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Proving Ground: Alberta's Role in U.S. Health Policy for Soldiers and School Children at Mid-Twentieth Century

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In the mid-twentieth century, Americans turned to Alberta as a proving ground to help save the lives of North American soldiers and children. To American researchers and government officials, the province provided ideal conditions for military and civilian field trials with human subjects. During World War II, American officials worked closely with their Canadian counterparts to learn from mustard gas tests conducted on more than 2000 soldiers at the Suffield Experimental Station in southern Alberta. These human experiments were part of Allied preparation for potential chemical warfare in the 1940s. A decade later, American scientists and leaders of a private medical foundation invited Alberta health officials to enroll school children in a massive clinical trial of the Salk poliomyelitis vaccine. The testing of over one million children, including thousands in Alberta, was part of the battle against polio in the 1950s. As these two historical case studies demonstrate, American officials were eager to learn what health science research in Alberta could contribute to U.S. policy in times of crisis.

This paper draws on an historical approach to analyze why data generated in Alberta was particularly useful to American policymakers. It explores the political meanings and health consequences of the testing of soldiers and school children in this province. Alberta's contributions to American medical and defense research occurred within the context of a cooperative, yet asymmetric, relationship between Canada and the United States. The longstanding imbalance of power between the two countires has led some historians to identify the nations as "ambivalent allies," especially after 1960.[1] Yet, the mustard gas experiments of the 1940s and the polio vaccine trials of the 1950s reveal a nation and a province that was far from ambivalent, but readily embraced opportunities for collaborative scientific research and testing. Canadian and Alberta officials were

eager to cooperate with the U.S. because they saw such international activity as in the interests of Canadians. Yet, Alberta's contribution to the achievement of U.S. policy goals was not without peril. The province's involvement in field trials designed to defend and protect soldiers and children enhanced, as well as alleviated, risks to human health.

Soldiers and Mustard Gas

During World War II, Alberta contributed to the shape of U.S. policy through its role in defense research at the Suffield Experimental Station. Opened in 1941, the facility specialized in chemical weapons research. The Canadian and British governments jointly financed the station and the province leased the 2600 square kilometers of land for one dollar per year for ninety-nine years.[2] The military organized Suffield into two camps: Camp A held the experimental laboratories and Camp B was the quarters for the military personnel who "volunteered" to serve as human subjects for the mustard gas experiments. There was also a hospital where nurses treated the injuries to soldiers used in the tests. [3]

The experiments in Alberta took place within a transnational program of Allied research in chemical warfare.[4] In light of the terrifying and deadly gas warfare used on the battlefields of World War I, scientists in the United States, Canada, Britain, and Australia resumed their interest in the toxicology of mustard gas.[5] They conducted experiments on at least 60,000 soldiers in the U.S., thousands of soldiers at Porton Down in England, 3000 Australian soldiers in Queensland, and over 2000 Canadian soldiers at Suffield.[6]

The Allied governments conducted experiments at centers like Suffield for both defensive and offensive purposes: to learn how to best protect Allied soldiers from potential gas attack and how to create casualties and disable the enemy.[7] For example, scientists conducted mustard gas testing to evaluate the quality of protective clothing, ointments, and respirators (or gas masks). There were three types of mustard gas programs. The first type was the drop test and patch test in which scientists applied a small amount of mustard agent to bare skin or to skin partially covered with an ointment to examine its protective properties. The second type was the field test in which low flying airplanes sprayed soldiers with mustard gas while they were wearing various levels of protective clothing. Finally, in the third type of test, known as the "man-break test," scientists placed men in gas chambers and released mustard gas in order to determine how long it took before the men were incapacitated.[8]

Americans were interested in the results of the mustard gas experiments on soldiers at Suffield for two key reasons: research opportunities provided by Alberta's geography and the Canadian military's willingness to conduct open-air field tests. The province's sparsely inhabited, dry prairie land near Medicine Hat provided an ideal location to reproduce combat conditions in a very large test site.[9] Furthermore, in 1942 Suffield officials created new rules to expand experiments beyond mere arm tests to full-body exposure, likely at the request of the British military. Until 1944, it appears that the Canadian military had fewer restrictions on human experimentation than the U.S. military.[10]

Indeed, the research on chemical weapons at Suffield turned Alberta into Canada's version of the U.S. Atomic West, a place known for such resources as the

Nevada test site for nuclear weapons. When it came to Allied chemical weapons research and development, the Suffield Experimental Station was a world class institution.

The health studies at Suffield were all about science in the service of alliance warfare. Americans received access to information about the Canadian research conducted at Suffield within the context of Allied efforts to upgrade older military technologies and investigate the casualty-causing properties of chemical weapons.[11] In 1940 the United States, Canada, and Britain negotiated an agreement to share chemical weapons information. The U.S. Chemical Warfare Service sent materials, including mustard gas, and an American representative to Suffield. Meanwhile, Suffield's researchers met with scientists at several American universities, including the University of Chicago. They also coordinated efforts with the staff at Dugway Proving Ground, located in Utah, creating a close collaborative relationship with that facility that continues to this day.[12]

Weapons development, which was so clearly focused on meeting military needs to defend Allied nations, nonetheless produced health consequences that harmed their own citizens. Indeed, the mustard gas experiments raise troubling questions about the disregard for medical ethics in times of war. According to the chief of Canada's Chemical Warfare Laboratories at the time, wartime conditions justified risking the health of a few soldiers to save the lives of many.[13]

What were the health consequences of the mustard gas experiments? Mustard gas exposure caused a wide range of injuries for the young men who became the research subjects. Some of the soldiers experienced immediate and severe eye injuries and damage to lungs. Most frequently, men had burns and blistering on the skin, especially

on the face, hands, underarms, buttocks, and genitals. They were sometimes in agony for days, weeks, and even months from the enormous blisters and oozing sores. There were also long-term health consequences, such as cancer, asthma, emphysema, and blindness. In this sense, for some men the experiment never ended.[14]

Military and scientific interests, coupled with a hierarchical system in which soldiers were encouraged or ordered to "volunteer," made these appalling experiments possible. Soldiers also participated in the tests out of patriotism, boredom, and the promise of extra pay and special leave privileges.[15] Regardless of motivation, most of the veterans have insisted that they had been given no warning of the level of suffering that they would face.

Over the past twenty years, former soldiers who served at Suffield have spoken publicly about the effects of full-body exposure to mustard gas in open-air field tests and gas chamber tests. In the case of the field tests, in which soldiers were sprayed by airplanes, one Canadian soldier remembered a bluish rain dropping on him and other men. "They didn't tell us what it was or to put on respirators. They said they were just testing our uniforms," Norman Amundson recalled. As a result of the test, his lungs and lower body were burned by the gas. John Dickson, a 19-year-old Canadian soldier sent to Suffield, was one of six men put into a windowless bunkhouse or chamber that was then filled with mustard gas. He explained that within one hour two of the men were unconscious. The researchers finally took all of the men out once everyone had lost consciousness. Dickson recalled that they placed him in the Suffield hospital where he saw about seventy other burned soldiers.[16]

Injuries from mustard gas exposure not only contributed to short term and long term health problems, but also personal humiliation. Veterans remembered that as young men it was especially embarrassing to have their burns treated by the young nurses. Enormous, grotesque blisters developed, especially in the armpits and on the genitals, and healing took a very long time. One nurse who worked at Suffield hospital recalled, "As soon as one blister broke and ran, underneath was another blister." Dickson, who ended up blind in one eye, looks back on his experience with deep regret: "We got into this mess . . . because we did everything they said. We thought we were fighting for the country, but it was a useless scam. I don't know how human beings could do that and take a new bunch of men every two months and put them through that type of torture." [17]

How could this happen? Canadian officials at both the provincial and national level were eager to collaborate with the United States in chemical weapons research because such activities provided enhanced status for a nation eager to assert its sovereignty and construct its own policy separate from Britain.[18] Thus, Canada readily shared its resources, including scientific expertise and military technology, with Americans in the battle against evil enemies. At one point, Canadian officials even offered to send some of its own soldiers to the U.S. to participate in American mustard gas tests because more extensive field tests could be conducted on the men given the Canadian military's more lax rules regarding human experimentation.[19] Clearly, Canada was willing to go to great lengths to ensure that it remained a key player in the Allied war effort.

Children and Polio

A decade later, Americans and Canadians waged a different type of war, this time against the contagious viral disease polio. Polio was a particularly fearsome disease, since it primarily affected children and frequently resulted in permanent paralysis or death. In response, President Franklin D. Roosevelt and his associates formed the National Foundation for Infantile Paralysis (March of Dimes) in 1938 to fund polio medical treatment and research.[20] By 1953, the Foundation's patronage of medical science led to a significant breakthrough when Dr. Jonas Salk and his associate Dr. Julius Youngner developed an effective polio vaccine.[21] To test the efficacy of the new vaccine, the Foundation in 1954 organized one of the largest vaccine field trials in American history involving 1.3 million children across 45 states.[22] Although locations outside of the United States were not initially considered, the Foundation eventually extended an offer for Canadian participation.[23] Canadian federal officials approved of the trial, but the ultimate decision to accept participation lay with each province.[24] On May 19, 1954, Alberta's Health Minister announced that he welcomed Alberta's inclusion in the study, making it the first province in Canada to officially accept the American offer and the only Canadian locality to have province-wide participation.[25]

Conducting the Alberta field trial proved to be a massive undertaking requiring provincial health authorities to distribute parental request forms, train medical staff, ship delicate vaccine, test blood samples, and coordinate efforts with the Vaccine Evaluation Center in Michigan. By managing such a challenging project, Alberta public health officials considered the field trial a rare opportunity to gain credibility and justify to the politicians and to the public prior expenditures in laboratories and staff.[26]

Alberta politicians also actively sought provincial participation in the trial to maintain a commitment to polio care and to increase their popularity.[27] Earlier, in 1938, the governing Social Credit Party had implemented the "Polio Sufferers Act," which paid the majority of expenses associated with the management of polio cases.[28] Alberta was the only province to institutionalize government-funded polio treatment and after-care, resulting in major recurring costs and considerable criticism from opposition parties.[29] Therefore, participation in the field trial not only reinforced politicians' commitment to the fight against polio but also promised them an expedient financial solution, since escalating treatment costs could be brought under control if the vaccine proved effective.

In turn, polio Foundation officials were attracted to Alberta due to its population's recurring polio epidemics. As polio typically had a low incidence, the inclusion of high-incidence populations for study was desirable for statistical reasons.[30] The years 1952 and 1953 were among the worst polio years in Alberta, exceeding the per capita incidence of many U.S. locations.[31] For instance, according to Royal Alexandra Hospital (RAH) physician Dr. Russell Taylor the "impact on the community [of Edmonton] was enormous." As Taylor recounted: "one day in late November 1953 there was a total of fifty-five [polio] patients in the [RAH] Isolation Hospital, thirty-three of them on respirators attended by eighty-five nurses, and eight doctors!"[32] The inclusion of Alberta, therefore, allowed the Vaccine Evaluation Center to obtain more data and thereby increase the statistical validity of the final report.

Foundation officials were also drawn to Alberta because of its sophisticated scientific research facilities and its prior experience with field trials. In fact, health officials had cooperated with the Foundation on earlier polio health projects, such as the

1952 gamma globulin (GG) trial on children.[33] Furthermore, the Alberta Health Department employed its own virologist who expressed a willingness to carry out special studies on the vaccine.[34] It became evident to Foundation officials that Alberta was not only going to be a suitable proving ground for the Salk vaccine, but also an eager collaborator in ongoing viral research.

The extension of the trial from the United States into Alberta reveals important aspects of U.S.-Alberta relations. In 1954, the United States had limited regulations concerning vaccines and pharmaceutical field trials. For instance, although the *Food, Drug, and Cosmetic Act* of 1938 stipulated that drugs had to be proven safe before use, the regulatory body that was assigned to enforce this act, the Food and Drug Administration (FDA), had lost its progressive spirit and activism.[35] In addition, the *Biologics Control Act* of 1902 had been designed to prevent the *sale* of untested drugs but not their *distribution*. Since the vaccine used in the study was provided at no cost to the recipients, the federal Division of Biologics Control had no authority to prevent the trial from proceeding.[36] Canadian and provincial authorities assumed that U.S. safety regulations were sufficient and therefore did not press for legal assurances or insist that the Canadian Food and Drug Directorate test the imported vaccine.[37] U.S. domestic health policy and the power of a private philanthropy allowed the polio vaccine experiment to gain momentum, which in turn influenced the perceptions of Albertans in favor of the trial.

Like the mustard gas experiments, the polio Foundation's field trial in Alberta also raises troubling questions about medical ethics. Safety of the vaccine, although monitored through triplicate testing, was never guaranteed by the Foundation.[38] Aware

of this tenuous situation, Foundation officials created participation forms that required parents to *request* their children's participation instead of *consent* to participation.[39] By requesting participation, parents were accepting the risks without sufficient information.[40] A later incident would show that there were legitimate reasons for concern, since a year after the trial an improperly produced Salk vaccine resulted in 164 cases of paralysis and 10 deaths.[41] Consequently, Alberta children were knowingly put at risk by the Foundation in order to facilitate their clinical study. Evidence also suggests that the polio trial in Alberta had long-term health risks. In June 1959, Dr. Bernice Eddy at the American Division of Biologics Control discovered that the Salk polio vaccine contained a previously undetected simian virus (SV-40), which was shown to be carcinogenic.[42] Alberta children, who were injected with the experimental vaccine, may have been exposed to a biological agent, which could potentially increase their risk of cancer.

The Alberta government and the Foundation cooperated on the Salk field trial because it fulfilled their respective financial, political, and research objectives. The polio Foundation was pleased to accept Alberta, a northern test site with suitable research facilities, personnel experienced in conducting field trials, and a population inundated with polio. Meanwhile, Alberta health officials eagerly sought to test the vaccine on children in the province because they considered the trial to be an opportunity to evaluate a vaccine, increase their prestige, and justify prior research expenditures. Likewise, Alberta politicians remained fixed on the field trial as part of a continuing policy commitment and a future means to control treatment expenses. Lax U.S. federal regulations and underdeveloped regulatory agencies enabled the Foundation to progress

with the field trial and ship an experimental vaccine. Parents were willing to sign the field trial request forms, since they were not made fully aware of the dangers involved.

Concerns with informed consent and health consequences of pediatric field trials persist to this day. In fact, according to the *Boston Globe* there exist "relaxed rules . . . surrounding the booming industry of experimentation on children."[43] As a result, children in the United States and Canada could face serious heath risks by participating in pharmaceutical trials. For instance, the *New York Times* recently reported that pediatric trials for a new antibiotic should be stopped because the FDA has found it to be deadly in certain circumstances. The FDA's Dr. Johann-Liang cautioned parents that "the long-term consequences . . . are unknown for the developing [immune] system."[44] Consequently, testing pediatric pharmaceuticals remain fraught with ethical concerns and health consequences.

Meanwhile, defense research and development continues in Alberta, which remains home to one of the largest chemical and biological weapons research facilities in North America.[45] In the late 1960s and 1980s, peace activists, led by women's groups in the province, called for an end to Canada's participation in weapons testing at Suffield, but to no avail.[46] However, in 1988 the Alberta Minister of the Environment responded to the activists' concerns by stating that the Government of Alberta had requested and received a promise that it would be given prior notice of any tests conducted at Suffield from then on.[47] Still this reassurance included no requirement of prior notice for residents of the province.

Furthermore, a national dilemma remained. As Joe Clark, then Secretary of State for External Affairs, observed in a letter to an Edmonton peace activist that same year:

"One of the questions for Canada is the degree to which we prepare to defend ourselves against weapons we are trying to eliminate." In Clark's view, "The security of our citizens demands that we make some preparation."[48] Hence, Canada has remained committed to working with the United States, as well as Britain and NATO, to conduct "defensive" research on chemical and biological weapons, that is, weapons of mass destruction. Alberta's role as a proving ground has continued, and no doubt expanded, in the current climate of war, raising renewed concerns about who is monitoring the impact of weapons testing on human health and environmental safety in the province, and beyond.

As these historical case studies demonstrate, health issues provide important insights into Alberta's connection to U.S. policy in its various permutations, including from within private foundations and the American military. Repeatedly, governments have conducted health science research and human testing in the name of defense: to provide protection and preserve life. In the case of polio, the participation of Alberta's children in the American field trials probably proved to be a risk worth taking, although that was not guaranteed at the time. However, American and Canadian chemical weapons research leaves a different legacy in Alberta. Causing harm to human health was not merely an unintended consequence of the mustard gas tests but the very point of the research program.[49]

[1] John Herd Thompson and Stephen J. Randall, *Canada and the United States: Ambivalent Allies*, Third Edition (Athens, Georgia: University of Georgia Press, 2002), 2, 7.

[2] Britain was eager for a large testing site because it no longer had access to French-controlled land in Algeria after Germany occupied France. John Bryden, *Deadly Allies: Canada's Secret War, 1937-1947* (Toronto: McClelland & Stewart, 1989), 61-62; Donald Avery, *The Science of War: Canadian Scientists and Allied Military Technology During the Second World War* (Toronto: University of Toronto Press, 1998), 3-13, 130-131; Environment Canada, "Suffield: History and Status: Land Expropriation for Military Research," last updated 15 February 2005, http://www.mb.ec.gc.ca/nature/whp/nwa/suffield/dd02s02.en.html#use, accessed 11 November 2006.

[3] Brigham Young Card, "Suffield Experimental Station (1941-1945)—Strategic Centre in 'Canada's Secret War,'" unpublished four-page essay written for Remembrance Day for the *Lethbridge Herald*, 15 October 2004, author's possession, courtesy of Brigham Young Card via Robert Lampard.

[4] Karen Freeman, "The Unfought Chemical War," *The Bulletin of Atomic Scientists*, v. 47 (December 1991): 30-39.

[5] There was an international agreement on gas warfare. According to Donald Avery, "the June 1925 Geneva Protocal, held under the auspices of the League of Nations, . . . banned the offensive, or first, use of chemical and biological weapons, and was signed by thirty-eight countries including . . . Canada." However, it was "a 'no-first-use' treaty in which every nation retained the right to use chemical weapons in a defensive or retaliatory situation." The U.S. signed the treaty but the Senate did not ratify it. Avery, *The Science of War*, first quote p. 16, second quote p. 122.

[6] The British also conducted some of their experiments in India and New Guinea. Bryden, *Deadly Allies*, 173; Freeman, "The Unfought Chemical War," 30-39; Constance Pechura and David P. Rall, eds. *Veterans at Risk: The Health Effects of Mustard Gas and Lewisite* (Washington, D.C.: National Academy Press, 1993), v; Bridget Goodwin, *Keen as Mustard: Britain's Horrific Chemic Warfare Experiments in Australia* (Queensland, Australia: University of Queensland Press, 1998); Rob Evans, *Gassed: A History of British Chemical Warfare Experiments on Humans* (London: House of Stratus, 2000).

[7] Freeman, "The Unfought Chemical War," 30-39. According to Donald Avery, "Using chemical weapons in retaliation against a German or Japanese attack had been official allied policy since the spring of 1942." Avery, *The Science of War*, 144.

[8] Freeman, "The Unfought Chemical War."

[9] Diana Chown, "Suffield, Chemical, Biological Warfare, and Canadian/U.S. Relations," *Peace Magazine*, February/March 1989: 12-14, Accession number 94.230, box 1, Provincial Archives of Alberta, Edmonton; Bryden, *Deadly Allies*, 61, 168.

[10] Bryden, *Deadly Allies*, 169, 171, 174. The 1947 Nuremberg Code established international ethical standards for research on humans, although the extent to which researchers implemented them in the following years remains the subject of much

scholarly investigation. Jonathan D. Moreno, *Undue Risk: Secret State Experiments on Humans* (N.Y.: Routledge, 2001), 53-85.
[11] Avery, *The Science of War*, 10-12, 122-150.
[12] Avery, *The Science of War*, 128-142, 150.
[13] Bryden, *Deadly Allies*, 176.
[14] Pechura and Rall, *Veterans at Risk*, 4-5, 64-65; *Secret War: Odyssey of Suffield Volunteers*. Insight Film and Video Productions, 2001.
[15] Bryden, *Deadly Allies*, 168.
[16] Brian Hauk, "In WWII, Canadian Army Used Soldiers as Guinea Pigs for Chemical Weapons," *Vancouver Sun*, 19 November 2002.
[17] Hauk, "In WWII, Canadian Army Used Soldiers as Guinea Pigs for Chemical Weapons." See also Bryden, *Deadly Allies*, 166, 173.
[18] Thompson and Randall, *Canada and the United States*, 6-7.
[19] Bryden, *Deadly Allies*, 174.
[20] Victor Cohn, *Four Billion Dimes* (Minneapolis: Minneapolis Star and Tribune, 1955), p. 55.
[21] David M. Oshinsky, *Polio: An American Story* (New York: Oxford University Press, 2005), pp. 92-128.
[22] For number of states see Allan M. Brandt "Polio, Politics, Publicity, and Duplicity: Ethical Aspects in the Development of the Salk Vaccine," *International Journal of Health Services*, 8, 2 (1978), p. 264. Approximately 600,000 children in the U.S., Canada, and Finland were injected with placebo or vaccine. The remainder served as observed controls; for more information, see David Oshinsky, *Polio: An American Story*, p. 200. For information about the important role of Dr. Julius Younger in the Salk vaccine, see Ibid., pp. 175, 205-206.
[23] The Foundation extended the offer for Canadian participation to Dr. Robert Defries of Toronto's Connaught Laboratories. Defries relayed this offer to the Deputy Minister of the Department of Health and Welfare, Dr. G. D. W. Cameron, who in turn notified each province. See Christopher Rutty, *Do Something, Do Anything* (PhD thesis, University of Toronto, 1995) p. 333. For information on the role of Connaught Laboratories, see Ibid., pp. 314, 315, 317.
[24] This is based on section 92, sub-section 7 in which provinces are responsible for: "The Establishment, Maintenance, and Management of Hospitals, Asylums, Charities, and Eleemosynary Institutions in and for the Province, other than Marine Hospitals." For more information about the *Constitution Act of 1867*, see <http://laws.justice.gc.ca/en/const/c1867_e.html> (last accessed: Sep. 4, 2006). This was also addressed by Cameron, who stated to the NFIP's Dr. Foard McGinnis: "As I explained to you, decisions in regard to this rest entirely with the provinces since under our constitution health is primarily their concern." See March of Dimes Archives (henceforth denoted as MODA), Government Relations (Foreign) Records, Box 1, Series 1: Country Files, "Canada: Polio vaccine field trial, 1954", Letter, May 20, 1954, From National Health and Welfare, G.D.W. Cameron, M.D., D.P.H., Deputy Minister of National Health to Dr. G. Foard McGinnis, Director, NFIP.
[25] Dr. W. W. Cross consulted Dr. Robert Defries before he made this announcement. See "City Children to Share Test On Polio Vaccine," *Edmonton Journal*, May 19, 1954, p. 1.

It is also important to note that Alberta was not the only Canadian locale to participate. Halifax, Nova Scotia also accepted on May 21 with 5,559 children, followed by Winnipeg on June 3 with 11,081 children. For more information on these other locations, see Rutty, *Do Something, Do Anything*, pp. 332, 333. In addition, there is some debate as to the number of students in Alberta who participated. According to Rutty, *Do Something, Do Anything*, p. 334, 37,406 children in Alberta participated. However, according to NFIP records, 20,000 children were injected with placebo or vaccine out of a total of 30,753 participating students. Regardless on the specific number, Alberta had by far the largest level of participation. Other provinces declined to participate either because they were not prepared or because "the amount [of vaccine] was not large enough to make a thorough test of vaccine effectiveness." For more on this latter claim, see "20,000 Alberta Children Slated For Polio Tests," *Edmonton Journal*, May 26, 1954, p. 17.

[26] There were significant expenses related to hospital management. See "Changes At 'Royal Alex' Add To Operating Costs," *Edmonton Journal*, May 29, 1954, p. 5. In addition, Alberta had employed a full time virologist, Dr. C. R. Amies.

[27] For Alberta's longstanding interest in polio, see Rutty, *Do Something, Do Anything*, p. 130.

[28] Rutty, *Do Something, Do Anything*, p. 130. It should also be noted that Alberta as early as 1927 began to show concern for polio patients. In 1927, provincial authorities built the "Provincial Special Hospital for Infantile Paralysis" in Edmonton with treatment given "at cost." Ibid., p. 82.

[29] Rutty, *Do Something, Do Anything*, p. 83.

[30] MODA, Government Relations (Foreign) Records, Box 1, Series 1: Country Files, "Canada: Polio vaccine field trial, 1954", Memorandum, May 20, 1954, Re: Vaccine Field Trial – Canada, From Dr. Thomas D. Dublin to Dr. Hart E. Van Riper.

[31] Alberta had a higher incidence of polio based on a comparison of Rutty, *Do Something, Do Anything*, pp. 396-397 and Oshinsky, *Polio: An American Story*, p. 81.

[32] Russell Frederick Taylor, *Polio '53* (Edmonton: University of Alberta Press, 1990), p. 16.

[33] Rutty, *Do Something, Do Anything*, pp. 236, 328.

[34] MODA, Government Relations (Foreign) Records, Box 1, Series 1: Country Files, "Canada: Polio vaccine field trial, 1954," Letter, May 25, 1954, From Thomas Francis, Director, Evaluation Program, University of Michigan to Dr. C. R. Amies, Laboratory Division, Provincial Health Department, Edmonton. See also MODA, Government Relations (Foreign) Records, Box 1, Series 1: Country Files, "Canada: Polio vaccine field trial, 1954." Memorandum, May 20, 1954. RE: Vaccine Field Trial – Canada, From Dr. Thomas D. Dublin to Dr. Hart E. Van Riper, NFIP.

[35] According to Allan Brandt, the Government Accounting Office would later attack the FDA for their lax regulations and drug testing. See Brandt, *Journal of Health Services*, pp. 268-269.

[36] For a discussion of the laissez-faire policies of the Eisenhower administration see Debbie Bookchin and Jim Schumacher, *The Virus and the Vaccine: The True Story of a Cancer-Causing Monkey Virus, Contaminated Polio Vaccine, and the Millions of Americans Exposed* (New York: St. Martin's Press, 2004), p. 38; Offit, *The Cutter*

Incident, p. 48. For a discussion of the Food and Drug Administration and the *Food, Drug, and Cosmetic Act* of 1938, see Brandt, *Journal of Health Services*, p. 261, 268, 269. For a discussion of the *Biologics Control Act* of 1902 and the Division of Biologics Control, see Offit, *The Cutter Incident*, pp. 48, 59; Bookchin and Schumacher, *The Virus and the Vaccine*, p. 38; Brandt, *Journal of Health Services*, p. 261. According to Paul Offit, Biologics Control was included in the field trial "because it would eventually be responsible for licensing the vaccine." It was therefore useful to for the Foundation to include Biologics Control early on so that they could quickly approve its distribution once the field trial was over. In addition, the Foundation exploited the division of responsibility and lax enforcement by cooperating with the legislatively weaker federal Biologics Control, since it could not threaten the field trial's momentum.

[37] Evidence indicates that the Canadian Government was content with verbal assurances from Foundation officials without conducting their own tests or investigation. See Government Relations (Foreign) Records, Box 1, Series 1: Country Files, "Canada: Polio vaccine field trial, 1954", Letter, May 20, 1954, From National Health and Welfare, G.D.W. Cameron, M.D., D.P.H., Deputy Minister of National Health to Dr. G. Ford McGinnis, Director, NFIP.

[38] Bookchin and Schumacher, *The Virus and the Vaccine*, pp. 35, 36; Offit, *The Cutter Incident*, pp. 113, 118.

[39] Jeffrey Kluger, *Splendid Solution: Jonas Salk and the Conquest of Polio* (New York: G.P. Putnam's Sons, 2004), p. 251. See also Jane S. Smith, *Patenting the Sun: Polio and the Salk Vaccine* (New York: William Morrow & Company, Inc., 1990), p. 237.

[40] David Oshinsky, *Polio: An American Story*, p. 191.

[41] Paul A. Offit, *The Cutter Incident: How America's First Polio Vaccine Led to the Growing Vaccine Crisis* (New Haven: Yale University Press, 2005), p. 89.

[42] Shorter, *The Health Century* (New York: Doubleday, 1987), pp. 196, 197, 199, 201, 203; Bookchin and Schumacher, *The Virus and the Vaccine*, pp. 60-70. There is some debate on this issue. According to Shorter there is no evidence that SV-40 has caused cases of cancer in humans but according to Bookchin there is a clear correlation to certain human cancers and SV-40.

[43] Sonia Shah, "Testing drugs on prisoners: The easy out," *The Boston Globe*, August 17, 2006; "Study Finds a Widespread Risk Of Reactions to Some Medicines," *New York Times*, Oct. 18, 2006, p. A 15.

[44] Gardiner Harris, "Halt Is Urged for Trials Of Antibiotic in Children," *New York Times*, Jun 8, 2006, p. A 16.

[45] The website of Defense Research and Development Canada – Suffield indicates the military is developing a new type of exposure chamber for "research and validation studies involving protection of military and first responder personnel against highly toxic substances." The chamber will test " 'realistic' chemical and biological agent simulants" on "a life-size, anthropometrically correct, articulated mannequin test platform and separate head-form." Defense R & D Canada Suffield, "Chemical/Biological (CB Plus) Exposure Chamber Facility," 21 February 2005, http://www.suffield.drdc-rddc.gc.ca/Facilities/CB/FS2004_01_CBPLUS/index_e.html, accessed 12 November 2006.

[46] The women's peace groups were very explicit in their critique of Canada's willingness to accommodate the needs of U.S. military policy. Diana Chown, "A Deadly Brew: Chemical and Biological Warfare Research In Alberta," *The Newsmagazine*, September/October 1987: 24-29; and Chown, "Suffield, Chemical, Biological Warfare, and Canadian/U.S. Relations."

[47] Ian C. Reid, Minister of Environment, Alberta Legislature, to Joyce Sorochan for Project Ploughshares Edmonton, 16 September 1988, Accession number 94.230, box 1, Provincial Archives of Alberta, Edmonton.

[48] Joe Clark to Joyce Sorochan, 22 August 1988, Accession number 94.230, box 1, Provincial Archives of Alberta, Edmonton.

[49] Bryden, *Deadly Allies*, 168. Veterans in the United States and Canada, as well as Britain and Australia, have waged political battles with their governments to gain public recognition for their service and suffering in the wartime experiments. Governments began to respond, if slowly. For example, in 2000 then Canadian Defense Minister Art Eggleton acknowledged that soldiers had been subjected to mustard gas tests during the war. In 2004, the Canadian government offered a $50 million compensation package, roughly $24,000 per veteran, in recognition of their service in the wartime experiments. On November 8, 2006, Canadian veterans filed a class-action lawsuit against the Canadian government for physical and mental suffering caused by exposure to compounds in chemical and biological warfare experiments, including at CFB Suffield. "Ex-soldiers File Suit Over Chemical Testing," *Edmonton Journal*, 8 November 2006, p. A9.