of the Soviet Union to develop more sophisticated BW munitions and delivery systems.³⁵ These concerns were reinforced by the appearance of a number of memoirs by