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# "Do Something!... Do Anything!" FOLIOMYELITIS IN CANADA 1927-1962

by

Christopher James Rutty

A Thesis submitted in conformity with the requirements for the Degree of Doctor of Philosophy Graduate Department of History University of Toronto

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		0474
	Animal rainology	
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	Forestry and Wildlite	0478
	Plant Culture	0479
	Plant Pathology	
	Plant Physiology	J817
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<b>n</b> •	wood lechnology	07 40
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	General	0300
	Anatomy	
	Biostatistics	0308
	Bolany	0309
	Cell	0379
	Ecology	0329
	Entomology	0353
	Genetics	0369
	Limology	0703
	Adjustician and	
	Microbiology	
	Molecular	
	Neuroscience	
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	Physiology	0433
	Rediction	0821
	Veterinary Science	0778
	Zoology	0472
Rim	obusics	
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	Adadted	0740
244	TH CORNER	
214	TILL SCIENCES	0.005
Bio	geochemistry	
Gee	chemistry	

Geology	.0372
Geophysics	. 0373
Hydrology	0388
Mineralogy	0411
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Paleontology	0418
Paleozoology	0985
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Physical Geography	0368
Physical Oceanography	0415
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SCIENCES	
Environmental Sciences	0768
Health Sciences	
General	0566
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Chemotherapy	. 0992
Dentistry	0567
Education	0350
Hospital Management	0769
Human Development	0758
Immunology	0982
Medicine and Surgery	0564
Mental Health	0347
Nursing	0569
Nutrition	0570
Obstetrics and Gynecology	0380
Occupational Health and	
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Pathology	
Pharmacology	0419

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5

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Mathematics	0405
Anysics	
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Astronomy and	
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Elementary Particles and	
High Energy	0798
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Nuclear	0610
Optics	0752
Radiation	0756
Solid State	0611
itatistics	0463
Applied Sciences	
Applied Mechanics	0346

General	0537
Aerospoce	0538
Agricultural	0539
Automotive	0540
Biomedical	0541
Chemical	.0542
Civil	0543
Electronics and Electrical	0544
<ul> <li>Heat and Thermodynamics.</li> </ul>	0348
Hydrau iic	0545
Indust ial	0546
Marine	0547
Materials Science	0794
Mechanical	0548
Matallurgy	0743
Niining	0551
Nuclear	0552
Pockoging	0549
Petroleurr	0765
Sanitary and Municipal	0554
System Science	0790
Geotechnology	0428
Operations Research	079ü
Pastics Technology	0795
extile Technology	0994
้วานที่นั้นดา	
seneral	0621
lehavioral	0384
Liniçal	0622

Behavioral	0384
Clinical	
Developmental	
Experimental	
Industrial	2624
Personality	
Physiological	0989
Psychobiology	
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## "Do Something!... Do Anything!" POLIOMYELITIS IN CANADA, 1927-1962

By Christopher J. Rutty

Department of History University of Toronto Professor Michael Bliss, Supervisor

A thesis submitted in conformity with the requirements for the degree of Ph.D.

1995

### ABSTRACT

During the first half of the twentieth century poliomyelitis became one of Canada's most prominent public health challenges. Each "polio season" this paralyzing disease primarily struck children suddenly and capriciously, leaving in its wake life-long physical disabilities. As epidemics worsened, their frightening public image and high costs generated an escalating response from provincial governments that established new precedents in the provision of free and unconditional hospitalization and medical services. After World War II, the growing polio threat stimulated new levels of federal intervention and financing, including the imposition of national standards and control in the distribution and evaluation of polio vaccines between 1955 and 1962.

This dissertation explores the factors underlying the Canadian response to polio, especially its terrifying nature and high visibility, and within a context of growing public expectations for action and protection, the profound frustrations associated with its scientific and medical understanding, diagnosis, prevention, control, treatment and after-care. Of particular significance was the middle class' unusual vulnerability to polio, especially during the post-war "baby boom."

The broad response of Canadian governments to polio was built upon the leadership and shared values of a number of key individuals involved in public health that were closely connected to the provincial and federal health departments. The

ii

#### Abstract

University of Toronto's Connaught Laboratories and its medical research and biologicals production efforts was a central link between these elements.

Strong government intervention differentiated the Canadian polio experience from the American, although there were important U.S. influences. In particular, the conjunction of American enthusiasm for a series of hopeful polio "weapons" with major Canadian epidemics had a direct impact on the growth of provincial polio services. A major force on governments and voluntary efforts north of the border was the National Foundation for Infantile Paralysis ("March of Dimes"), with its unprecedented fundraising, patient care and research program. There were also important influences from north to south. Financed by American dimes, and by significant Canadian funding, comprehensive polio research efforts at Connaught proved critical to the development and unprecedented field trial of the Salk vaccine and the ultimate control of this disease.

### ACKNOWLEDGEMENTS

This dissertation would not have been possible without the generous financial support of the Hannah Institute for the History of Medicine, the Department of History, and the School of Graduate Studies at the University of Toronto. Thank you for the scholarships, teaching assistantships and other support over the past five years.

Special thanks must be directed to my supervisor, Professor Michael Bliss, for his "herculean efforts" of reading and editing the numerous drafts of this project in record time. I also wish to thank my advisors, Professors Paul Rutherford and James T.H. Connor, for their encouragement and advice in its shaping. Particular thanks to Jim for his long support of my polio and other medical history work since my undergraduate years and Masters at the University of Western Ontario, and through this project.

Essential to the researching and development of this thesis has been Connaught Laboratories Ltd. and its librarian, Hugh McNaught. Thank you for all the photocopies and continuing enthusiasm. Similarly, Shirley Teolis, Post-Polio Coordinator of the Ontario March of Dimes, has remained an important source of support in a number of ways, especially with the development and distribution of the polio survivor historical questionnaire, and as my unofficial agent and link to the media and others interested the history of polio in Canada. In particular, thanks to the polio survivors and post-polio support groups across the country who responded to the questionnaire. Also crucial to this project has been the cooperation and contributions of Dr. Andrew J. Rhodes, Dr. Arthur E. Franklin, and Frank Shimada, all of whom played key roles in Connaught's polio research and vaccine efforts. Thank you for your time and insights.

Thanks are also owed to Allison Hancock of C.B.C. Prime Time News for her assistance through the "Conquering the Crippler" documentary. Fellow Connaught

iv

historian, Paul Bator, of the Ontario Heritage Foundation, has also been an important source of support, as has Professor Joseph Kaufert of the University of Manitoba, and New Brunswick polio historian Gillian Liebenberg. Thank you also Diane Gilday of the Hospital for Sick Children Archives; Catherine Bailey and Kerry Bacigley of the National Archives of Canada; Bill Young, ghost writer of Paul Martin's autobiography, for access to his interviews and files; and all those who assisted my research efforts at the Archives of Ontario, the Provincial Archives of Manitoba, the Saskatchewan Archives Board, the Alberta Provincial Archives, as well as the smaller local, university and medical archives and libraries visited across Canada.

On a more personal level, special acknowledgment must be directed to my family, particularly to my mother, Kathryn Rutty, for proofing my chapter drafts and for letting me come back home for the final push to finish this dissertation. Thank you too, Dorothy Summers, my neighbor with the eagle eye for proofing the final drafts, Jocelyne Bordage, for putting me up during my research trips to Ottawa, and my brother and sister-in-law, and my wife's aunt and uncle, and cousins for doing the same in Edmonton, Saskatoon and Regina respectively. Closest to my heart and sou', and the one who has stood by me unconditionally through the thick and thin of all this talk of polio for so long has been my wife, Andrea. Thank you for all your intellectual, moral and emotional support.

must also acknowledge the original spark of this long academic journey into the history of polio in Canada. Thank you Neil Young, who passed through his own polio crisis in 1951, and his father, writer Scott Young, who thought to record his son's experience soon after he recovered. Neil's personal polio story and music has inspired and helped sustain my understanding of the national polio experience.

## DEDICATION

This dissertation is dedicated to the memory of Dr. Andrew J. Rhodes (1911-1995). His scientific energy, dedication and public health spirit symbolized and shaped the Canadian polio story and played a major role in the larger understanding and control of this disease. His polio research efforts at Connaught Laboratories from 1947-1953 represented the most exciting and challenging chapter of his scientific life. I am honoured to have known him and to chronicle his substantial research efforts for this project.

TIDDE OF CONTENTS	TA	BL	E	OF	C	) N	T	E١	1T	S
-------------------	----	----	---	----	---	--------	---	----	----	---

Acknowledgments	iv	
Dedication	vi	
Table of Contents	vii	
List of Figures and Tables		
Introduction	1	
Chapter 1: Medical, Political and Popular Background to 1927	26	
<ul> <li>1.1) Passage Through Crisis: The Disease</li> <li>1.2) The Enigma of Poliomyelitis: Polio and Medical Science to 1927</li> <li>1.3) Polio and Physicians to 1927</li> <li>1.4) Canadian Public Health and the State to 1927</li> <li>1.5) Disease and the Mass Media to 1927</li> </ul>	27 32 41 44 55	
Chapter 2: The First Wave, 1927-1932: Provincial Polio Epidemics and Convalescent Serum	60	
<ul><li>2.1) First Wave Epidemics and Provincial Public Health, 1927-32</li><li>2.2) Convalescent Serum, Publicity and the State</li><li>2.3) The Provinces and Paralysis Management</li></ul>	61 70 82	
Chapter 3: The Second Wave, 1935-1940: Science, Technology and Government Polio Treatment	88	
<ul> <li>3.1) Experimental Polio and the Monkey Model</li> <li>3.2) Second Wave Epidemics and the Provincial Response, 1936-37</li> <li>3.3) Medical Science, Technology and Crisis Management: <ul> <li>a) "Paralysis Nose Spray: Just Squirt and Smile"</li> <li>b) "Miraculous Metal Monsters"</li> </ul> </li> <li>3.4) Standardized Treatment, Hospitalization, and After Care</li> </ul>	90 97 106 113 118	
Chapter 4: The Third Wave, 1941-1946: Provincial Polio Policies and the Sister Kenny Revolution	132	
4.1) Epidemic Polio and Provincial Health Frustrations, 1941-42 4.2) The Sister Kenny Revolution in Canada, 1941-46 4.3) The Polio Challenge and Rising Federal Interest, 1946-47	135 143 162	
Chapter 5: Polio Volunteers and the State, 1945-1952: The Canadian Foundation for Poliomyelitis and the Politics of the "March of Dimes"	171	
<ul> <li>5.1) Polio Volunteers and the March of the N.F.I.P., 1938-48</li> <li>5.2) Polio and Canadian Voluntary Organizations to 1948</li> <li>5.3) "Don't Panic Over Polio!" The Canadian "March of Dimes" and the Politics of Polio. 1948-52</li> </ul>	173 182 188	

Chapter 6: The Fourth Wave, 1947-1953: Summers of Fear, Desperate Hopes and the Federal Politics of Polio	209
6.1) Worsening Epidemics and Post-War Federalism, 1947-51 6.2) Politics, Policies and the High Costs of Polio, 1952-53 6.3) "The Summer of Fear"	211 229
The National Polio Crisis of 1953	240
Chapter 7: "Hopeful Science:" Connaught Laboratories, American Dimes, Canadian Science and the Making of a Polio Vaccine, 1947-1953	262
7.1) Early Polio Research in Canada, 1937-46	265
Canadian Virus Laboratory, 1947-49	271
and Eskimo Polio, 1949-51	280
7.4) The Money, the Medium and the Methods: Polio Immunity, Virus Cultivation, and American Dimes, 1949-53	291
Chapter 8: "An Unusual Effort:" Canada and the Salk Vaccine Story, 1953-1955	309
8.1) "A Herculean Task:"	
8.2) Ottawa, the Provinces, and the Salk Vaccine, 1954-55 8.3) Triumph, Tragedy and Canadian Lessons	311 330 344
Epilogue: From Salk to Sabin, 1955-1962	360
Conclusions: The Meaning, Lessons and Legacy of Polio in Canada	381
Appendix	394
Bibliographic Essay	410
Bibliography	416
1) Primary Sources	416
<ul> <li>a) Principal Archival Sources</li> <li>b) Other Archival Sources</li> <li>c) Interviews</li> <li>d) Published Monographs and Reports</li> <li>e) Selected Medical Articles</li> <li>f) Selected Popular Articles</li> </ul>	416 417 417 418 420 436
2) Secondary Sources	437
a) Monographs b) Selected Articles	437 442
Biographical Sketch	449

## LIST OF FIGURES AND TABLES

Figure 1: Poliomyelitis Incidence in Canada, 1927-1962	395
Table 1: Poliomyelitis Case Rates per 100,000 Population,	
Canada and by Province, 1927-1962	396
Table 2: Poliomyelitis Reported Cases, Canada and by Province, 1927-1962	397
Table 3. Poliomyelius Death Rates per 100,000 Population,	
Canada and by Province, 1927-1962	398
Table 4: Poliomyelitis Deaths, Canada and by Province, 1927-1962	399
Table 5: Connaught Medical Research Laboratories:	
Research Funding Priorities by Outside Grants, 1947-1954	400
Table 6: Average Annual Death Rates per 100,000, Leading Causes of Death	
Canada, for 5-year Periods, 1921-1965	401
Table 7: Annual Rates of Notifiable Diseases, Cases per 100,000 Population	
Canada, 1927-1962	402
Exhibit 1: Historical Questionnaire for Polio Survivors, 1993	403
Exhibit 2: Sample Pages of Questionnaire Analysis Chart	408

ix

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### INTRODUCTION

"Polio is the worst cold there is." Neil Young, age 5<sup>1</sup>

The flowering of scientific medicine from the seed's sown in the 1880s, most notably by Louis Pasteur and Robert Koch, opened a new era of medical and popular hope that something specific could finally be done to diagnose, and then prevent, treat, an . even cure, many of the infectious diseases that had once been major epidemic killers. These included tuberculosis, cholera, smallpox, typhoid fever, diphtheria, and yellow fever.<sup>2</sup> Optimism was especially strong among parents that the deadly and crippling diseases of childhood would soon be vanquished, including the apparently new threat of "infantile paralysis." By the turn of the century, many of these expectations were realized and infant and childhood mortality levels declined sharply.<sup>3</sup> Consequently, there was a comparable rise in the investment families placed in their children and an escalation of their broader social, cultural and

Scott Young, "Polio Was a Killer and Neil Had It," chapter in Neil and Me (Toronto: McClelland and Stewart, 1984), p. 36. The road to this dissertation began with an interest in Neil Young's music, and his polio case, which sparked a 1988 undergraduate essay on the 1951 Ontario polio epidemic. This led to a MA thesis on polio in Ontario, which led to this national study (see note #51 below). Thus, my historical journey with polio has moved from the personal, to the provincial, to the national experience of polio in Canada. It is therefore appropriate to begin here with Neil Young's simple, but characteristically succinct, description of this disease.

George J. Wherrett, The Miracle of the Empty Beds: A History of Tuberculosis in Canada (Toronto: University of Toronto Press, 1977); Charles E. Rosenberg, The Cholera Years: The United States in 1932, 1849, and 1866 (Chicago: University of Chicago Press, 1962, 1987); Richard J. Evans, Death in Hamburg: Society and Politics in the Cholera Years, 1830-1910 (London: Oxford University Press, 1987); Michael Bliss, Plague: A Story of Smallpox in Montreal (Toronto: HarperCollins Publishers Ltd., 1991); Judith W. Leavitt, "Typhoid Mary' Strikes Back: Bacteriological Theory and Practice in Early-Twentieth-Century Public Health," Isis, 83 (1992): 608-29; Jane Lewis, "The Prevention of Diphtheria in Canada and Britain, 1914-1945," Journal of Social History, 20 (1986): 163-76; Margaret Humphreys, Yellow Fever and the South (New Brunswick, N.J.: Rutgers University Press, 1992).

John R. Paul, A History of Poliomyelitis (New Haven: Yale University Press, 1971), p. xiii; Erwin H. Ackerknecht, A Short History of Medicine (Revised Edition) (Baltimore: Johns Hopkins University Press, 1982), p. 175-85; Richard H. Shryock, The Development of Modern Medicine: An Interpretation of the Social and Scientific Factors Involved (Madison: University of Wisconsin Press, 1947, 1979), p. 273-355, 431-57.

political value, especially among a growing middle class.<sup>4</sup> Childhood became idealized as a time of protected innocence, safe from the threats of the world, especially from deadly diseases that threatened to rob the young of their future because of an early death. In a cuiture of heightened expectations for children's health and security, reflected and magnified by an expanding popular press,<sup>5</sup> some diseases could leave them with something much worse than death: a lifetime of crippling disability and physical limitations and disadvantage.

Within this context, especially after World War II, popular faith in scientific medicine was transformed into high anticipation that scientific progress and victory against most, if not all, diseases was imminent. Many of these expectations were met during the first decades of the century as steady declines in mortality and incidence were evident in intestinal, infantile, respiratory and communicable diseases generally. With improving standards of living and the introduction and wide use of toxoids, vaccines and penicillin, by the late 1940s this decline was sharpest with diphtheria and typhoid fever incidence, and to a lesser extent, tuberculosis. A number of other diseases, however, resisted, and even contradicted this trend. Among the most prominent and problematic included heart disease, cancer, measles and poliomyelitis, the latter two frequently generating major epidemics (see Tables 6 and 7).<sup>6</sup>

<sup>&</sup>lt;sup>4</sup> Neil Sutherland, "'To Create a Strong and Healthy Race:' School Children in the Public Health Movement, 1880-1914," in S.E.D. Shortt (ed.) Medicine in Canadian Society: Historical Perspectives (Montreal and Kingston: McGill-Queen's University Press, 1981), p. 361-93; Helen Lenskyj, "Raising 'Good Vigorous Animals:' Medical Interest in Children's Health in Ontario, 1890-1930," Scientia Canadensis, 12 (1988): 129-49; Dianne Dodd, "Advice to Parents: The Blue Books, Helen MacMurchy, MD, and the Federal Department of Health, 1920-34," Canadian Bulletin of Medical History (hereafter CBMH), 8 (1991): 203-30.

<sup>&</sup>lt;sup>5</sup> See, for example Paul Rutherford's, *The Making of the Canadian Media* (Toronto: McGraw-Hili Ryerson Ltd., 1978), and A Victorian Authority: *The Daily Press in Late Nineteenth-Century Canada* (Toronto: University of Toronto Press, 1982). See also Terra Ziporyn, Disease in the Popular American Press: The Case of Diphtheria, Typhoid Fever, and Syphilis, 1870-1920 (New York: Greenwood Press, 1988).

<sup>6</sup> Harry F. Dowling, Fighting Infection: Conquests of the Twentieth Century (Cambridge, Mass.: Harvard University Press, 1977); Elizabeth W. Etheridge, Sentinel for Health: A History of the Centers for Disease Control (Berkeley: University of California Press, 1992).

Until the late 1950s and early 1960s when polio vaccines were introduced, paralytic polio was one of the most feared diseases of the twentieth century. Indeed, for people born in the two or three decades before 1955, the year of Salk vaccine, polio and the anxieties associated with it left an indelible mark whether one was directly affected by the disease or not. Parents taught their children to be afraid of polio, "to regard it as a fierce monster that lurked in the damp hollows of their experience;" "a grim terror that is more menacing, more sinister than death itself."<sup>7</sup> Despite modern medical science, and, ironically, because of improving health standards, polio epidemics escalated alarmingly throughout the industrialized world.

In the absence of medical progress against polio, emotionally sharpened by its episodic but unpredictable nature, and its unique predilection to suddenly strike and permanently paralyze healthy middle class children, public demands for action grew desperate. Pressures mounted on physicians, scientists, voluntary health agencies and governments to do something, anything, to minimize polio's high personal and financial costs. The nature and intensity of the state's response, however, was mitigated by local and national traditions of public health activity, the relationship of governments and public health authorities with the medical profession, and the level of activity among voluntary and organizations and private individuals.<sup>8</sup>

Jane S. Smith, Patenting the Sun: Polio and the Salk Vaccine (New York: William Morrow & Co., 1990); B. Davies, "Death Walks in Summer," Canadian Magazine, 82 (July 1934): 7.

See, for example: Douglas O. Baldwin, "Volunteers in Action: The Establishment of Government Health Care on Prince Edward Island, 1900-1931," Acadiensis, 19 (1990): 121-47; Jay Cassel, "Making Canada Safe for Sex: Government and the Problem of Sexually Transmitted Diseases in the Twentieth Century," in C..D. Naylor (ed.), Canadian Health Care and the State: A Century of Evolution (Montreal and Kingston: McGill-Queen's University Press, 1992), p. 141-92; Heather MacDougall, Activists and Advocates: Toronto's Health Department, 1883-1983 (Toronto: Dundurn Press, 1990); Robert D. Defries (ed.), The Federal and Provincial Health Services in Canada (Toronto: Canadian Public Health Association, 1956); Paul Starr, The Social Transformation of American Medicine: The Rise of a Sovereign Profession and the Making of a Vast Industry (New York City: Basic Books Inc., 1982); John Duffy, The Sanitarians: A History of American Public Health (Chicago: University of Chicago Press, 1990); Richard Carter, The Gentle Legions (Garden City, NY: Doubleday and Co., 1961); Elizabeth S.L. Govan, Voluntary Health Organizations in Canada (Canada, Royal Commission on Health Services) (Ottawa: Queen's Printer, 1966).

In Canada, an aggressive government response to the polio problem emerged and expanded in most provinces after 1927 in response to growing waves of serious provincial epidemics that climaxed in 1953. This response was built upon a distinctive tradition of close institutional and personal links between leaders in local, provincial, and federal health departments, the medical profession, and public health education, research and the centralized and non-commercial production of preventive health products at the University of Toronto's Connaught Medical Research Laboratories and the intimatery associated School of Hygiene. In many ways, these ties played a similar role in the Canadian response to diphtheria from 1914 through the early 1940s, a dangerous and much-feared childhood plague that until an effective toxoid was widely used, shared several features with polio.<sup>9</sup>

Connaught was Canada's national serum institute, which like its European models, facilitated and reinforced strong national public health connections. In contrast, no national serum institute existed in the U.S. (not even on a state level) and thus, neither did such associated national public health links. Moreover, Connaught was distinguished from both the American and European public health structures by its dual research and biologicals production capacity within a university setting.<sup>10</sup>

Canadian public confidence in, and expectations of the state grew during this period, particularly with the federal government increasingly demonstrating its powers in military, economic and social management through two world wars. For provincial health departments, where responsibility for health was entrenched, and increasingly in Ottawa, attacking diseases and providing the therapeutic benefits of

<sup>&</sup>lt;sup>9</sup> Defries, *Ibid*, p. 76-79; Bator with Rhodes, *Ibid*., p. 18-21, 57, 59; Lewis, "The Prevention of Diphtheria in Canada and Britain, 1914-1945."

<sup>10</sup> Robert D. Defries, The First Forty Years, 1914-1955: Connaught Medical Research Laboratories, University of Toronto (Toronto: University of Toronto Press, 1968); Paul A. Bator with Andrew J. Rhodes, Within Reach of Everyone: A History of the University of Toronto School of Hygiene and the Connaught Laboratories, Volume I, 1927-1955 (Ottawa: Canadian Public Health Association, 1990); Paul A. Bator, Within Reach of Everyone, Volume II: A History of the University of Toronto School of Hygiene and Connaught Laboratories Limited, 1955-1975, With an Update to 1994, (Ottawa: Canadian Public Health Association, 1995).

modern medicine to its citizens through increasing investment in health care became a politically popular activity. Besides developing specific polio policies during the 1930s, '40s and '50s, provincial governments, to varying degrees, also implemented publicly funded programs to diagnose, treat and hospitalize tuberculosis, venereal disease and cancer patients.

During the 1930s, provincial investment in health care ranged between eight and nine percent of total spending, grew to about ten to eleven percent by 1947, and fifteen to seventeen percent of total expenditures through the 1950s and early 1960s. In the 1930s and early 1940s health spending was sixth and seventh among provincial government spending priorities, but rose to third by the 1950s and early 1960s. The federal government's spending on health was negligible before 1948; less than one percent of total expenditures. It hovered around one percent of the federal budget until the late 1950s, when it accelerated above five percent by the early 1960s. As a federal spending priority heath averaged eleventh during the 1930s, '40s and '50s, but reached sixth by 1962. Between 1948 and 1957, Ottawa's direct support to the provinces in the form of federal health grants represented between six and seven percent of total federal transfers. With the introduction of national public hospitalization insurance in 1958 this amount doubled and then grew to thirty-four percent of total federal transfers by 1962.<sup>11</sup>

Percentages based on tables in F.H. Leacy, M.C. Urquart and K.A.H. Buckly (eds.), *Historical Statistics of Canada* (Second Edition) (Ottawa: Statistics Canada, 1983), Tables H19-34 (Federal government bugetary expenditures, by function, 1867-1975); H474-493 (Federal government transfers to provinces and territories, 1947-1975); H161-175 (Federal government, net general expenditure by major function, selected years, 1933-1969); H176-187 (Provincial governments, net general expenditure by major function, selected years, 1933-1969); H148-160 (All governments, net general expenditure by major function, selected years, 1933-1969); Federal transfers were divided into "Unconditional" and "Conditional," with Health in the latter category along with Agriculture, Welfare, Transportation and Communication, Education, Resources Development, and Others. Of this group Health transfers accounted for from eleven to nineteen percent each year from 1948 to 1951, an average of about thirty-five percent per year between 1952 and 1957, and about half of the total Conditional federal transfers each year between 1958 and 1962.

Within this general context, the alarming health menace of worsening polio epidemics and their long-term effects provides an important historical window through which to analyze these dynamics. Polio's dramatic threat also provides a valuable opportunity to differentiate Canadian and American public health institutions and explore their interaction with respect to medical research, voluntary and government activity in what became an unprecedented effort to control and conquer this crippling disease. Moreover, the Canadian experience and response to polio set new precedents in the state's role in Canadian health care, while Canadian medical research proved crucial to the development, production, evaluation and distribution of polio vaccines and the international control of this modern plague.

The Canadian response to polio was led and shaped by a number of key individuals with common public health education and values, which tended to favour strong government leadership and broad intervention in the protection of public health. These included provincial deputy ministers of health, most notably, Dr. J.T. Phair in Ontario, and Dr. F.W. Jackson of Manitoba, each of whom established new precedents in the provincial management of major polio epidemics during the 1930s and early 1940s. They were also graduates of the University of Toronto's School of Hygiene, as were most of their successors and colleagues in other provinces during this period, and in Ottawa, especially Dr. G.D.W. Cameron, who served as Deputy Minister of National Health from 1946 to 1965. Previously, Cameron had worked at Connaught, served as Chief of the federal government's Laboratory of Hygiene, and then Director of Federal Health Services. Moreover, contact and cooperation among all provincial and federal deputy ministers of health was regularly maintained and reinforced by the Dominion Council of Health, the Minister of Health's national advisory committee established in 1920. Such a national public health forum succeeded the Advisory Committee on Scientific Work established at Connaught in 1918 by its founder, Dr. J.G. FitzGerald.

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All of these individuals shared a close personal and professional relationship with perhaps the most important figure in Canadian public health, Dr. Robert D. Defries, Director of Connaught Laboratories and the School of Hygiene between 1940 and 1955. Indeed, along with FitzGerald, Defries largely built both institutions.<sup>12</sup> His leadership was crucial to Connaught's polio research and vaccine production efforts. This work would not have been possible without the scientific contributions of Dr. Andrew J. Rhodes between 1947 and 1953, an internationally respected virologist from Scotland. On the national political level, growing federal involvement in polio support to the provinces and the Canadian introduction of the Salk vaccine depended upon the leadership of the Minister of National Health and Welfare, Paul Martin. He held this position from 1946 to 1957 and had considerable experience with the effects of polio, both personally as a child, and when his son was stricken just before he was appointed Minister.

The evolution of a state-led Canadian response to epidemic polio began in 1927-28 when the first major epidemics hit western Canada and provincial governments, especially in Alberta, responded broadly. In most provinces, and to varying degrees, provincial polio strategies expanded during serious epidemics with the development of specific preventive, treatment and hospitalization services that were freely available to all polio cases, regardless of income. No other disease generated such a broad and unconditional response from Canadian governments, and with the blessing and cooperation of the medical profession. In the absence of any effective medical treatments against polio, the assumption of responsibility for much of the polio problem by provincial governments helped to relieve some of the frustrations and pressures polio increasingly placed on private physicians. Bearing the brunt of the worst epidemics, Alberta, Ontario, Manitoba and Saskatchewan developed the most sophisticated and generous polio policies.

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<sup>12</sup> Defries, The First Forty Years; Defries (ed.), The Federal and Provincial Health Services in Canada; Bator with Rhodes, Within Reach of Everyone.

The establishment and expansion of provincial polio programs followed a clear pattern of discrete conjunctions between major provincial epidemics and the emergence of new polio therapies around which intense public hopes and dramatic publicity were generated. Striking conjunctions occurred in 1927-28, 1936-37, 1941-42, 1952-53, 1953-54 and 1959-60. Each involved different polio treatments, ranging from prophylactic human immune serums, to preventive nasal sprays, to unorthodox physical therapy methods, and finally two different polio vaccines.

The broad enthusiasm surrounding these "polio weapons" largely originated in the United States and created significant political pressures north of the border. In an effort to appear to be doing something, anything, against the ravages of major polio epidemics, against which little was possible, most provincial governments, and ultimately Ottawa, assumed direct control of the financing and production of such hopeful weapons and distributed any potential benefits freely and unconditionally. Despite their limited preventive, prophylactic, or therapeutic value, as one federal health official stressed in the wake of Canada's worst epidemics of 1953, Ottawa "could not afford to do nothing if the country is hit with a severe polio epidemic during the coming summer." Referring to the latest such polio weapon, gamma globulin, he stressed that despite questions about its value, there was "some real merit" in using it, "not only for the treatment of public opinion."<sup>13</sup>

This degree of state or federal government involvement with polio did not exist in the U.S.; responsibility for public health was largely a matter for local governments and private physicians.<sup>14</sup> After 1938 comprehensive polio services for Americans were assumed by the phenomenal voluntary and philanthropic efforts of the National Foundation for Infantile Paralysis (NFIP), or "March of Dimes." Indeed, the

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<sup>13</sup> Memo, J.H. Horowicz, Health Insurance Studies, Department of National Health and Welfare, Ottawa, to G.D.W. Cameron, Deputy Minister of Health, Ottawa, April 5, 1954, National Archives of Canada, RG29, Vol. 200, file 311-P11-10, part 4.

<sup>&</sup>lt;sup>14</sup> Duffy, The Sanitarians.

high profile activities of the NFIP was an important factor in the expansion of provincial and federal involvement in polio health services north of the border.

In North America generally, the fear of epidemic polio rose to preoccupy the public consciousness and agenda to a degree unmatched by most other diseases until the emergence of AIDS. As a contemporary study of American voluntary health organizations stressed, "By popular consent and after more than one public panic, polio was the disease of greatest concern."<sup>15</sup> More specifically, of the four diseases of most concern to Americans in the early 1950s, a national survey found that cancer and heart disease were considered most serious, but polio was felt more serious and fearsome than tuberculosis.<sup>16</sup> The Canadian medical profession often acknowledged polio's prominent threat. In 1936, a Manitoba medical journal highlighted that "There is no disease over which the public is more apprehensive and in which both the laity and the medical profession feel so helpless than Epidemic Poliomyelitis." In 1952 an Ontario journal echoed this assessment, but stressed polio's relatively small death incidence among children compared to whooping cough and automobile accidents. Thus, the unprecedented public anxiety generated by polio "may eventually result in unwarranted restrictions on the life of the community."<sup>17</sup>

The omnipresent public image of polio, amplified through the popular press had a major influence in shaping the response to this disease in Canada. This publicity was generated each summer "polio season," and especially during major epidemics. Beyond reporting on their daily toll and trying to minimize panic, detailed press coverage served an important pragmatic function to educate parents, as well as physicians, about the vague but crucial early symptoms of the disease. Striking a balance

<sup>15</sup> Carter, The Gentle Legions, p. 94.

<sup>&</sup>lt;sup>16</sup> David L. Sills, The Volunteers: Means and Ends in a National Organization (Glencoe, Ill.: The Free Press, 1957), p. 116-48, 176-99; Fred Davis, Passage Through Crisis: Polio Victims and Their Families (New Brunswick, N.J.: Transaction Publishers, 1963, 1991), p. 3-8.

 <sup>17</sup> C.R. Donovan, "News Items: Epidemic Poliomyelitis," Manitoba Medical Association Review, 16 (Sept. 1936): 187; R.P. Hardman, "Poliomyelitis - Ontario," Ontario Medical Review, 19 (July 1952): 302.

between providing accurate public health information and the need to prevent panic from sensational publicity, proved to be a vexatious problem for health authorities. Magnifying this situation was the massive American publicity machine of the NFIP which became particularly intense when hopeful news of Foundation-sponsored research projects, promising new treatments, and the long anticipated polio vaccine were enthusiastically reported. Public expectations were thus regularly stimulated on both sides of the border, especially when the Foundation took it upon itself to broadly test and supply these new measures freely to the American public.

During the epidemic era, polio incidence and mortality, on average, was minor relative to other, less dramatic, less publicly discussed, communicable diseases such as influenza, whooping cough, measles, tuberculosis, and venereal disease, or such chronic killers as heart disease, cancer and accidents (Tables 6 and 7).<sup>18</sup> However, until the advent of the Salk and Sabin polio vaccines in 1955 and 1962 respectively, polio was high among a rapidly shrinking group of dangerous infectious diseases in the industrialized world. Canada was one of the most seriously affected nations and on a per capita basis was hit harder by polio than the United States. Nationally, the U.S. experienced major incidence peaks in 1916, 1944, 1946, 1949 and 1952, the last and worst of which recorded a case notification rate of 36.2 per 100,000 population. In Canada, the major epidemic years of 1937 and 1952 matched this American peak, but in 1953 the national case rate in Canada reached 60 per 100,000 (Figure 1, Tables 1, 2, 3 and 4).<sup>19</sup> Canada's peculiar susceptibility to polio epidemics was recognized after the

<sup>18</sup> Eileen Pettigrew, The Silent Enemy: Canada and the Deadly Flu of 1918 (Saskatoon: Western Producer Prairie Books, 1983); Alfred W. Crosby, America's Forgotten Pandemic: The Influenza of 1918 (Cambridge: Cambridge University Press, 1989); Jay Cassel, The Secret Plague: Venereal Disease in Canada, 1838-1939 (Toronto: University of Toronto Press, 1987); Allan M. Brandt, No Magic Bullet: A Social History of Venereal Disease in the United States Since 1880 (Oxford: Oxford University Press, 1985); James T. Patterson, The Dread Disease: Cancer and Modern American Culture (Cambridge, Mass.: Harvard University Press, 1987).

<sup>&</sup>lt;sup>19</sup> M.-J. Freyche and J. Nielsen, "Incidence of Poliomyelitis Since 1920," in World Health Organization, *Poliomyelitis* (Geneva: WHO, 1955), p. 59-106

first major epidemic wave between 1927 and 1932 and helped justify significant levels of provincial, and later, federal government intervention.<sup>20</sup>

The dread that paralytic polio engendered can be explained by a number of singular features of this disease and of polio epidemics specifically. Much like a natural disaster, polio epidemics could spread through entire communities suddenly and randomly on a local, regional and even national basis. But most importantly, unlike most infectious diseases, in their wake they left varying degrees of malaise, disability and death, especially among the young and otherwise healthy. Between 1927 and 1953, Canadian polio epidemics tended to worsen in incidence, geographic scope, physical severity and financial and political impact, thus intensifying public uncertainty and fear, as well as the extraordinary news worthiness of this disease.

Within the child-centred culture that characterized this period, particularly during the "baby boom" of the late 1940s and 1950s, which coincided with the worst epidemics, each "polio season" parents' concerns were focused on this disease beyond all others. Moreover, young parents themselves, and even older adults, were not safe from the spectre of polio and alarming numbers faced its worst effects: death, or more frightening, indefinite confinement in an "iron lung." The iron lung was among the most terrifying and memorable images of polio. It was both a "miraculous device and technological monster" and during major epidemics rows of them often filled up entire hospital wards, each rhythmically pulsating with the "breath of life" for their terrified occupant, all but the head helplessly sealed inside.<sup>21</sup> Most of the children stricken by paralytic polio that affected the less vital parts of the body did not die, but neither did they always recover. Many were forced to drag out the bulk of their lives in wheelchairs and on crutches, their disabilities

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<sup>20</sup> Davies, "Death Walks in Summer," p. 7.

Susan B. Sepples, "Polio Nursing: The Fight Against Paralysis," Nursing Connections, 5 (1992): 33; Richard Stone, "FDA to Rescue Russian Vaccine Program," Science, 261 (July 9, 1993): 151; Richard Stone, "Post-Polio Syndrome: Remembrance of Viruses Past," Science, 264 (May 13, 1994): 909.

permanent and visible reminders "the crippler" within their communities. Thus, most people knew a polio victim, but nobody wanted to become one. Under such circumstances, "polios" were regarded by their neighbors – who knew that they could easily be next – with a mixture of trepidation, special consideration and mass sympathy. As stressed in Fred Davis,' *Passage Through Crisis: Polio Victims and Their Families*, paralytic polio "was regarded as a powerful symbol of blind, devastating, and uncontrollable misfortune whose victims were specially entitled to the support and good will of the community."<sup>22</sup>

The most significant feature of paralytic polio, beyond its general age-specific incidence, and the principal factor underlying its social and political impact, was its class-specific incidence. Polio, unlike most infectious diseases, was predominantly a middle class plague.<sup>23</sup> For epidemiological reasons which will be outlined later, middle and even upper class urban, and especially suburban and isolated rural communities were most vulnerable to polio epidemics. Sophisticated public health infrastructures, high hygienic standards and a decline in breast feeding practices, combined to lower natural immunity levels and transformed what had always been an endemic and all but invisible gastrointestinal infection among infants, in which paralysis was extremely rare (hence "infantile paralysis"), into a major epidemic scourge. Beginning in the late nineteenth century, the poliovirus no longer circulated as uniformly and as health standards improved this circulation declined sharply. An immunizing early exposure to the virus was thus delayed, leaving children and increasingly older age groups vulnerable to paralytic infection. Although nonparalytic cases greatly outnumbered paralytic ones, in major epidemics the numbers of permanently paralyzed children was frighteningly high. Thus as the population

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<sup>22</sup> Davis, Passage Through Crisis:, p. 6; Carter, The Gentle Legions, p. 91-5.

<sup>23</sup> Davis, Ibid., p. 5; Sills, The Volunteers, p. 128-30. On the importance of the middle class to the broader history of medicine in Canada during the early twentieth century, particularly with respect to Ontario hospitals, see David Gagan, "For 'Patients of Moderate Means:' The Transformation of Ontario's Public General Hospitals, 1880-1950," Canadian Historical Review, 70 (1989): 151-79.

of non-immune individuals grew, so did the potential for widespread polio epidemics, against which neither modern medicine nor economic affluence offered an effective defense until the emergence of vaccines. With the Salk vaccine there was finally a means to prevent polio, but, ironically, it did nothing for the 50,000 Canadians affected by the disease between 1927 and 1962 (Table 2). Unfortunately, this much celebrated and dramatic victory was reserved for those who would never get polio. For the victims of polio, such a medical victory rang somewhat hollow since there was no way of putting right what the virus had inflicted on them.<sup>24</sup>

There is limited scholarship on the history of polio, although in recent years the amount and sophistication of studies have increased significantly. Much of the more recent scholarship has been inspired by the current AIDS pandemic.<sup>25</sup> On a more practical level historical attention has been stimu'ated by the post-polio syndrome challenge,<sup>26</sup> and current international efforts to eradicate poliomyelitis worldwide by 2005. Physicians today need to better appreciate the original polio experience during the epidemic era in order to understand and effectively manage postpolio syndrome. Physicians, governments and the public also need to be reminded of the potential dangers and high costs of polio outbreaks and epidemics should broad immunization programs be relaxed in a short-term effort to save money. Eradication has recently been declared for the Americas, but polio vaccinations are still necess-

<sup>24</sup> Lauro S. Haistead, "The Lessons and Legacy of Polio," in L.S. Halstead and G. Grimby, Post-Polio Syndrome (Hanley & Belfus, in press), draft of chapter provided by Ontario March of Dimes. There are also an estimated 1.6 million polio survivors in the U.S., 500,000 of whom are experiencing post-polio syndrome.

Guenter B. Risse, "Epidemics and History: Ecological Perspectives and Social Responses," in
 E. Fee and D.M. Fox (eds), AIDS: The Burdens of History (Berkeley: University of California Press, 1988), p. 33-66;

On post-polio syndrome, see for example: Lauro S. Halstead and David O. Wiechers (eds.), Research and Clinical Aspects of the Late Effects of Poliomyelitis, in Birth Defects, 23 (1987); Donald M Mulder, "Post-Polio Syndrome - Past, Present, and Future," in T.L. Munsate (ed.), Post-Polio Syndrome (Boston: Butterworth-Heinemann, 1991); Ontario March of Dimes, Destination '92: Well Being for Polio Survivors (Proceedings of Ontario March of Dimes Conference, Mississauga, June 1992) (Toronto: Ontario March of Dimes, 1993); Lauro S. Halstead and Gunnar Grimby (eds.), Post-Polio Syndrome (Hanley & Belfus, Inc, in press); Richard Stone, "Post-Polio Syndrome: Rememberance of Viruses Past," Science, 264 (May 13, 1994): 909.

ary until worldwide eradication is confirmed. There are still about 15,000 officially reported cases of paralytic polio reported worldwide, although there may actually be up to 140,000.<sup>27</sup> Recent polio outbreaks, no matter how small and isolated, whether self generated due to anti-vaccinationist religious beliefs, or caused by the wild virus or vaccine itself, serve as powerful and frightening reminders of the potent public and personal impact of this disease.<sup>28</sup> Attention to the polio epidemic era has also been sparked by the modern re-emergence of other serious diseases that were believed vanquished, or at least well controlled, such as cholera, tuberculosis, and even plague, and by a variety of new and dramatic health threats such the Ebola fever virus and "the flesh-eating disease" (necrotizing fasciitis).<sup>29</sup>

There has yet to be written a comprehensive examination of the polio epidemic era on a national basis. Indeed, there are few national studies of any specific disease, especially during the twentieth century period. Useful Canadian models exist, but not for this period, or on as comprehensive a basis.

<sup>Poliomyelitis Outbreak - Netherlands, 1992," Journal of the American Medical Association (JAMA), 269 (Jan. 6, 1993): 24, 29; "National Poliomyelitis Immunization Days - People's Republic of China, 1993," JAMA, 270 (Dec. 1, 1993): 2537, 2541; P.V. Varughese (et al.), "Eradication of Indigenous Poliomyelitis in Canada: Impact of Immunization Strategies," Canadian Journal of Public Health (CJPH), 80 (Sept/Oct. 1989): 363-68; J.L. Melnick, "Poliomyelitis: Eradication in Sight," Epidemiology and Infection, 108 (1992): 1-18; P. Gunby, "PolioPlus: Poliomyelitis Eradication by Year 2005," JAMA, 269 (Jan. 6, 1993): 15-16; Expanded Program on Immunization, Pan American Health Organization (PAHO), "Strategies for the Certification of the Eradication of Wild Poliovirus Transmission in the Americas," Bulletin of PAHO, 27 (1993): 287-96; H.F. Hull (et al.), "Paralytic Poliomyelitis: Seasoned Strategies, Disappearing Disease," The Lancet, 343 (May 28, 1994): 1331-37.</sup> 

<sup>28</sup> E.G. Morrison and J.A. Embil, "Poliomyelitis in North America: The Disease is Not Dead Yet," CMAJ, 137 (Dec. 15, 1987): 1085-7; Epidemiological Reports, "Vaccine-Associated Poliomyelitis in Quebec," CMAJ, 137 (Sept. 1, 1987): 418-19; D. Salk, "Polio Immunization Policy in the United States: A New Challenge for a New Generation," American Journal of Public Health, 78 (Mar. 1988): 296-300; Edouard Kurstak (ed.), Measles and Poliomyelitis: Vaccines, Immunization, and Control (New York: Springer-Verlag, 1993);; Public Broadcasting System (PBS-TV), Nova, "Can You Still Get Polio?" broadcast April 5, 1988.

<sup>&</sup>lt;sup>29</sup> John D.H. Porter and Keith P.W.J. McAdam (eds), Tuberculosis: Back to the Future (Chichester: John Wiley & Sons, 1994); Davis, Passage Through Crisis, "Introduction to Transaction Edition," p. vii-xx; Halstead, "The Lessons and Legacy of Polio;" Etheridge, Sentinel for Health, p. 219-22; Trish Crawford, "Epidemic 'A Wake Up Call To World," Toronto Star, (Oct. 1, 1994); I.Z. Abolnik and D.J. Sexton, "Necrotizing fasciitis and myositis caused by group A streptococci: Epidemiology, diagnosis, and treatment of 'flesheating bacteria,'" North Carolina Medical Journal, 55 (Oct. 1994): 464-6.

Geoffrey Bilson's A Darkened House: Cholera in Nineteenth-Century Canada. stresses how, despite cholera's severity, its impact rarely overcame the prevailing laissez-faire attitudes of local and provincial governments towards public health legislation. Jay Cassel's The Secret Plague: Venereal Disease in Canada, 1838-1939, takes a broad approach, and while it spresses the role of VD in stimulating significant levels of provincial and federal intervention, this theme is left to the last chapters of his study. Michael Bliss' Plague: A Story of Smallpox in Montreal, explores the active role of the press and its relationship to the local and provincial response to the 1885 epidemic, but its local and narrow time focus is quite different from the approach taken in the present study. Similarly, Eileen Pettigrew's The Silent Enemy: Canada and the Deadly Flu of 1918, is focused on a single epidemic, although her national approach is useful. Non-Canadian studies of cholera, particularly Charles Rosenberg's The Cholera Yeus: The United States in 1832, 1849, and 1866, and Richard Evans' Death in Hamburg: Society and Politics in the Cholera Years, 1830-1910, are both valuable models. Rosenberg's is a narrower study, centering on New York City, while Evans' is a richly detailed examination of the political links between the local and national management of cholera in Germany over an extended period. Of the few broadly-based national studies of a twentieth century disease, James Patterson's The Dread Disease: Cancer and Modern American Culture, is particularly valuable for its cultural and political analysis of perhaps the twentieth-century's greatest health challenge.<sup>30</sup>

These historiographic models, however, all take relatively insular local or national approaches and neglect to explore the two-way relationships that exist across international borders, especially the world's longest undefended one between Canada and the United States. The relationship between the U.S. and Canada, and the effects of the southern giant on its northern neighbor, especially on a cultural level,

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<sup>30</sup> See notes #2 and #18.

is a major theme in Canadian history.<sup>31</sup> The Canadian polio experience highlights the dynamics of this relationship in a number of important ways. This relationship was likely unique relative to other infectious diseases, particularly with respect to the general social and political context and expectations of the period, the nature of polio epidemics and the disease itself, the limited medical prospects of its control and treatment, and the cross-border political and scientific dynamics generated by the NFIP and its unprecedented publicity, patient care and research programs.

The need to investigate the history of polio from the Canadian perspective is not merely to provide a study of interest only to Canadians, but to place the Canadian experience within the larger understanding of this disease, which almost all existing studies have defined and characterized in American terms. Indeed, polio has been perceived as a particularly "un-American" disease that directly challenged American optimism and ingenuity.<sup>32</sup> A war on polio was therefore necessary and the American public rose to the challenge, giving to the "March of Dimes" in an singular philanthropic effort to finance patient care and medical research until victory was at hand with the Salk vaccine. Within the context of the Cold War of the 1950s, the Salk vaccine victory took on significance for Americans to a degree comparable to the moon landings of the next decade. As stressed by Allan Brandt:

The vaccine, an affirmation of American scientific and technological progress, was viewed as a triumph of the American system, [and] American science, pragmatic and purposeful, demonstrated the continued viability of the promise of American life.<sup>33</sup>

While it is clear that the American experience of polio was vital, the existing historiography all but ignores any other contributions. This leaves historians, polic survivors and the general public assuming that the American experience was the

<sup>&</sup>lt;sup>31</sup> See for example D.H. Flaherty and F.E. Manning (eds), *The Beaver Bites Back?: American Popular Culture in Canada* (Montreal and Kingston: McGill-Queen's University Press, 1993).

<sup>32</sup> Davis, Passage Through Crisis, p. 41.

<sup>33</sup> Allan M. Brandt, "Polio, Politics, Publicity, and Duplicity: Ethical Aspects in the Development of the Salk Vaccine," *International Journal of Health Services*, 8 (1978): 265; also published in *Connecticut Medicine*, 43 (1979): 581-90.

only one of any importance in understanding the history of this disease. The present study integrates the Canadian experience into the historiography, and also explores how the American scientific and publicity war on polio influenced how the disease was perceived and managed in Canada, especially by governments.

Despite the American bias of the polio historiography, valuable work has been done in several areas. There are many disparate works that focus on selected periods, particular epidemics, key individuals, major themes, medical research or noteworthy events in the history of this disease.<sup>34</sup> Biographical works have focused on Salk,<sup>35</sup> and on Sister Elizabeth Kenny, an Australian nurse who directly challenged the orthodox methods of polio treatment prevalent until the early 1940s by advocating early active physiotherapy as opposed to strict immobilization in casts and splints.<sup>36</sup> Other biographies focus on local doctors involved with polio,<sup>37</sup> and on individuals who describe their experience as polio survivors.<sup>38</sup> There are also a number of imp-

<sup>34</sup> Some of these include: A.B. Cross, "The Solomon Islands Tragedy: A Tale of Epidemic Poliomyelitis," Medical History, 21 (1977): 137-55; H.V. Wyatt, "Provocation Poliomyelitis: Neglected Clinical Observations From 1914-1950," Bulletin of the History of Medicine, 55 (1981): 543-57; Russell W. Brown and James H.M. Henderson, "The Mass Production and Distribution of HeLa Cells at Tuskegee Institute, 1953-55," Journal of the History of Medicine, 38 (1983): 415-31; James H. Maxwell, "The Iron Lung: Halfway Technology or Necessary Step," Millbank Quarterly, 64 (1986): 3-29; Lawrence B. Berk, "Polio Vaccine Trials of 1935," Transactions and Studies of the College of Physicians of Philadelphia, Series 5, 11 (1989): 321-37; Allen B. Weisse, "Polio: The Not-So-Twentieth-Century Disease," in his Medical Odysseys: The Different and Sometimes Unexpected Pathways to Twentieth-Century Medical Discoveries (New Brunswick, N.J.: Rutgers University Press, 1991).

<sup>35</sup> Richard Carter, Breakthrough: The Saga of Jonas Salk (New York City: Trident Press, 1966). See also the recent biographies for younger readers: Marjorie N. Curson, Jonas Salk (Englewood Cliffs, N.J.: Silver Burdett Press, 1990); Carmen Bredeson, Jonas Salk: Discoverer of the Polio Vaccine (Hillside, N.J.: Enslow Publishers, Inc., 1993).

<sup>36</sup> Elizabeth Kenny and M. Ostenso, And They Shall W 'k: The Life Story of Sister Elizabeth Kenny (New York City: Dodd, Mead & Co., 1943); Victor Cohn, Sister Kenny: The Woman Who Challenged the Doctors (Minneapolis: University of Minnesota Press, 1975); Victor Cohn, "Sister Kenny's Fierce Fight For Better Polio Care," Smithsonian, 12 (Nov. 1981): 180-200.

<sup>&</sup>lt;sup>37</sup> See, for a recent Canadian example, see Russell F. Taylor, *Polio '53: A Memorial for Russell Frederick Taylor* (Edmonton: University of Alberta Press, 1990).

<sup>38</sup> See, for example: Peter Marshall, Two Lives (London: Hutchinson & Co., 1962); D. Kirkendall and M.P. Warner, Bottom High to the Ground: The Story of One Man's Fight Against a Crippling Disease (New York City: Walker & Son, 1973); Betty Bannister, Trapped: A Polio Victim Fights for Life (Saskatoon: Modern Press, 1975); Young, Neil and Me; Louis and Dorothy Sternburg and Monica Dickens View From the Seesaw (New York City: Dodd, Mead & Co., 1986); L.R. Zimmerman and B.M. Dyck, When the Hedges are Down (Burlington, Ont.:

ortant polio studies that have recently taken fresh and more sophisticated approaches to understanding its broad impact on both the United States and Canada.<sup>39</sup>

Fundamental to any study of this disease is John R. Paul's, A History of Poliomyelitis, published in 1971, which covers the story from the perspective of one of the principal polio researchers. This is the most comprehensive work to date, but as an "internalist" work, it neglects the social and political dimensions that are crucial to understanding the full impact of epidemic polio. Other former polio researchers have also written short histories of this disease that, like Paul's text, offer valuable information and insights into the medical history of polio.<sup>40</sup> Next to Paul's work, of most importance is that of historian Saul Benison, who has published numerous articles on polio research. especially of the early, pre-March of Dimes era, as well as works on Albert Sabin, and an oral history text with one of the leading virologists in

See also Daniel J. Wilson, "Covenants of Work and Grace: Themes of Recovery and Redemption in Polio Narratives," *Literature and Medicine*, 13 (1994): 22-41; and his "'More Good Than a Gallon of Medicine:' Polio, Stigma, and the Inspiration of FDR," paper presented, Annual Meeting, American Association for the History of Medicine, Pittsburgh, May 1995.

Welch Publishing Co., 1987); Theresa Ducharme and Eric Jensen, Life and Breath: A Love Story (Winnipeg: Pro-Pal Promotions, 1987); Nancy B. Carter, Of Myths and Chicken Feet: A Polio Survivor Looks at Survival (Omaha: NPSA Press, 1992); Julie Johnston, Hero of Lesser Causes (Toronto: Lester Publishing Ltd., 1992).

<sup>&</sup>lt;sup>39</sup> Lorraine O'Donnell, "A 'Dread Disease:' The 1937 Polio Epidemic in Toronto," unpublished MA paper, Department of History, York University, August 1989; Margaret L. Grimshaw, "The Poliovirus Controversy, 1931-1941," MA Thesis, San Diego State University, 1989, and her "Scientific Specialization and the Poliovirus Controversy in the Years Before World War II," Bulletin of the History of Medicine, 69 (1995): 44-65; Gillian Liebenberg, "Disease and Disability: Poliomyelitis Rehabilitation and Social Reform for Disabled Persons in New Brunswick, 1941-1955," MA Thesis, University of New Brunswick, 1994; Naomi Rogers, "Trial and Error: Polio Prevention and Public Health in Alabama in 1936," presented at Annual Meeting, Organization of American Historians, Louisville, 1991. See also the just published monograph by Tony Gould, A Summer Plague: Polio and its Survivors (London: Yale University Press, 1995).

<sup>40</sup> David Bodian, "Poliomyelitis and the Sources of Useful Knowledge," Johns Hopkins Medical Journal, 138 (1976): 130-36; Albert B. Sabin, "Oral Poliovirus Vaccine: History of Its Development and Use and Current Challenge to Eliminate Poliomyelitis From the World," Journal of Infectious Diseases, 151 (1985): 420-36; Dorothy M. Horstmann, "The Poliomyelitis Story: A Scientific Hegira," Yale Journal of Biology and Medicine, 58 (1985): 79-90; Albert B. Sabin, "Role of My Cooperation With Soviet Scientists in the Elimination of Polio: Possible Lessons for Relations Between the USA and the USSR," Perspectives on Biology and Medicine, 31 (1987): 57-64.

polio research, Dr. Thomas Rivers, of the Rockefeller Institute for Medical Research in New York City.<sup>41</sup>

Polio epidemics have received uneven attention from medical historians. Detailed surveys of major epidemics are rare, with most being brief localized studies of individual outbreaks with few comparative examinations of epidemics over time and/or geographic region.<sup>42</sup> The most recent and sophisticated analysis of a polio epidemic is by Naomi Rogers, entitled *Dirt and Disease: Polio Before FDR*, which focuses on one of the greatest polio epidemics ever in the United States, which hit the Northeastern states in 1916.<sup>43</sup> As her title suggests, Rogers analyzes the period before Franklin D. Roosevelt was stricken by polio. This occurred in 1921 when the future U.S. President was 39 and about to be elected Governor of New York. Until then, polio was associated with dirt, flies and immigrants, much like other infectious diseases, despite the fact that it was striking suburban middle and upper class families far more often than the poorer urban areas where immigrants congregated.

<sup>&</sup>lt;sup>41</sup> These works by Saul Benison include: "The Enigma of Polio, 1910," in L.W. Levy and H. Hyman (eds.), Freedom and Reform: Essays in Honor of Henry Steele Commager, (New York City: Harper & Row, 1967), p. 235-41; "The History of Polio Research in the United States: Appraisal and Lessons," in G. Holton (ed.), The Twentieth Century Sciences: Studies in the Biography of Ideas (New York City: W.W. Norton & Co., Inc., 1970, 1972), p. 308-43; "Poliomyelitis and the Rockefeller Institute: Social Effects and Institutional Response," Journal of the History of Medicine, 29 (1974): 74-92; "Speculation and Experimentation in Early Poliomyelitis Research," Clio Medica, 10 (1975): 1-22; "International Medical Cooperation: Dr. Albert Sabin, Live Poliovirus Vaccine and the Soviets," Bulletin of the History of Medicine, 56 (1982): 460-83; Tom Rivers: Reflections on a Life in Medicine and Science (Cambridge, Mass.: MIT Press, 1967). Saul Benison is also planning to publish a similar oral history of Albert Sabin.

<sup>42</sup> Stuart Galishoff, "Newark and the Great Polio Epidemic of 1916," New Jersey History, 54 (1976): 101-11; Cross, "The Solomon Islands Tragedy;" Jay J. Hinkhouse, "Omaha: The Polio Years," Nebraska Medical Journal, 21 (1986): 238-41; M. Wilkinson, "Poliomyelitis Epidemic 1937: A Recollection," Australian Paediatric Journal, 24 (1988): 112-13; Kathleen H. Arsenault, "The Summer Nightmare: Poliomyelitis in Florida," Journal of the Florida Medical Association, 75 (1988): 526-31; Guenter B. Risse, "Revolt Against Quarantine: Community Responses to the 1916 Polio Epidemic, Oyster Bay, New York," Transactions and Studies of the College of Physicians of Philadelphia, Series 5, 14 (1992): 23-50.

<sup>&</sup>lt;sup>43</sup> Naomi Rogers, Dirt and Disease: Polio Before FDR, (New Brunswick, N.J.: Rutgers University Press, 1990); Naomi Rogers, "Dirt, Flies and Immigrants: Explaining the Epidemiology of Poliomyelitis, 1900-1916," Journal of the History of Medicine, 44 (1989): 486-505; Naomi Rogers, "Screen the Baby, Swat the Fly: Polio in the Northeastern United States, 1916," Ph.D. Thesis, University of Pennsylvania, 1986.

FDR's polio case, though carefully stage-managed by his handlers as he rose to the Presidency in 1932, defined a new era in the history of polio. If the rich and powerful FDR could get polio, it could not be as easily characterized as a poor man's disease, nor defined as "infantile paralysis."<sup>44</sup> Of most significance, however, was the founding of the National Foundation for Infantile Paralysis (NFIP) by FDR and his law partner Basil O'Connor in 1938. The NFIP's annual "March of Dimes" fundraising campaigns quickly became the most successful, by far, of any single voluntary health agency. Between 1938 and 1959 the March of Dimes raised a total of \$622,000,000, and for 325,000 Americans who could otherwise not afford it, spent half of this amount on unprecedented direct patient care services by paying medical, hospital and nursing bills. The NFIP also spent \$55,000,000 on polio-related research and \$33,000,000 on polio education services for physicians, nurses and physiotherapists. In 1954 alone, the March of Dimes raised almost \$68,000,000, and averaged close to \$30,000,000 per year through the latter 1950s.<sup>45</sup>

This level of philanthropy, based literally on the dimes of the American public, consistently dwarfed the fundraising efforts of other voluntary health organizations, such as the National Tuberculosis Association, the American Cancer Society and the American Heart Association.<sup>46</sup> Such success was often quite disconcerting to

<sup>44</sup> Jean Gould, A Good Fight: The Story of F.D.R.'s Conquest of Polio (New York City: Dodd, Mead & Co., 1960); Richard T. Goldberg, The Making of Franklin D. Roosevelt: Triumph Over Disability (Cambridge: 1981); Hugh G. Gallagher, FDR's Splendid Deception (New York City: Dodd, Mead & Co., 1985); John Duffy, "Franklin Roosevelt: Ambiguous Symbol for Disabled Americans," Midwest Quarterly, 29 (1987): 113-35.

<sup>45</sup> Carter, The Gentle Legions, p. 95-96; Sills, The Volunteers, p. 176-99.

Sills, The Volunteers, p. 177. In 1954 the Tuberculosis Association was second to the NFIP in fundraising with \$23,200,000, while the Cancer Society raised \$21,670,000, and the Heart Association raised \$11,350,000. A decade earlier these relative positions were even more dramatic and remained so into the 1960s; Gunn and Platt, Voluntary Health Agencies, p. 206-27; Hamlin, Voluntary Health and Welfare Agencies in the United States, p. 84-7. To compare, the average recipts for 1943 and 1944 were: NFIP, \$4,122,968; TB, \$732,464; Cancer, \$215,268; Heart, \$30,029. The average recipts for 1958, 1959 and 1960 were: NFIP, \$36,350,300; TB, \$29,089,600; Cancer, \$34,601,067; Heart, \$25,212,600. During the latter period the next most succesful organizations were the National Society for Crippled Children and Adults (\$17,433,033) and the United Cerebral Policy Associations (\$12,008,667). The American Red Cross was the only such voluntary organization to raise more than the

these other groups, as well as the medical profession and the federal governments on both sides of the border.<sup>47</sup> Canadian concerns about the NFIP intensified when an independent Canadian Foundation for Poliomyelitis (CFP) was founded in 1948 and planned its own "March of Dimes" campaigns. Climaxing in 1951, these concerns developed into a serious political effort to undermine the CFP and absorb its efforts into more generalized voluntary and government programs designed for all crippled children. Moreover, in light of elaborate provincial polio treatment and hospitalization policies, many questioned how the CFP would spend its money.

Underlying such political, voluntary and medical anxiety about the NFIP and polio, was the often repeated claim that polio was not worthy of the degree of public attention and money it generated. On a statistical basis many other diseases were more pervasive and deadlier health threats than polio. Their proper prevention, management, treatment and research efforts were being overshadowed by the admittedly tragic, though relatively minor health problem polio presented. Such arguments had little effect, since as pointed out by Richard Carter in his 1961 study of voluntary health organizations in America, *The Gentle Legions*,

It is probably fortunate that human beings hold statistics in limited veneration. Experience itself is often a more comprehensive and trustworthy guide to life's complexity. The so-called human equation has never been reduced to intelligible numbers. Thus, you could assure Americans of the pre-Salk era that paralytic polio was a comparatively rare disease hardly worth all the razzmatazz (as many doubters did), but you could not convince them, because they knew from experience that nothing was more frightening or tragic than a polio epidemic.<sup>48</sup>

There has yet to be written a scholarly study of the NFIP, or of voluntary health organizations generally. The pioneering 1957 sociological study of NFIP volunteers by David Sills, entitled *The Volunteers: Means and Ends in a National* 

NFIP, although it was not focused specifically on health problems. Over the 1958-1960 period the Red Cross raised an average of \$96,340,300 per year in the U.S.

<sup>47</sup> Carter, The Gentle Legions; Gunn and Platt, Voluntary Health Agencies, p. 206-27.

<sup>&</sup>lt;sup>48</sup> Carter, *The Gentle Legions*, p. 94. Carter's book mainly examined the American Red Cross, the National Tuberculosis Association, the American Cancer Society and the American Heart Association, but placed special emphasis on the NFIP.

Organization, has not been superseded by any other similar academic effort and Sills' text remains the best study of the NFIP in general. It is of particular importance for this dissertation because it provides a valuable analysis of the broader social phenomenon of polio.<sup>49</sup> Richard Carter's book is perhaps one of the best surveys of voluntary health agencies in general, but he is not an academic historian and his book was written for a general audience, which is also the case for a number of other polio studies, especially those that focus on the Salk vaccine story, including the recent book by Jane Smith, *Patenting the Sun: Polio and the Salk Vaccine.*<sup>50</sup>

Canadian scholarship in the history of polio is sparse. Work has been done on the relationship between the medical profession and the popular press in Ontario during polio epidemics from 1937 to 1953 in Ontario, as well as on epidemics in British Columbia, Manitoba and Toronto. Gillian Liebenberg, in her recent Masters thesis, has studied major New Brunswick epidemics with an emphasis on the impact they had on the development of rehabilitation services in that province.<sup>51</sup> The present study is thus a first effort to provide a national survey of the polio experience in Canada upon which other historians can build in more geographically and thematically focused studies.

See, in particular Sills' chapters, "Assisting Polio Victims," "Raising Funds" and "Giving to the March of Dimes." Sills also provides a useful section on the history of the NFIP (p. 42-48). See also Benison, *Tom Rivers*, for valuable details on the history of the NFIP.

<sup>&</sup>lt;sup>50</sup> John R. Wilson, Margin of Safety: The Story of Poliomyelitis Vaccine (London: Collins. 1963); Aaron E. Klein, Trial By Fury: The Polio Vaccine Controversy (New York City: Charles Scribner's Sons, 1972); Smith, Patenting the Sun: Polio and the Salk Vaccine.

<sup>51</sup> Christopher J. Rutty, "'Helpless:' The 1951 Ontario Poliomyelitis Outbreak: The Neil Young Case," The Mirror (University of Western Ontario Student History Journal), 9 (1989): 82-109; also published in Alan Jenkins (ed.), Neil Young and Broken Arrow: On a Journey Through the Past (Mid Glamorgan, Wales: Neil Young Appreciation Society, 1994), p. 95-112; Christopher J. Rutty, "'A Grim Terror More Menacing, More Sinister Than Death Itself:' Physicians, Poliomyel itis and the Popular Press in Early 20th-Century Ontario," MA Thesis. Department of History, University of Western Ontario, 1990; H.G. Mackie, "The Polio Epidemic of 1927," Okanagan Historical Society Annual Report, 29 (1965): 43-48; L.R. Sherman, "Manitoba's Response to a Major Epidemic of Poliomyelitis and the Consequences for Rehabilitation Services," University of Manitoba Medical Journal, 50 (1980): 80-83; O'Donnell, "A 'Dread Disease:' The 1937 Polio Epidemic in Toronto;" Liebenberg, "Death, Disease and Disability: Poliomyelitis and Social Change in New Brunswick, 1940-1965." See also MacDougall, Activists and Advocates, p. 147-58.

The principal themes of this dissertation are addressed within a chronological narrative and analytical structure made up of eight chapters. Chapter 1 provides some background to polio itself and its broader medical history and highlights the Canadian public health context up to 1927. The emergence of major polio epidemics in Canada between 1927 and 1946 and the development of specific provincial polio policies are the focus of chapters 2, 3 and 4. Three epidemic periods, or waves, are of interest during these years, each of which marked a distinctive phase in how various provincial governments responded to this disease. The first wave, 1927-1932, involved a number of provinces and coincided with intense enthusiasm for an immune serum which was freely provided in an effort to prevent or minimize paralysis. Major epidemics in Manitoba in 1936 and Ontario in 1937 are the focus of the second wave, during which provincial efforts were broadened to include free diagnosis, hospitalization and after-care. This period coincided with strong confidence in the potential of science and technology to meet the polio problem with iron lungs and a prophylactic nasal spray. The third wave (1941-1946) was marked by a lower degree of confidence in science and technology to provide a quick solution and an increase in interes' in the active treatment of polio generated by the popular, though controversial, therapeutic methods of Sister Elizabeth Kenny. Her methods were adopted by most provincial governments and led to an expansion in polio treatment policies.

Chapter 5 examines the creation of the Canadian Foundation for Poliomyelitis in 1948 and the controversy it generated in many provinces, in Ottawa, and among the medical profession and other voluntary health organizations. Chapter 6 concerns the further expansion of provincial polio policies during the fourth wave of major epidemics in all parts of Canada between 1947 and 1953 and the challenges they created both provincially and federally, especially with rising numbers of adult cases requiring iron lungs. During the unprecedented national epidemic of 1953,
#### Introduction

Ottawa became directly involved in its management on many levels, most notably by providing and distributing a very limited supply of gamma globulin.

Connaught's comprehensive polio research efforts led by A.J. Rhodes between 1947 and 1953, and the Laboratories' leading role in developing the methods that allowed Salk to prepare a practical polio vaccine are analyzed in Chapter 7. Of special interest is the funding and scientific interaction between Connaught and the NFIP. Chapter 8 examines the Salk vaccine story from the Canadian perspective and, in particular, focuses on the extraordinary effort undertaken by Connaught to provide sufficient poliovirus fluids to allow the unprecedented Salk vaccine field trial in the U.S. in 1954. The political repercussions of this trial in Canada and the relationships between R.D. Defries and provincial and federal health authorities such as G.D.W. Cameron and Paul Martin that led to a Canadian field trial of Connaught's vaccine are analyzed, followed by an examination of the American vaccine crisis of 1955 and its aftermath from the Canadian viewpoint. The Epilogue highlights the development and introduction of the Sabin vaccine in Canada between 1959 and 1962, its provincial and federal impact, and Connaught's leading role in its production, testing and international distribution.

This analysis of the polio experience in Canada is based on a wide variety of primary sources, the most important of which are the government records of the Department of National Health and Welfare, Canadian medical journals, and the extensive archive collection at Connaught Laboratories Ltd. in Toronto. The papers of the provincial departments of health, especially those of the deputy ministers of health in Ontario, Manitoba, Saskatchewan and Alberta, have been consulted, while annual reports from these and other provincial health departments have proven particularly useful. Other important sources include newspapers and popular magazines, and archival material at the University of Toronto, the Ontario March of Dimes, the Hospital for Sick Children in To. Jnto, and the Canadian Broadcasting Corporation.

#### Introduction

Valuable insights into these printed sources have been a series of interviews with key members of the polio research and vaccine production team at Connaught. An important supplement to an understanding of the personal impact of polio has been developed largely through a historical questionnaire collected through a network of provincial and local post-polio support groups across Canada (Exhibits 1, 2).<sup>52</sup>

<sup>52</sup> For reasons of confidentiality, in referring to these questionnaires last names have been reduced to an initial. Included in the reference are the year, age and place of onset, followed by the date the completed questionnaire was received, or other reference.

# CHAPTER 1:

#### Medical, Political and Popular Background to 1927

Poliomyelitis has been one of the most enigmatic and ironic infectious diseases in medical history. It was both an ancient endemic illness and a modern epidemic plague; an invisible, harmless and immunizing infection, yet also one of the most visible, destructive and intractable health challenges of the twentieth century. It was a disease popularly known as "infantile paralysis," but its most serious effects did not only involve infants, and paralysis, though dramatic and devastating, was its most misleading epidemiological feature. Nevertheless, polio is almost the only disease with the tragic capacity to inflict sudden paralysis in an otherwise healthy infant or child, as well as adult. Polio was also a disease that grew into a major health threat directly because of improving public health infrastructures. It is caused by one of the smallest and simplest viruses, which proved to be among the most complex microorganisms to understand, control and ultimately eradicate.<sup>1</sup>

Why was epidemic poliomyelitis such a scientific enigma? What actually caused it, how did it spread within and outside the human body, and why did it take so long for medical science to solve the puzzle? How much was known about polio by the time major Canadian polio epidemics emerged in 1927? What could physicians do about it then and how prepared were provincial governments for its sudden rise in incidence? This chapter addresses these basic questions in order to establish an understanding of the disease itself and the state of that knowledge up to 1927. Also of importance is the broader Canadian public health and media context during this early period.

Expanded Program on Immunization, Pan American Health Organization (PAHO), "Strategies for the Certification of the Eradication of Wild Poliovirus Transmission in the Americas," *Bulletin of the PAHO*, 27 (1993): 287-96; Harry F. Hull (*et al.*), "Paralytic Poliomyelitis: Seasoned Strategies, Disappearing Disease," *The Lancet*, 343 (May 28, 1994): 1331-37.

# 1.1) Passage Through Crisis:<sup>2</sup> The Disease

Paralytic poliomyelitis is an acute disease caused by the inflammation and destruction of motor neurons after an infection by any one of three immunologic types of the poliovirus. Before the introduction of polio vaccines, this virus was almost universally distributed internationally and caused an inapparent, harmless and immunizing gastrointestinal infection. Such infections far outnumbered those showing the recognizable symptoms and physical signs of the disease. This universality of infection was one of polio's main epidemiological traits, but it was also one of the most difficult for physicians and scientists to fully recognize and appreciate. As Paul stresses in his authoritative study, A History of Poliomyelitis, "The agent spreads, if given a chance, from one susceptible child to another, almost in the same manner that air rushes into a vacuum or water seeks its own level."<sup>3</sup> Invasion of the central nervous system and paralysis was a relatively rare complication when the poliovirus overwhelmed the body's immunological defenses. Worsening polio epidemics were due to a growing population of immunologically susceptible individuals of increasingly older ages. This was a situation created by the decreasing universality of poliovirus infection as public health infrastructures improved.

The poliovirus is transmitted by personal contact with an already infected individual and most often enters the body through the mouth. Faecal-oral contamination through such common routes as changing diapers, contaminated towels, food and other articles, and droplet infection to a lesser degree, introduces the virus into the throat and gastrointestinal tract. The virus then multiplies in the mucous lining of the intestinal wall and surrounding lymph nodes, as well as in the tonsils and lymphatic glands in the throat. No damage is done by the virus in these sites and

John R. Paul, A History of Poliomyelitis (New Haven: Yale University Press, 1971), p. 2.

<sup>&</sup>lt;sup>2</sup> Fred Davis, *Passage Through Crisis: Polio Victims and Their Families*, with a New Introduction by the Author (New Brunswick, NJ: Transaction Publishers, 1963, 1991).

there it meets the body's first line of defense. In many cases the infection stops at this stage with no outward signs of the struggle. Such individuals are nevertheless infectious since the virus is being continually excreted, unknowingly, throughout the entire active infection. Permanent immunity is the result of any polio infection, although only to the particular invading type.<sup>4</sup>

Between five and twenty five percent of those infected during a polio epidemic experience the minor illness of polio after about two to five days following exposure. This is a brief, mild, flu-like and non-paralytic episode which is generally disregarded. If the body's defenses fail to stop the virus in the intestinal tract and it enters the central nervous system via the bloodstream, then more distinctive symptoms emerge, such as a stiff neck and back, high fever and varying sites and degrees of muscle weakness. Should the virus be arrested at this stage without paralysis, as was true for most reported cases, it would be classified as an abortive case. However, if these symptoms persist and include paralysis then the most dangerous major illness stage is evident, signaling nervous system invasion, resulting in varying sites and degrees of lesions along the spinal cord to the midbrain. The higher the site of lesions, the higher in the body is the raralysis manifested, and the more severe and deadly is the potential outcome.

Frank paralytic cases occurred among only three to four percent of all poliovirus infections, but in a sizable polio epidemic the toll of disabled persons could reach alarming proportions. On average, about half of these paralytic cases recovered within about six months without serious disability. But even if only a third remained permanently paralyzed, in the wake of Canada's worst polio year in 1953, in which close to 9,000 cases were reported, some 3,000 Canadians were left with crippling disabilities.<sup>5</sup> From a public health perspective, however, paralytic polio cases

<sup>&</sup>lt;sup>4</sup> *Ibid.*, p. 1-4. See also H.V. Wyatt, "Poliomyelitis," in K.F. Kiple (ed.), *The Cambridge World History of Human Disease* (New York: Cambridge University Press, 1993), p. 942-50.

<sup>&</sup>lt;sup>5</sup> Paul, *History of Poliomyelitis*, p. 4. Paul cites an American example of 10,000 cases being reached during the peak epidemic years of the 1930s and 1940s.

represent but the tip of the epidemiological iceberg. In order to control the paralytic disease the far larger, invisible, though uneven, circulation of the three poliovirus types among a growing population of susceptibles had to be recognized and addressed. Without polio vaccines this process, and epidemics, would have continued.

The Salk and Sabin polio vaccines operate at two different points in the infection to prevent the development of the paralytic disease. The Salk vaccine stimulates poliovirus antibody production in the bloodstream through an injected, inactivated trivalent poliovirus solution.<sup>6</sup> The resulting circulating antibodies effectively block the poliovirus from entering the nervous system and thus prevent paralysis. The Sabin attenuated oral live vaccine stimulates antibody production and immunity in the gastrointestinal tract. This weakened virus multiplies and acts like a natural, but harmless poliovirus infection. It also has the benefit of naturally distributing the attenuated poliovirus strains in the community, thus allowing for secondary immunization. Moreover, the live vaccine can control wild poliovirus outbre ks by rapidly displacing the wild virus with the attenuated strains.<sup>7</sup>

The paralytic effects of polio varied considerably from case to case in site and severity of weakness or paralysis. Over time these effects also changed during the initial onset of the disease; some functions worsened, while others improved and recovered, either spontaneously or through physiotherapy. While paralysis was often localized in a particular muscle group, in many cases such effects were combined with paralysis in other limbs or muscle groups in separate areas of the body. Complete, or near total paralysis, usually from the neck down, requiring the respiratory support of an iron lung, was a growing and challenging medical and technological problem. Polio was most dangerous when the swallowing muscles in the throat were affected and an iron lung and/or tracheotomy was necessary. These life-

<sup>&</sup>lt;sup>6</sup> The Salk vaccine contains selected strains from each of the three distinct poliovirus types.

<sup>&</sup>lt;sup>7</sup> The Sabin vaccine can be offered in a trivalent form, but is often prepared with separate monovalent doses of each virus type.

threatening symptoms were the result of poliovirus damage to the "bulbar," or upper spinal cord and lower brain stem motor neurons.<sup>8</sup>

Dr. Peter Cameron, who was stricken with total paralysis in 1952 while a graduate medical student in Saskatchewan, later looked at polio's effects philosophically: "We have to admire the idiosyncrasy displayed by the [polio] virus in attacking very specifically the one cell in the body that controls voluntary muscle contraction."<sup>9</sup>

One of the most disturbing features of the acute polio experience was the sharp discontinuity between the potentially devastating effects of the illness, juxtaposed against the mundane and seemingly innocuous symptoms of polio's early stage. For the families in Fred Davis' *Passage Through Crisis: Polio Victims and Their Families* study, this was one of the "most sinister aspects" of contracting polio; "In retrospect, the deceptively commonplace appearance of the prodromal symptoms imparted elements of unreality, even treachery, to the whole crisis experience."<sup>10</sup> According to Canadian polio survivors, the most memorable of these early symptoms were pain in the spine, back, waist, knees or legs, headaches, high fever, a bad chill, nausea, a stiff neck, weakness and "tearful fatigue." All of these symptoms were characteristic of a "severe flu."<sup>11</sup> Headaches were particularly noteworthy, often described as "bad," "severe," "violent, " "intense," "terrible," "splitting," or distinctively "stran-

<sup>8</sup> There are five groups of bulbar polio syriptoms: 1) the bulbar-cranial nerve nuclei, causing difficulty in svallowing; 2) the bulbar-respiratory centre, upsetting the rate and depth of breathing, but not affecting respiratory muscle function; 3) the bulbar-circulatory centre, impairing autonomic control of circulatory function causing a shocklike state; 4) the bulbar-encephalitic region, upsetting more general cerebral function and causing confusion, twitching, anxiety and convulsions; and 5) the bulbar-cervical cord, weakening or paralyzing the diaphragm and chest muscles, and often occurring in combination with either of groups 1, 2 and 3, and for which respirator treatment was most often used; J.M. Bowman, "The Management of Bulbar Poliomyelitis," University of Manitoba Medical Journal, 21 (Feb. 1950): 124-33. See also H.C.A. Lassen (ed.), Management of Life-Threatening Poliomyelitis, Copenhagen, 1952-1956 (Edinburgh and London: E. & S. Livingstone Ltd., 1956).

<sup>9</sup> Peter Cameron, "Polio - A Second Challenge," in Proceedings of Ontario March of Dimes Conference: Polio - A Second Challenge, Toronto, November 1-2, 1986 (Toronto: Ontario March of Dimes, 1987), p. 35.

<sup>10</sup> Davis, Passage Through Crisis, p. 22-23.

<sup>&</sup>lt;sup>11</sup> Joy A. J. (1944, age 3, Winnipeg, Man.), June 1993.

ge.<sup>\*12</sup> For a New Brunswick fisherman the onset of polio began with a "bad headache" that he recalled was "the only one I ever had.<sup>\*13</sup> The pain of the early onset of polio was also remembered in similarly vivid terms.

Faced with these vague symptoms and no specific diagnostic test, the most basic problem for physicians was making an accurate diagnosis, hopefully before paralysis appeared. Professionally and emotionally, this was extremely frustrating for physicians who, since the 1910s had become reliant on such precise diagnostic tools as the Schick test for diphtheria, the Widal test for typhoid, the tuberculin test for TB, and the Wassermann test for syphilis. Differentiating the early symptoms of polio, which mimicked a variety of other common childhood diseases, strained the clinical observation skills of private physicians. Pre-paralytic polio symptoms were also similar to other more serious "virus" diseases of the central nervous system that grew more prominent in the early twentieth century. These included acute aseptic meningitis, as well as various types of encephalitis, or "sleeping sickness"<sup>14</sup>

Thus, in most cases the initial diagnosis of polio was difficult and delayed, usually until the appearance of paralysis made the diagnosis obvious. There were many "baffled" doctors who had to get advice from textbooks or other doctors. Delays pushed parents to seek out second and third opinions to establish an accurate diagnosis. Misleading diagnosis and outright misdiagnosis were also common. Appendicitis, food poisoning, pleurisy and alcoholism were frequently confused with the early

Helen W. (1952, age 22, Dryden, Ont.), September 1993; Barbara D. W. (1951, age 11, Toronto, Ont.), September 1993; Clarice R. (1955, age 40, Prince Albert, Sask.), August 1993; Betty K. (1951, age 25, Fruitvale, BC), August 1993; Martha Smith (1953, age 22, Winnipeg, Man.), Steve Whysall, "The 20 Who Can't Forget the 1953 Polio Epidemic," Winnipeg Tribune, (Nov. 21, 1978) and University of Manitoba Medical Journal, 50 (1980); 97-8; Betty Bannister, (1953, age 27, Elk Horn, Man.), "The 20 Who Can't Forget the 1953 Polio Epidemic," and Peter Carlyle-Gordge, "Summer of Fear," Winnipeg Magazine, (June 1983) and see also her Trapped: A Polio Victim's Fight For Life (Saskatoon: Modern Press, 1975); Jean E. K. (1953, age 34, Barrie, Ont.), June 1993.

<sup>&</sup>lt;sup>13</sup> Sherwin B. (1960, age 29, Grand Manor, NB), June 1993; Denise B. (1928, age 6, Drumheller, Alb.), November 1993.

<sup>14</sup> Paul, History of Poliomyelitis, p. 166-76; Editorial, "Infantile Paralysis and Cerebro-Spinal Infections," CMAJ, 15 (May 1925): 530-32.

symptoms of polio, as were scarlet fever, and most commonly, "the flu." Often the doctor confidently declared that whatever the problem was, it was "not polio" and thus there was no need for parents to worry.<sup>15</sup>

The final arbiter in making an official diagnosis of polio was the lumbar puncture or "spinal tap." This procedure emerged in the 1890s and became useful for diagnosing meningitis. It involved inserting a needle between the vertebrae and drawing off a small amount of spinal fluid for microscopic examination for particular cells that could then be cultured.<sup>16</sup> For polio, while a spinal tap and a characteristic cell count rendered an official polio diagnosis, by the time this was done it was often too late. Moreover, in most cases, beyond confirming the obvious for physician and parents, a spinal tap served no real practical purpose since the poliovirus could not be cultured outside a living host before 1949. This was the most serious obstacle in the accurate understanding and effective control of this disease.

# 1.2) The Enigma of Poliomyelitis:<sup>17</sup> Polio and Medical Science to 1927

There are records of the paralytic poliomyelitis as far back as ancient Egypt. The poliovirus was endemic and almost always harmless, but isolated cases of paralysis developed in the very young over the centuries. It was not until the late eighteenth century that physicians first described such effects systematically, although the first name, "debility of the lower extremities" did not sound very precise. Thereafter the nomenclature of the disease kept pace with the changing understanding of it. Between 1840 and 1870 a series of more specific names were used, all of which stressed the paralytic effects, but which reflected the confusion surrounding the site

<sup>&</sup>lt;sup>15</sup> Pat M. (1930, age 4, Barrie, Ont.), June 1993; Inez S. (1947, age 23, Moose Jaw, Sask.), May 1993; Jean H.C. (1952, age 33, Mistawasis Indian Reserve, Leask, Sask.), June 1993.

Harry F. Dowling, Fighting Infection: Conquests of the Twentieth Century (Cambridge, Mass.: Harvard University Press, 1977), p. 51.

<sup>&</sup>lt;sup>17</sup> Saul Benison, "The Enigma of Poliomyelitis, 1910," in H.M. Hyman and L.W. Levy (eds.), Freedom and Reform: Essays in Honor of Henry Steele Commager (New York City: Harper & Row, 1967), p. 228-54.

of the damage that caused them. In 1860, the German orthopaedist Jacob Heine, first correctly observed the spinal cord as the seat of trouble. The characteristic lesions in the grey matter in the anterior horn of the spinal cord were recognized a decade later. In 1874, the term "poliomyelitis" was first used to describe such lesions, derived from the Greek "polios" = grey, "myelos" = marrow, and the Latin "itis" = inflammation. The French, in the meantime, had originated the term "paralysie atrophique graisseuse de l'enfance," which was later anglicized to "infantile paralysis," which stuck in the popular mind. The more impressive scientific term "poliomyelitis" was almost superseded for a time after 1907 by "Heine-Medin disease." This was in honor of Heine, and Oskar Medin, a Swedish pediatrician who studied the first Swedish epidemics in the 1890s and first brought world attention to the disease.<sup>18</sup>

The suggestion that polio might be an infectious disease did not emerge until about 1880 in the wake of a number of localized outbreaks in Scandinavia and the first significant epidemic in 1881 in Sweden. But this idea was not acceptable to the medical profession, which long resisted such a concept despite increasing incidence and indirect evidence of contagiousness. The problem was that it was difficult, if not impossible, to establish direct relationships among paralytic cases. Also, multiple cases of paralytic polio among families were quite rare. During another Swedish epidemic in 1887, Medin carried out the first clinical study of a group of cases and suggested that there was an initial systemic phase of illness in some cases before paralysis developed. It seemed to him that paralysis might actually be a relatively rare complication of such an illness.<sup>19</sup>

The first North American polio epidemics were reported in the 1890s, notably in Boston in 1893 and Vermont in 1894, the latter involving 132 paralytic cases. It was also the first epidemic to be closely studied by a full time public health official, Charles S. Caverly of the Vermont Department of Public Health. Caverly also recog-

19 *Ibid.*, p. 71-78.

<sup>18</sup> Paul, History of Poliomyelitis, p. 4-9.

nized the existence of abortive cases, as well as a shift in the age incidence pattern into older children than had previously been reported. But as he could not establish a clear relationship between paralytic cases he did not believe the disease was contagious. Caverly also went on to help provide after-care services in Vermont for polio cases and was instrumental in establishing a polio research laboratory at Harvard University. He had a strong feeling that he had to "do something about a disease which had singled out his state and cruelly invaded it."<sup>20</sup> This feeling grew more common as epidemics worsened while means to stop them remained unknown.

Medin's work was taken up by his student, Ivar Wickman, who carried out more intensive clinical, as well as epidemiological studies of polio epidemics in 1899, 1903, and especially in 1905 in which more than 1,000 cases were reported. Wickman stressed the epidemiological importance of abortive cases to the spread of the disease. This became evident to him by studying the relative incidence between rural and urban areas; the former being ravaged by polio much more than the latter. Polio outbreaks in small villages provided an opportunity to trace more easily inapparent case contacts. His work also raised the complex statistical problem of how to count cases. He recognized that paralytic cases were less epidemiologically important to the spread of the disease, but there was no way to precisely identify and control the movement of inapparent or abortive cases. Wickman's views appeared radical, as doctors felt it was ridiculous to diagnose polio without paralysis. But he was on the right epidemiological track, despite not knowing the precise viral cause of polio.<sup>21</sup>

There were early hopes that a bacteria would be discovered as the cause of polio since a "filterable virus" would be considerably more difficult to isolate and study. Virology at the turn of the twentieth century was in an embryonic state with

<sup>20</sup> Ibid., p. 79-87. See also Vermont State Department of Public Health, Infantile Paralysis in Vermont, 1894-1922: A Memorial to Charles S. Caverly, M.D. (Burlington: Vermont State Department of Public Health, 1924).

<sup>21</sup> Paul, History of Poliomyelitis, p. 71-78.

only a small number of viruses isolated.<sup>22</sup> Viruses needed living cells in which to multiply and as tissue culture methods were unknown, a living host was required to establish the presence, pathology, and transmission of a virus.<sup>23</sup> Finding an animal host susceptible to paralytic polio was difficult until 1908, when Karl Landsteiner of Vienna, was able to inoculate monkeys with a ground suspension of spinal cord from a fatal human case. He had unsuccessfully experimented with rabbits, guinea pigs and mice when he decided to risk the expense of inoculating two monkeys of different species with the suspension. It was injected intraperitoneally and after an autopsy Landsteiner was able to demonstrate the characteristic lesions of polio in the cord and brain of both the original human case and the monkeys. He also concluded that a filterable virus was responsible. He was fortuitous in his choice of Old World monkey species that were particularly susceptible to experimental polio, Cynocephalus hamadryas and Macaca rhesus. New World species were less so. In order to definitively establish that a particular microorganism was the cause of the disease, Landsteiner was more systematic in following the strict rules of Robert Koch, established in 1894. Koch's postulates required: 1) the presence of the organism in all cases of the disease in such a way as to explain the lesions; 2) the isolation of the specific organism in a pure culture; and 3) the reproduction of the disease in animal hosts by inoculation of the particular organism. Landsteiner only satisfied the last two postulates, and not the first at all, which took several more years of experimental work to firmly establish.<sup>24</sup>

Landsteiner's results were quickly confirmed by others, as was the existence of the poliovirus. This discovery raised a host of new questions about polio and new problems of how to study the disease. Well-equipped laboratories with proper facil-

<sup>&</sup>lt;sup>22</sup> These included the viruses that caused smallpox, vaccina, rabies and foot in mouth disease.

<sup>23</sup> Alfred Grafe, A History of Experimental Virology, translated by Elvira Reckendorf (Berlin: Springer-Verlag, 1991); Ton van Helvoort, "History of Virus Research in the Twentieth Century: The Problem of Conceptual Continuity," History of Science, 32 (1994): 185-235.

<sup>&</sup>lt;sup>24</sup> Paul, *History of Poliomyelitis*, p. 98-106. Intraperitoneally refers to injecting into the membrane that lines the abdominal cavity.

ities to house and handle monkeys and carry out pathological studies were necessary. Monkeys were particularly expensive to acquire and difficult to handle. This limited the number of institutions able to conduct polio research during the first decades of the century. One of the most important of these was the Rockefeller Institute for Medical Research in New York City, where Simon Flexner quickly became the dominant authority on the disease. In 1909, Flexner was able to transmit the virus between monkeys and thus establish the virus outside the human body. Flexner had been involved in polio research since a New York City epidemic in 1907 and had just completed a successful attack on menigococcal meningitis. He had transmitted the disease to monkeys and prepared a meningitis antiserum in horses which modified the disease in monkeys. In light of the successful and often dramatic use of serums or anti-toxins against meningitis and other diseases (diphtheria, tetanus, pneumonia), after hearing of Landsteiner's discovery, Flexner was confident that he would enjoy similar success in solving the problem of polio through the use of monkeys and a protective polio serum. He was further encouraged when the immune serum of convalescent monkeys was able to neutralize the active poliovirus in a test tube.

Flexner was determined to place American medicine on a firm scientific base through laboratory research. But it was in the laboratory where Flexner and most polio researchers largely remained until the 1930s. Some valuable information was discovered about the poliovirus and how it caused the disease in monkeys under the misleading assumption that this was an accurate model for the human disease. The virus seemed to infect only the nervous system in monkeys, but was also present in a small number of non-neural sites, particularly the nasopharynx after direct inoculation there. Like meningitis, polio thus appeared to be a respiratory infection with the virus spread by infected droplets, followed by direct nervous system invasion via the olfactory bulb. Yet, this did not explain polio's characteristic summer incidence pattern since other respiratory infections largely occurred in the winter.

This kind of experimental laboratory information had limited practical value to physicians, many of whom turned desperately to Flexner for advice as polio incidence sharply rose across North America. How long was a child infectious? How can polio's apparent lack of contagiousness be explained? What was the best form of treatment? Such questions were left unanswered, although Flexner exhorted physicians to carry out their own laboratory work and send him tissue samples to study. A basic problem for North American physicians prior to 1917 was a lack of an up-todate medical textbook on polio in English.<sup>25</sup>

In focusing almost solely on the paralytic pathology of polio in monkeys, almost no attention was given to the gastrointestinal tract by American researchers until the late 1930s. This was despite the encouraging results of Swedish investigators, led by Carl Kling, who in 1911 had isolated the poliovirus from the intestinal contents of living patients with both abortive and frank paralysis. Moreover, the virus was persistently recovered from stool samples for months. These findings raised practical problems in trying to quarantine convalescent cases: how long should and could they be kept in isolation? Kling's colleague, Wilhelm Wernstedt, even suggested that immunity was acquired naturally in most of the population from inapparent infections during epidemics. It was between such epidemics that a population of new susceptibles grew among the children born in the interim. This seemed to explain polio's characteristic age incidence pattern. However, these results were indifferently received by American researchers under the influence of Flexner and the experimental monkey model of polio. These results were also

<sup>25</sup> Ibid., p. 107-25. On Flexner and his polio studies at the Rockefeller Institute see the following works by Saul Benison: "The Enigma of Poliomyelitis, 1910;" "The History of Poliomyelitis Research in the United States: Appraisals and Lessons," in G. Holton (ed.), The Twentieth Century Sciences" Studies in the Biography of Ideas (New York City: W.W. Norton & Co. Inc., 1970, 1972), p. 308-18; "Poliomyelitis and the Rockefeller Institute: Social Effects and Institutional Response," Journal of the History of Medicine, 29 (1974): 74-92; "Speculation and Experimentation in Early Poliomyelitis Research," Clio Medica, 10 (1975): 1-22. The first such textbook was George Draper, Acute Poliomyelitis (Philadelphia: P. Blakiston's, 1917). A thoroughly revised second edition was published in 1935.

difficult to reproduce in the U.S. as "painfully few" researchers were able or willing to conduct focused epidemiological and clinical studies during a major epidemic. "To the skeptics the idea was incredible." The Swedish model was nevertheless essentially correct, but it took another 25 years before it was widely accepted.<sup>26</sup>

In the meantime, polio researchers tried to explain epidemics and the particular susceptibility of children to them through the agency of the housefly<sup>27</sup> and a characteristic physical constitution among susceptibles. In the latter case, George Draper believed only children with certain physical characteristics were vulnerable to polio. This was typically "the large, well-grown, plump individual who has certain characteristics of face and jaws, is broad browed, and broad of face." While Draper was confident in this innate susceptibility to polio through the mid 1930s, few others were able to perceive such subtle features and his theory went the way of many other hopeful, but difficult to prove ideas about polio.<sup>28</sup>

Houseflies, increasingly perceived by public health authorities as "germs with legs," were a popular target of blame for one of the greatest polio epidemics ever. It quickly made polio one of "three great epidemic diseases," along with streptococcus pneumonia and influenza.<sup>29</sup> This polio epidemic struck the northeastern United States in 1916, causing some 27,000 paralytic cases and 6,000 deaths, with New York City bearing the brunt with 9,000 cases. Also blamed were poor immigrants and the dirt and disease popularly associated with their lifestyle, despite the fact that most cases occurred among middle and upper class children. It was the fly that was

Paul, History of Poliomyelitis, 126-36. One of the few American polio researchers interested in polio epidemiology, and who investigated numerous polio epidemics during the 1910-1930 period was Wade Hampton Frost of the U.S. Public Health Service. See Paul, History of Poliomyelitis, p. 137-47.

<sup>27</sup> Ibid., p. 132; Naomi Rogers, "Germs With Legs: Flies, Disease, and the New Public Health," Bulletin of the History of Medicine, 63 (1989): 599-617.

<sup>28</sup> Paul, History of Poliomyelitis, p. 162-63, and on Draper more generally, p. 161-66. See also Sarah W. Tracy, "George Draper and American Constitutional Medicine, 1916-1946: Reinventing the Sick Man," Bulletin of the History of Medicine, 66 (1992): 53-89.

<sup>&</sup>lt;sup>29</sup> Editorial, "Epidemiology and Recent Epidemics," CMAJ, 9 (1919): 1022-24.

believed to have brought the disease across class lines.<sup>30</sup> Indeed, in the absence of useful information and desperate groping in the dark by doctors, health authorities and the public alike, everything was suspected of carrying the poliovirus. But unlike during the earlier Swedish epidemics, minimal scientific effort was directed into taking advantage of the epidemic to collect data on the distribution of the virus in the human body and environment. Under Flexner's influence, reinforced by a dependence on monkeys that very few researchers could afford to experiment with, studies were limited to inoculating a small number of monkeys and carrying out numerous "trials" of the highly touted polio serum.<sup>31</sup>

The 1916 epidemic marked a high-water mark in attempts to enforce drastic isolation and quarantine measures, most notably the introduction of strict travel restrictions on all children under 16 years of age. They were not allowed to leave New York City without official certification that they were free of polio.<sup>32</sup> With the 1916 epidemic spreading north, especially in Montreal, the Canadian government also closed the border to such children unless they had the proper travel certificates.<sup>33</sup> Some claimed that strict quarantine measures had helped check previous epidemics. However, the principal rationale underlying them was that "there was little else to do in the way of control and here was a visible effort, indicating that at least something was being done about the problem."<sup>34</sup>

<sup>&</sup>lt;sup>30</sup> Naomi Rogers, "Dirt, Flies and Immigrants: Explaining the Epidemiology of Poliomyelitis, 1900-1916," *Journal of the History of Medicine*, 44 (1989): 486-505; Naomi Rogers, *Dirt and Disease: Polio Before FDR* (New Brunswick, NJ: Rutgers University Press, 1990).

<sup>31</sup> Paul, History of Poliomyelitis, 152-60, 190-96. Rogers, Dirt and Disease, p. 96-105. See also Haven Emerson, A Monograph on The Epidemic of Poliomyelitis (Infantile Paralysis) In New York City in 1916 (New York City: Department of Health of New York City, 1917) (Reprint edition, New York City: Arno Press, 1977).

<sup>32</sup> Paul, Ibid., p. 149; Rogers, Ibid., p. 33-38; Guenter B. Risse, "Revolt Against Quarantine: Community Responses to the 1916 Polio Epidemic, Oyster Bay, New York," Transactions and Studies of the College of Physicians and Surgeons of Philadelphia, Vol. 14 (1992): 23-50.

<sup>33</sup> Medical certificates were needed for U.S. children under sixteen to enter Canada. See federal correspondence, National Archives of Canada (NAC) RG29, Vol. 300, file 416-2-13; Editorials: "The Recent Epidemic of Poliomyelitis," CMAJ, 6 (Oct. 1916): 916-22; "Infantile Paralysis," CMAJ, 6 (Dec. 1916): 1111-13.

<sup>34</sup> Paul, History of Poliomyelitis, p. 148-49.

The issue of quarantine remained controversial through the entire epidemic era.<sup>35</sup> The Swedish work suggested that during any polio epidemic the number of recognized polio cases amounted to less than 10% of infected persons,<sup>36</sup> but in 1916 only a few polio experts were aware of these results and recognized the futility of strict quarantines. For physicians and public health officials, when faced with the complex and frightening problems associated with epidemic polio, such ideas held little practical appeal as they further restricted what could be publicly done about this disease. Mounting public fear of polio necessitated visible action to protect children, including strict quarantine efforts. However, as the nature of polio became better understood, such actions grew more obviously ineffective. Still, the practice of quarantine persisted because little else was possible to prevent or contropolio.

By 1910 polio had been recognized as a reportable disease in only about half the American states. This slow process was due to the questions surrounding polio's degree of communicability, the serious difficulties of diagnosis and deciding what was, and was not to be considered a *bona fide* case of polio, and by a general neglect at the time in collecting morbidity statistics.<sup>37</sup> In Canada, provincial governments varied in the reportability of polio. For example, in Ontario, polio was considered a reportable disease from 1910, while in Manitoba this did not happen until 1918.<sup>38</sup> National polio figures in Canada were not available until 1924 and even in 1954 there remained variations in how some provinces reported this disease.<sup>39</sup>

<sup>35</sup> For an early Canadian (London, Ont.) view critical of strict quarantine see Capt. H.W. Hill, "Poliomyelitis," *Canadian Practitioner and Review*, 43 (Feb. 1918): 39-41.

<sup>36</sup> *Ibid.*, p. 149.

<sup>37</sup> Ibid.; Benison, "The History of Polio Research in the United States," p. 335, note #3.

<sup>38</sup> Ontario Department of Health, Report on Poliomyelitis in Ontario, 1937, (Toronto: Ontario Department of Health, March 1938), p. 1-2; J.D. Adamson and Maxwell Bowman, "History of Poliomyelitis in Manitoba," Manitoba Medical Review, 35 (June-July 1955): 339.

<sup>39</sup> R. Kohn, "Some Figures on Poliomyelitis in Canada," Canadian Journal of Public Health, 45 (June 1954): 225-35.

1.3) Polio and Physicians to 1927

The treatment options open to family physicians in the face of individual polio cases, or an epidemic were extremely limited, and remain so today. Within the prevailing context of the serum era that began with diphtheria antitoxin in the 1890s, and lasted through the 1930s, the first great hope for controlling paralytic polio was a human antipolio convalescent serum. Similar human serums were also used to minimize the severity of measles, scarlet fever and whooping cough.<sup>40</sup> Polio serum was prepared from the blood of individuals who had recovered from an attack of polio, and which possessed poliovirus antibodies. Convalescent serum was first used for polio prophylaxis in France in 1915 and was celebrated as a discovery of major importance. Serum therapy was promptly taken up by individual physicians during the 1916 New York City epidemic and Flexner carried out a small uncontrolled therapeutic trial.<sup>41</sup> Despite limited results, further serum trials vere done on this rather haphazard basis until the late 1920s when more "controlled" studies were finally attempted. These trials seemed to support the idea that the serum had "definite therapeutic value."<sup>42</sup>

In Canada, during the period of low polio incidence before 1927 there was little enthusiasm for the serum, although the *British Medical Journal* considered that its use "has definitely passed out of the experimental stage."<sup>43</sup> It was not yet prepared by provincial laboratories, nor by Canada's central serum institute, Connaught Laboratories at the University of Toronto. Just prior to the onset of Canada's first major

<sup>40</sup> Wm. Warwick, "Convalescent Serum in the Prevention of Measles," CMAJ, 21 (Dec. 1929): 694-96; W. Thalhimer, "Convalescent Measles and Scarlet Fever Serums: their use in Prophylaxis and Therapy," CPHJ, 31 (Feb. 1940): 51-55; Current Health Literature, "The Use of Pooled Human Serum in Experimental Pertussis," CPHJ, 32 (Sept. 1941): 489.

<sup>41</sup> Paul, A History of Poliomyelitis, p. 190-91.

<sup>42</sup> Editorial, "On Acute Poliomyelitis," CMAJ, 17 (Apr. 1927): 454.

<sup>43</sup> Editorial, "Serotherapy in Poliomyelitis," CPHJ, 18 (Jan. 1928): 76; J.G. FitzGerald, An Introduction to the Practice of Preventive Medicine, (St. Louis: C.V. Mosby, 1922), p. 124; Editorial, "Serum in the Treatment of Acute Poliomyelitis," CMAJ, 16 (Jan. 1926): 75-6.

epidemic wave, a British epidemic in 1925 and 1926 focused the main discussion about polio, which was "a disease always to be regarded with particular anxiety by the physician." It was impossible to accurately predict how serious its paralytic effects might be in any given case, and as there was no specific agent available, "the best treatment may be summed up in one word - *Rest.*"<sup>44</sup>

Canadian doctors had a very limited arsenal to treat acute polio patients. Discussed along with the serum were a small number of other treatments, including various types of animal-based immune sera.<sup>45</sup> One was "Rosenow's serum," which was made "by immunizing horses with the pleomorphic streptococcus," a bacteria Dr. E.C. Rosenow of the Mayo Clinic firmly felt was responsible for polio. Rosenow's serum was easily made and often used when convalescent serum was unavailable, or in limited supply.<sup>46</sup> Other such animal serums were often used, usually an anti-meningococcic serum which some felt helped against polio.<sup>47</sup> Otherwise, doctors turned to various pain killers and such drugs as urotropin, hexamine, adrenaline and hypertonic saline, although none of these were particularly effective.<sup>48</sup>

There were significant problems with convalescent serum during its early use that distinguished it from most other serums, and which were rarely acknowledged as it grew in popularity among American physicians. Administration techniques were cumbersome and time consuming, the source, potency and dosage were not standardized, nor was the route of inoculation. The most serious problem was the

<sup>44</sup> Editorial, "Epidemic Polionyelitis in England," CMAJ, 17 (Jan. 1927): 104.

H.B. Cushing, "An Address on the Use of Immune Sera," CMAJ, 14 (June 1924): 477-79;
Editorial, "Infantile Paralysis and Cerebro-spinal Infections," CMAJ, 15 (May 1925): 530-2.

E.C. Rosenow, "Abstract of Discussion" JAMA, 91 (Aug. 11, 1928): 393; R.B. Jenkins, "Some Findings in the Epidemic of Poliomyelitis in Alberta, 1927," CPHJ, 20 (May 1929): 222; Paul, History of Poliomyelitis, p. 156.

<sup>&</sup>lt;sup>47</sup> J.H. Crouch, "An Epidemiological Study of Poliornyelitis in Montana in 1928," Journal of Preventive Medicine, 2 (1929): 460. M.M. Seymour and W.J. Bell, "Convalescent Serum in Epidemic Poliomyelitis," CPHJ, 19 (Oct. 1928): 480; Paul, Ibid., p. 197-98.

<sup>&</sup>lt;sup>48</sup> Editorial, "On Acute Poliomyelitis." CMAJ, 17 (Apr. 1927): 454; M.D. Morrison, "Poliomyelitis Anterior Acuta," Nova Scotia Medical Bulletin, 5 (Feb. 1926): 9; O.J. Day, "Poliomyelitis in Manitoba in 1928," CMAJ, 21 (Nov. 1929): 557.

question of which patients to treat and when to treat them. A "positive" spinal fluid test was requisite before the serum was given and the doctor risked the wrath of the parents if it was withheld to satisfy the rules of statistical science. A positive result generally indicated central nervous system invasion. If the doctor waited for a positive spinal tap, by then the major phase of the illness had started and lesions would likely have been produced. At this point it was unlikely the serum had any therapeutic effect. Moreover, a high percentage of patients with negative spinal fluid findings recovered uneventfully, while a smaller, but significant proportion of those with the major illness also recovered spontaneously. Under such circumstances, it is remarkable that any conclusions about the serum's value were possible. Strict rules for the standardization and use of the serum were not mandatory and its administration was the responsibility of the individual physician during its early use in the U.S. Faced with the moral dilemma of withholding the serum, scientific discipline lapsed and every benefit of the doubt was given by physicians in the hope of seeing improvement in paralysis.<sup>49</sup>

Within a context of strong confidence in the efficacy of immune serums generally and despite these difficulties, some argued that if the clinical diagnosis of polio was early enough, and on the fine line between the minor and major phases of the disease, these difficulties could be overcome. George Draper, in particular, thought that in a well-organized campaign to combat polio epidemics there needed to be a "sufficient number of doctors with clinical and laboratory experience working from a central office or laboratory, to go on call ready to do lumbar punctures and give serum." In the U.S. such "an elaborate scheme" was rarely implemented.<sup>50</sup> In Canada, however, after 1927, this became the standard practice of most provincial health departments and the start of an expanding strategy to manage paralytic polio.

<sup>49</sup> Paul, Eistory of Poliomyelitis, p. 190-96.

<sup>50</sup> Ibid., p. 195, quoting Draper, Acute Poliomyelitis (1917), p. 87-88.

#### 1.4) Canadian Public Health and the State to 1927

Before 1927, Canadian polio outbreaks were generally small and localized and attracted minimal provincial government attention. The first recorded outbreaks occurred in 1910 with 38 cases in Montreal, 75 in British Columbia, and 179 reported cases in Ontario.<sup>51</sup> The 1916 American epidemic spilled over the border and brought a new incidence peak in some provinces which was not surpassed until after 1927.<sup>52</sup>

A better statistical reflection of the relative severity of polio incidence, other than referring to the total number of cases, was expressing it in terms of a "case rate," or the per capita rate of case notification in a population of 100,000 in a given area. It is important to note, however, that such statistics have limited value, especially when used comparatively on an international scale. Varying definitions of polio notification within and among different countries, diagnostic error, and limited, unever, and non-reporting by physicians, as well as over-reporting during epidemics, rendered polio statistics particularly problematic. Collecting and interpreting polio incidence statistics was plagued primarily by the question of whether or not to count abortive or non-paralytic cases. These figures are, nevertheless, a relatively accurate reflection of rising paralytic polio incidence in different parts of Canada that provincial governments could not ignore.<sup>53</sup>

How involved were provincial governments generally in actively providing public health services, such as free prophylactics, diagnosis and hospital treatment,

<sup>51</sup> C.A. Hodgetts, "The Statistics of Infantile Paralysis," CMAJ, 1 (Nov. 1911): 1036-39; Emerson, A Monograph on The Epidemic of Poliomyelitis (Infantile Paralysis) in New York City in 1916, Table I; Matthieu-Jean Freyche and Jonannes Nielsen, "Incidence of Poliomyelitis Since 1920," in World Health Organization, Poliomyelitis, (Geneva: WHO, 1955), p. 60. Based on a national survey of doctors, the Hodgetts report suggests there were 354 cases in Ontario in 1910, 187 in Quebec, 48 in British Columbia, 27 in Alberta, 17 in Manitoba, 12 in New Brunswick and less than 10 in the other provinces.

<sup>52</sup> Ontario Department of Health, Report on Poliomyelitis in Ontario, 1937, p. 2; Montreal Department of Health, Annual Report, 1931 (Montreal: 1932), p. 38; /damson and Bowman, "History of Poliomyelitis in Manitoba," p. 339.

<sup>53</sup> M.-J. Freyche and J. Nielsen, "Incidence of Poliomyeltis Since 1920" in World Health Organization, *Poliomyelitis* (Geneva: World Health Organization, 1955), p. 59-106.

during the early decades of the twentieth century? What public health threats did provincial governments respond to, what form did their services take, and whom did they serve? What was the response of the medical profession? How did the threat of polio fit into this system, and how did it change and expand as polio epidemics worsened? This last question is a central theme of this entire study.

By the turn of the century most provincial governments had established public health boards. During the 1:300s-1920s their work underwent expansion and integrated a network of local health departments and health units. Formal departments of public health were created in most provinces by the early 1920s. Federally, a Department of Health was not created until 1919, despite strong lobbying from the medical profession, public health leaders and politicians. Two major factors forced the issue: World War I and the public health challenges of influenza and venereal disease. More specifically, the Canadian government became alarmed by the physical and mental inferiority of new recruits into the military, as well as by shocking infant mortality statistics. Immediately after the war the world-wide influenza epidemic, which killed more Canadians than the entire war, vividly dramatized the power of some infectious diseases against which modern medicine was helpless. As influenza subsided, this situation was reinforced and complicated by the rising incidence of venereal disease among returning soldiers, prompting the federal government to finally establish a public health department in the spring of 1919.<sup>54</sup>

<sup>Robert D. Defries (ed.), The Federal and Provincial Health Services in Canada (Toronto: Canadian Public Health Association, 1959); Heather MacDougall, "Researching Public Health Services in Ontario, 1882-1930," Archivaria, #10 (Summer 1980): 157-71; Heather MacDougall, Activists and Advocates: Toronto's Health Department, 1883-1983 (Toronto: Dundurn Press, 1990); Paul Bator with Andrew J. Rhodes, Within Reach of Everyone: A History of the University of Toronto School of Hygiene and the Connaught Laboratories, Volume I, 1927-1955 (Ottawa: Canadian Public Health Association, 1990), p. 23-4; Douglas O. Baldwin, "Volunteers in Action: The Establishment of Government Health Services on Prince Edward Island, 1900-1931," Acadiensis, 12 (1990): 121-47; H.E. MacDermott, One Hundred Years of Medicine in Canada, 1867-1967 (Toronto: McClelland and Stewart, 1967). Cn the influenza pandemic in Canada see: Janice P. Dicken McGinnis, The Impact of Epidemic Influenza: Canada, 1918-1919," in S.E.D. Shortt (ec.), Medicine in Canadian Society: Historical Perspectives (Montreal and Kingston: McGill-Queen's University Press, 1981), p.</sup> 

In Canada, the expansion of government health services at the turn of the century was driven by five main factors. The first was the emergence of voluntary health associations and their close relationships to government. These included such agencies as the Canadian Tuberculosis Association, the Canadian Red Cross, the Health League of Canada, the Victorian Order of Nurses, and the Canadian Public Health Association. A second factor was that members of professional associations networked provincially, nationally and internationally with similar organizations, and in many cases played leading roles among them. The Dominion Council of Health, set up in 1920 as the federal health department's national health advisory committee, was of particular importance in reinforcing national public health standards.<sup>55</sup>

A third and more direct influence was the increasing professionalization and political activism of public health work that was encouraged through higher education standards, such as the introduction of the Diploma of Public Health (DPH) at the University of Toronto, which became mandatory for most health departments in Canada after 1910. The DPH was originally set up in the U. of T.'s Faculty of Medicine in 1904 as a single exam for physicians to certify them as health officers, but with no special courses. A special DPH curriculum was developed in 1912, built on a British model, but with subsequent North American additions. The first candidate to complete the DPH courses was Dr. Robert D. Defries. Defries then became a demonstrator in the program, and starting in 1913-14, along with Dr. John G. FitzGerald, began, as Paul Bator argues, "the task of teaching the generation of physicians who established modern public health services in Canada."<sup>56</sup> One of Defries' teachers, Dr. John A. Amyot, who was Ontario's first provincial bacter iologist, went on to serve as the first federal deputy minister of health in 1919, while most of the provincial deputy minister.

<sup>447-77;</sup> Eileen Pettigrew, *The Silent Enemy: Canada and the Deadly Flu of 1919* (Saskatoon: Western Producer Prairie Books, 1983).

<sup>55</sup> MacDougall, "Researching Public Health Services in Ontario, 1882-1930," p. 157-58, 168-71; MacDougall, Activists and Advocates, p. 26-32; J.J. Heagerty, The Romance of Medicine in Canada (Toronto: Ryerson Press, 1940), p. 107-13; Bator with Rhodes, Ibid, p. 1-30.

<sup>56</sup> Bator with Rhodes, *Ibid.*, p. 13.

ters of health and local health officers across Canada received the DPH under Defries' and FitzGerald's direction. These events led to the establishment of the School of Hygiene in 1927, which was endowed as one of the Rockefeller Foundation's three North American public health schools. Earlier, many of the doctors involved in the establishment of the DPH and the School of Hygiene were also active in the birth of the Canadian Public Health Association and its journal in 1910. Defries served as Editor from 1928 to 1963.<sup>57</sup>

Underlying and shaping these developments were the general advances in medical science in the wake of the germ theory and the recognition of specific causes of infectious diseases. The science of bacteriology provided a precise means to diagnose many diseases and identify cases and carriers. In Canada, diagnostic services to physicians were offered by provincial bacteriological laboratories set up between 1890 and 1913. More important was the development of specific prophylactic sera, anti-toxins and vaccines with which a variety of diseases could be controlled and even prevented. Such advances provided an opportunity for public health authorities to widely apply the benefits of science.<sup>58</sup>

Central to the Canadian application of such advances was the establishment of Connaught Laboratories at the University of Toronto in 1914. Connaught was founded by J.G. FitzGerald, a medical graduate of the U. of T. in 1903, out of a need to provide diphtheria antitoxin at a price "within the reach of everyone." He also wanted to follow the lead of many European countries and set up a Canadian serum institute to prepare and deliver public health products for free distribution through governments and physicians. He was particularly inspired by France's Pasteur Institute,

<sup>&</sup>lt;sup>57</sup> Bator with Rhodes, *Ibid.*, p. 8-13. The journal of the CPHA was variously named *The Public Health Journal* (1910-1928), the *Canadian Public Health Journal* (1929-1942), and finally the *Canadian Journal of Public Health* (1943 to present); Charles G. Roland and Paul Potter, *An Annotated Bibliography of Canadian Medical Periodicals*, 1826-1975 (Toronto: Hannah Institute for the History of Medicine, 1979).

<sup>58</sup> Defries (ed.), The Federal and Provincial Health Services in Canada; Dowling, Fighting Infection; p. 23-54; John Duffy, The Sanitarians: A History of American Public Health (Chicago: University of Illinois Press, 1990), p. 193-204.

where studied in 1910 and 1911, in addition to other serum institutes and public health laboratories in Europe and America. Other than diphtheria antitoxin, Fitz-Gerald, initially at his own expense, also prepared an anti-rabies treatment. In May 1914, through the support of Amyot and others, including the Ontario Department of Health, FitzGerald's efforts were integrated into the University of Toronto's Department of Hygiene in the Faculty of Medicine.

World War I had a major impact of the expansion of the fledgling Antitoxin Laboratory, as it was called, especially with the production of tetanus antitoxin for the Army. This effort closely connected FitzGerald's work with Ottawa and with the Laboratories' greatest benefactor, Colonel A.E. Gooderham, who in 1915 donated a farm property north of Toronto to provide proper facilities for the Laboratories' important work and growth. When "The Farm" was officially opened in 1917, Fitz-Gerald's creation became known as "Connaught Antitoxin Laboratories and University Farm," named by Gooderham after Canada's Governor General during the war, the Duke of Connaught. At its official opening Connaught was also endowed by the Ontario government with \$75,000 and an annual grant to support medical research.<sup>59</sup> Connaught's international reputation, as well as its financial security, was further entrenched in 1921 with the discovery of insulin at the University of Toronto by Banting, Best, Collip and MacLeod. Connaught prepared the first supplies of insulin for clinical trial, and then in quantities to meet Canadian requirements.<sup>60</sup>

Until it was sold by the University of Toronto in 1972, in many ways Connaught Medical Research Laboratories stood as a unique international public health institution. In particular, Connaught's intimate University connections to the School of Hygiene set it apart from its European models. It was also distinctive from anything in the U.S., where a national serum institute did not exist, even at the state level.

<sup>&</sup>lt;sup>59</sup> Defries, First Forty Years, 1-46; Bator with Rhodes, Within Reach of Everyone, p.18-21.

<sup>60</sup> Defries, *Ibid.*, 68-75; Michael Bliss, *The Discovery of Insulin* (Toronto: McClelland and Stewart, 1982).

Local public health laboratories and commercial pharmaceuticals provided biological products to Americans in varying degrees of quality and price. Moreover, the three-fold purpose of Connaught and the School of Hygiene – medical research, graduate teaching and public health service through the production and improvement of essential biological products – was not duplicated anywhere else.<sup>61</sup>

As a non-commercial, though largely self-supporting institution, Connaught could manufacture a consistent national supply of biologicals far more cheaply than American imports. After 1916, this allowed their distribution by most provincial health departments to physicians and local health departments for free public administration. Among the products produced by Connaught by the 1920s were antimeningitis serum, smallpox vaccine, typhoid-paratyphoid vaccine, and insulin, and the earlier diphtheria, tetanus and rabies products. This list grew quickly to 29 products by 1938 and 42 by 1945.62 Insulin was particularly significant to the financial security of Connaught through its substantial Canadian and international sales. The insulin patent held by the University of Toronto benefited the University generally, as well as Connaught's insulin production capacity. More importantly, the bulk of the insulin royalties were "designated for medical research in four Canadian universities.<sup>763</sup> Connaught's importance was reinforced by the research it undertook, its long experience of practically applying such research to the production of biological products, and by its leadership in the execution and evaluation of clinical trials of such products as diphtheria toxoid in the mid-1920s. Such trials were conducted closely with provincial and local health departments and the medical profession.<sup>64</sup>

<sup>&</sup>lt;sup>61</sup> Defries, *Ibid.*, p. 88; Dowling, *Fighting Infection*, p. 36-38.

<sup>62</sup> Defries, Ibid., p. 330-31.

<sup>63</sup> A.M. Fisher, "Influence of Patents on Development and Distribution of Insulin," Applied Therapeutics, 5 (May 1963): 430-32. By the late 1950s, out of total sales of \$6,000,000 per year, Connaught's insulin sales totaled \$1,300,000, second only to polio vaccines, which were worth about \$4,000,000 per year before the Sabin vaccine was licenced; Connaught Laboratories, "Estimates 1959-1960," Connaught Archives, 83-005-11, file 3.

<sup>&</sup>lt;sup>64</sup> Defries, *First Forty Years*, p. 38-42; Jane Lewis, "The Prevention of Diphtheria in Canada and Britain, 1914-1945," *Journal of Social History*, 20 (1986): 163-76.

With the growing polio problem, Connaught was in a valuable position to continue and expand in these areas on a variety of fronts, especially after World War II.

During the pre-1927 period there were four infectious diseases against which provincial governments provided specific public health services. These were smallpox, tuberculosis, venereal disease, and diphtheria. Influenza was another, but its importance lay more in its large scale dramatic impact in 1918-19, and the potential potency it and other infectious diseases represented, than with what governments actually did about it. The influenza pandemic effectively shook up the growing complacency of public health departments as most of the major epidemic diseases had come under control by then. Serious polio epidemics had a similarly potent and dramatic impact, but with more lasting provincial results.

Smallpox was the first infectious disease against which an effective vaccine was available. The problem for public health departments was to ensure it was widely used and ultimately made compulsory, as was legislated in Ontario and elsewhere after 1885. Another important effect of smallpox was to foster standardization of disease control procedures, such as mandatory notification and strict quarantine regulations. These regulations and compulsory vaccination programs, while largely supported by physicians and the public, stimulated an active anti-vaccination movement, especially in Ontario after World War I. The principle that community needs outweigh individual and professional concerns was nevertheless adhered to by provincial and local governments. Despite this controversy and others, a general pattern of close cooperation between public health departments and the medical profession was maintained in Canada.<sup>65</sup> This was not the general case in either the United States or Britain during this period, or after, where the private interests of

<sup>65</sup> MacDougall, Activists and Advocates, p. 116-26; Michael Bliss, Plague: A Story of Smallpox in Montreal (Toronto: HarperCollins, 1991); Paul Bator, "The Health Reformers versus the Common Canadian: The Controversy over Compulsory Vaccination Against Smallpox in Toronto and Ontario, 1900-1920," Ontario History, 75 (1983): 348-73; Katherine Arnup, "Victims of Vaccination:' Opposition to Compulsory Vaccination in Ontario, 1900-90," Canadian Bulletin of Medical History, 9 (1992): 159-76.

physicians were more closely guarded against the perceived encroachments of state medicine.<sup>66</sup>

Tuberculosis and venereal disease generated broader, yet more delicately managed government health services in Canada. The social stigma of tuberculosis, a lingering, wasting, contagious and ultimately fatal illness, effectively delayed provincial action, despite increasing pressure from such voluntary organizations as the Canadian Tuberculosis Association for the establishment of sanatoriums and diagnostic services. Unlike polio, TB and VD both had specific diagnostic tests which could quickly identify infectious cases and carriers. Private sanatoriums and voluntary TB clinics were established, but with minimal success between the 1890s and 1910. This effort expanded during the 1910s and 1920s as most provincial governments finally made the reporting of TB mandatory, despite medical resistance, and took administrative control of sanatoriums, offered financial assistance in hospitalizing and treating indigent patients, and set up traveling diagnostic clinics and mass screening programs. By the 1930s, in some provinces, this led to full financial support for the hospitalization and treatment of all cases.<sup>67</sup>

A similar pattern developed with venereal disease, but the federal government played an unusual financial role between 1918 and the late 1920s. With federal assistance most provinces enacted specific VD control legislation between 1918 and 1920. This allowed the establishment of VD clinics which provided free dia: nosis and treatment along with active, though discreet, efforts to identify cases and their sexual contacts. However, public and medical interest in this effort was fickle and financial

<sup>66</sup> Lewis, "The Prevention of Diphtheria in Canada and Britain, 1914-1945;" Jane Lewis, "The Medical journals and the Politics of Public Health, 1918-1990," in in W.F. Bynum, S. Lock and R. Porter (eds.), *Medical Journals and Medical Knowledge: Historical Essays* (London: Routledge, 1992), p. 207-27; Duffy, *The Sanitarians.* 

<sup>67</sup> MacDougall, Activists and Advocates, p. 126-35; George Jasper Wherrett, The Miracle of the Empty Beds: A History of Tuberculosis in Canada (Toronto: University of Toronto Press, 1977); Defries (ed.), The Federal and Provincial Health Services in Canada; Katherine McCuaig, "Tuberculosis: The Changing Concepts of Disease in Canada, 1900-1950," in C.G. Roland (ed.), Health, Disease and Medicine: Essays in Canadian History (Toronto: Hannah Institute for the History of Medicine, 1984), p. 296-307.

constraints through the 1920s led to the reduction and elimination of federal funding. The Depression added to such restraint provincially and government efforts languished until World War Two.<sup>68</sup>

The response of provincial governments to polio generally followed the TB and VD models with free diagnostic and hospitalization services, but not just for the indigent patient. By the early 1930s, similar provincial government programs for cancer treatment in special clinics also developed, particularly in Saskatchewan and Ontaric, primarily to provide radium treatments to all diagnosed cases. However, the costs of other medical services, such as hospitalization and surgery were covered only for indigent patients.<sup>69</sup> With polio, in most provinces as epidemics worsened, all paralytic cases became eligible for public funds. Reflecting the broad emotional threat of polio against middle class children, provincial efforts were less hampered by social stigmas. The provincial governments were also not helped by Ottawa until after 1948, nor limited so much by the effects of the Depression. Indeed, it was during the Depression that broader provincial polio services began to try and minimize the potential social costs of long term public support of those permanently disabled by polio.

In many ways diphtheria, and the response to it by provincial governments, was the closest model for the development of a polio strategy between the late 1920s and mid-1930s. Canada, and in particular Connaught, also played an important research and productive role in the control of diphtheria. much as it would with polio. After the discovery of diphtheria antitoxin in 1893, and then a specific diag-

<sup>68</sup> MacDougall, Ibid., p. 211-18; Defries (ed.), Ibid.; Jay Cassel, The Secret Plague: Venereal Disease in Canada, 1838-1939 (Toronto: University of Toronto Press, 1987); Jay Cassel, "Making Canada Safe for Sex: Government and the Problem of Sexually Transmitted Diseases in the Twentieth Century," in C..D. Naylor (ed.), Canadian Health Care and the State: A Century of Evolution (Montreal and Kingston: McGill-Queen's University Press, 1992), p. 141-92.

<sup>69</sup> Ontario, Report of the Royal Commission on the use of Radium snd X-Rays in the Treatment of the Sick, Etc. (Toronto: Ontario Sessional Paper #41, 1932); "Report of Cancer Study Committee, Canadian Medical Association," CMAJ, 29 (Sept. 1933, suppl.): xx-xxi;

nostic test in 1913, hope grew that this would be one dreaded and deadly childhood disease that could be controlled through applied science. But such an effort was hampered by the expense of importing antitoxin from the U.S. This problem directly stimulated the founding of Connaught Laboratories. By 1916 a uniform supply of antitoxin, at about one third the imported cost, was freely distributed through most provincial health departments to local health departments and physicians. Public education was necessary to insure that the antitoxin was used, although the results were mixed. When a more effective diphtheria toxoid (a immunizing agent made by detoxifying diphtheria toxin with formalin) was developed in the mid-1920s, Connaught played a leading role in preparing it and conducting clinical field trials and mass immunizations in school children between 1925-1927.<sup>70</sup>

These efforts against diphtheria involved considerable publicity and proved successful, definitive and became internationally recognized. There was, however, some resistance from the medical profession, who wanted control over administering the toxoid. Their concerns reflected growing frestrations with the encroachment of state medicine in Canada in the 1920s. A commonly heard complaint was that too much free work was being done by provincial governments for those who could otherwise afford it. The diphtheria campaign was seen as legitimate, but limits were being reached and clear definitions between state and private medicine were desired. Connaught was also being criticized by drug companies at this time for its monopolistic relationship with the provinces.<sup>71</sup>

<sup>70</sup> Defries, *First Forty Years*, p. 76-9; J.G. Fitzgerald, R.D. Defries, D.T. Fraser, P.J. Moloney and N.E. McKinnon, "Experiences with Diphtheria Toxoid in Canada," *American Journal of Public Health*, 22 (Jan. 1932): 25-8; MacDougall, *Activists and Advocates*, p. 136-47; Lewis, "The Frevention of Diphtheria in Canada and Britain, 1914-1945; Bator with Rhodes, *Within Reach of Everyone*, p. 18-21.

<sup>71</sup> Lewis, Ibid., p. 171-72; Paul A. Bator, "Saving Lives on the Wholesale Plan: Public Health Reform in the City of Toronto, 1900-1930," Ph.D. Thesis, University of Toronto, 1979; Janice Dickin McGinnis, "From Health to Welfare: Federal Government Policies Regarding Standards of Public Health for Canadians, 1919-1945," Ph.D. Thesis, University of Alberta, 1980.

The rising incidence of polio in the late 1920s and afterwards occurred in this context and provided provincial health departments with a new opportunity for active public health intervention. The striking success of the diphtheria toxoid campaigns stood in sharp contrast to the serious problems paralytic polio epidemics posed. Both diseases principally attacked children in a sudden and terrifying way. but there was no simple diagnostic test for polio as there was for diphtheria, nor was there any specific treatment other than human convalescent serum, the effectiveness of which was limited and difficult to prove. After 1927, however, medical and popular interest in the serum, originating in the U.S., rose to a new level just as a series of major polio epidemics struck western Canada and seemed to move inexorably eastwards. In the hope that the serum was effective and harmless, and allowed the government to do something targible, its provincial preparation and free and unrestricted provision thus became politically, if not medically, necessary. Its use was expected and demanded by physicians and the public and followed in the tradition of freely providing other immune sera as well as other biological products, although this serum was prepared by each provincial bacteriological laboratory; Connaught only prepared Ontario's supply. The model of diphtheria also provided well-recognized Canadian experience with clinical trials utilized in later trials of convalescent serum, the nasal spray in 1937, and ultimately the Salk and Sabin vaccines. The precedents established with VD and TB clinics and hospital services also led to similar programs for polio patients after 1937, especially after the enthusiasm for convalescent serum declined and epidemics and their paralytic aftermath sharply worsened.

# 1.5) Disease and the Mass Media to 1927

The media coverage of polio, among other diseases, has been touched upon by historians, but a systematic analysis of the relationship between the popular press and public health has yet to be undertaken. In particular, how did intense media attention to a particular health threat influence the response by physicians and governments? Existing studies of medicine and the media approach this relationship more passively and have generally focused on the way newspapers reported on particular diseases and epidemics, and how the popular press was used to educate the public about medical and scientific issues. There has been less thought given to the effects popularization had on how diseases were actually managed by doctors and governments. The long term enigma of epidemic polio suggests that the media's influence over health and political authorities in Canada was significant.<sup>72</sup> What was the relationship between other diseases and the media in the pre-1927 period?

Two major epidemic diseases of the nineteenth century dominated the small amount of space Canadian newspapers generally devoted to medical concerns: cholera and smallpox. Such room was limited for a number of reasons, not least of which was the large amount of space taken up by a plethora of patent medicine advertisements, especially during the last decades of the century. Newspaper publishers and patent medicine hucksters were quite willing to profit from the everyday ailments of readers by promising relief and simple "cures."<sup>73</sup> But when it came to covering the

<sup>&</sup>lt;sup>72</sup> See for example: Terra Ziporyn, Disease in the Popular American Press: The Case of Diphtheria, Typhoid Fever, and Syphilis, 1870-1920 (New York City: Greenwood Press, 1988); Stephen Klaidman, Health in the Headlines: The Stories Behind the Stories (New York City: Oxford University Press, 1991).

<sup>73</sup> On patent medicines see for example: Catherine Sullivan, "Dr. Thomas' Eclectric Oil," Parks Canada Research Bulletin, #218 (May 1984); Madeline Callaghan, "The Nineteenth-Century Patent Aedicine Industry in Toronto: An Era of Adventure," (unpublished manuscript, University of Toronto, Department of Fine Arts, 1986), Royal Ontario Museum Library; Christopher J. Rutty, "Patent Medicines and Popular Health in Ontario: Medicine, Pharmacy and the Development of Government Legislation, 1890-1908," (unpublished manuscript, University of Western Ontario, Department of History, 1990); James Harvey Young, The Toadstool Millionaires: A Social History of Patent Medicines in America Before Federal Regulation (Princeton: Princeton University Press, 1961); John Parascandola, "Patent Medicines in

story of a deadly epidemic in their midst, there was considerably more reticence to give all the details to those same readers for fear of inciting a panic and blackening the image and trading status of the city.

Such was the case in Lower and Upper Canada during the devastating 1832 cholera epidemic. Fearing a repeat of that terrifying situation, when further cholera epidemics were rumored or began, the provincial governments made concerted efforts to limit information and "manage" the news. This was reinforced by poor statistics that were slow in being released and the prevailing medical idea that panic predisposed individuals to the disease. Thus newspapers were under considerable political, medical and economic pressure to refrain from mentioning an epidemic until it was well underway, or hopefully, seemed to be declining. In the relatively undeveloped Canadian colonies of the mid-nineteenth century this was easier to do than in Britain or the United States.<sup>74</sup>

In Canada the limits of such restraint were reached during the devastating smallpox epidemic of 1885 in Montreal. Smallpox could be terrifying during an epidemic, but as it was usually endemic there seemed to be a sense of indifference that was reinforced by the availability of a vaccine. When the beginnings of the 1885 epidemic emerged, Montreal's English press maintained its tradition of low-key reporting and printed only basic statistics. It was soon obvious that this approach had little effect on the spread of the disease. As the situation deteriorated, the English press stepped up their coverage led by the city's largest newspaper, the *Montreal Star*. The *Star's* editors grew alarmed at the inaction of the city's health authorities and also at the apathy of the French Canadian public and Catholic church to the

Nineteenth-Century America," Caduceus, 1 (1985): 1-41; M.N.G. Dukes, Patent Medicines and Autotherapy in Society (Den Haag: Drukkerij Pasmans, 1963).

Geoffrey Bilson, A Darkened House: Cholera in Nineteenth Century Canada (Toronto: University of Toronto Press, 1980), p. 66, 70-71, 73-74; R.J. Morris, Cholera 1832: The Social Response to An Epidemic (London: Croom Helm, 1976); Charles E. Rosenberg, The Cholera Years: The United States in 1832, 1849, and 1866, With a New Afterword (Chicago: University of Chicago Press, 1962, 1987); Richard J. Evans, Death in Hamburg: Society and Politics in the Cholera Years, 1830-1910 (London: Penguin Books, 1987).

epidemic and vaccination. The French press all but ignored the entire epidemic, save for chastising the English press for its sensational coverage. As was argued by the Church and many of the city's merchants, the press' sensationalism had created a panic and effectively labeled the city a pest hole in the minds of everyone across North America. The efforts of the *Star* and other papers, however, effectively shaped how the epidemic would be managed. Their dramatic coverage ultimately aroused the city's leading citizens and physicians to speak out, prodded the local health authorities into action, and sparked the creation of a provincial health board. The Catholic clergy even urged their congregations to get vaccinated.<sup>75</sup>

While the press could have a significant influence over the management of major epidemic threats, its interest and role in the management of less dramatic, though more deadly diseases such as venereal disease, tuberculosis, and cancer, was less pronounced during the early twentieth century. The fear of scaring away readers and advertisers made it difficult for newspapers to voluntarily devote much space to stories about incurable and unseemly diseases. VD was all but unmentioned in the press until World War I, and was later only referred to rarely and euphemistically.<sup>76</sup> The press was mainly interested in the scientific "war" against TB and cancer, and quickly and uncritically reported on the latest research and hopeful "cures." It would be a more uphill battle for significant amounts of space to be devoted to basic and accurate general information about either disease.

Pressure from voluntary agencies and leading individuals was usually required to prompt the press to run such stories, most of which were to be found deep inside the paper, usually in or near the "women's page." In American newspapers and popular magazines, other than the spike of stories published during such major epi-

<sup>75</sup> Bliss, *Plague: A Story of Smallpox in Montreal.* See also Barbara Craig, "Smallpox in Ontario: Public and Professional Perceptions of Disease, 1884-1885," in C.G. Roland (ed.), *Health, Disease and Medicine: Essays in Canadian History* (Toronto: Hannah Institute for the History of Medicine, 1984), p. 215-49.

<sup>76</sup> Cassell, The Secret Plague.

demics as influenza in 1918-19, TB and cancer received the most press coverage between 1900 and 1927. TB clearly dominated until the mid-1930s when the average number of stories per year for cancer took the lead, prompted by the emergence of a strong alliance against cancer among doctors, the American Cancer Society, the U.S. government, and the media.<sup>77</sup> By the late 1930s, a similar alliance emerged in Canada with the founding of the Canadian Society for the Control of Cancer, the emergence of various provincial cancer programs, and the development of a Canadian radium supply.<sup>78</sup> The Canadian voluntary efforts marshaled against TB, coupled with sympathetic support and coverage from the press, played a large role in forcing provincial governments to get involved in providing TB services between 1910 and 1930. On Prince Edward Island, such voluntary efforts were instrumental in the establisnment of a provincial department of health in 1931.<sup>79</sup>

When the influenza pandemic struck in 1918-1919 any reticence on the part of the press had all but disappeared. The sheer scale of the emergency in all parts of Canada was overwhelming and there was little resistance to full disclosure in the press and an all-out effort to control the disease. With Ottawa worried that another epidemic was possible, this situation had considerable influence in the establishment of the Federal Department of Health.<sup>80</sup>

Although another influenza epidemic did not arrive, at least not on the same scale, the emergence of the more mysterious and crippling threat of polio caused new fears in the press and among health authorities. In North America, the polio epidemics of 1910 and 1916 resulted in considerable press attention, and in 1916 in

<sup>&</sup>lt;sup>77</sup> James T. Patterson, *The Dread Disease: Cancer and Modern American Culture* (Cambridge: Harvard University Press, 1987), p. 82-86, 97-98, 111, 123-26.

<sup>&</sup>lt;sup>78</sup> "Report of the Study Committee on Cancer, Canadian Medical Association," CMAJ, 37 (Sept 1937, suppl.): 24-43.

<sup>&</sup>lt;sup>79</sup> Baldwin, "Volunteers in Action: The Establishment of Government Health Care on Prince Edward Island, 1900-1931;" Wherrett, The Miracle of the Empty Beds.

<sup>&</sup>lt;sup>80</sup> Pettigrew, *The Silent Enemy*; McGinnis, "The Impact of Epidemic Influenza: Canada, 1918-1919." p. 471-73.

New York City especially, such media attention was overwhelming.<sup>81</sup> Unlike smallpox, for which there was a vaccine, or cholera, which seemed to have disappeared in Canada, or tuberculosis, venereal disease and cancer, which seemed to strike adults invisibly in a mysterious or unspeakable manner, polio attacked innocent children and left among them a visible legacy of permanent disability more often than death. Also during this period, and for some time after, much less was known about polio than most other diseases. Yet in order to ease widespread fears of polio and give every chance of protecting children, parents, physicians, and the public needed to know as much as possible. To that end, the relationship between public health authorities and the press grew closer, as there were "advantages to be expected from intelligent self-interest." In New York City in 1916 health officials met with the editors of the major newspapers in the city in order to carry out the "unusual step of publishing in the daily press the names and addresses of all true cases reported in the previous twenty-four hours."<sup>82</sup> The general nature of the press' coverage could not be directly controlled, but cooperation resulted in some control over the "factual" information that was supplied by the health department. This also resulted in a larger number of prominently featured polio stories. This was a common pattern in most cities and provinces when major polio epidemics struck in Canada beginning in 1927.

<sup>81</sup> Benison, "The Fnigma of Poliomyelitis: 1910;" Benison, "Poliomyelitis and the Rockefeller Institute: Social Effects and Institutional Response;" Rogers, *Dirt and Disease: Polio Before FDR*; Risse, "Revolt Against Quarantine: Community Responses to the 1916 Polio Epidemic. Oyster Bay, New York."

<sup>&</sup>lt;sup>82</sup> Emerson, A Monograph on The Epidemic of Poliomyelitis (Infantile Paralysis) in New York City in 1916, p. 16.
# <u>CHAPTER 2:</u>

# The First Wave, 1927-1932: Provincial Polio Epidemics and Convalescent Serum

The first wave of major polio epidemics to strike Canada was coincident, first, with a significant rise in confidence in the medical profession's ability to diagnose polio in the pre-paralytic stage; and second, with a related increase in interest in the potential value of human convalescent serum to minimize paralysis if administered in this apparently better recognized early stage. The conjunction of these developments in 1927-28 with a series of major outbreaks in British Columbia and Alberta in 1927, and Manitoba in 1928, followed by even larger epidemics in Ontario in 1929-30 and Quebec in 1931-32 (Figure 1, Tables 1, 2 and 3), also brought provincial governments enthusiastically on to the serum bandwagon.

With the successful use of prophylactic serums against a number of other diseases during this period (diphtheria, tetanus, meningitis, pneumonia), convalescent serum quickly became the principal focus of provincial public health strategies against paralytic polio during the first epidemic wave. This was not so much because of its therapeutic effectiveness, which was much more difficult to establish than was the case with other serums. More importantly, despite its many limitations, it fit into the larger immune serum model and gave physicians and provincial governments a rare opportunity to actually do something against polio on a large scale; or at least gave that public impression. This perceived ability to act took on added significance as the Depression intensified through the early 1930s, just as confidence in the serum declined and the personal and social costs of "crippling deformities" among children grew more apparent. The use of the serum also depended upon close state and medical cooperation, as well as the close involvement of the popular press to educate parents and general practitioners about polio's early symptoms, and to recruit blood donors to insure a sufficient provincial serum supply.

The parallel of serum enthusiasm with Canadian epidemics also provided an opportunity for some provinces to attempt evaluations of its effectiveness, while at the same time providing a uniform supply to all officially diagnosed cases of polio. This supply was prepared and controlled by each provincial laboratory and was not part of the general serum supply provided for the provincial health departments by Connaught Laboratories, except for in Ontario. The Americans had yet to conduct "controlled" clinical trials on a large scale and the 1928 Manitoba epidemic, in particular, offered a chance to make a scientific contribution to the limited understanding of this disease. According to the Manitoba study, the serum seemed to have at least some therapeutic value, and was harmless. But regardless of the validity of these results, since there was nothing else to offer, for provincial governments the political value of providing serum remained through the 1930s, and even into the early 1940s, as epidemics continued across Canada and nothing better came along.

The intense interest in the serum had two important effects during the first wave of epidemic polio in Canada. First, it clouded appreciation of the therapeutic limits of the serum and drew attention away from investigating the broader epidemiological and public health questions that remained outstanding. Second. and most important, it distracted provincial governments and physicians from the challenging and expensive problems of treatment and after-care of paralytic polio victims.

2.1) First Wave Epidemics and Provincial Public Health, 1927-1932

In the summer of 1927 when British Columbia and Alberta experienced their first major polio epidemics, the potential impact of this disease was clear. The memory of the great northeastern U.S. polio epidemic of 1916 was still strong in western Canada, and even in Quebec City, which bore the brunt of a major provincial epidemic in 1932.<sup>1</sup> The 1916 New York polio experience served as a model for the Alberta

<sup>1</sup> British Columbia Board of Health, Annual Report, 1926-27 (Victoria: 1928), p. K5-6; A.R. Foley, "The 1932 Epidemic of Poliomyelitis in Quebec," Canadian Public Health Journal

government when it was faced with a major epidemic of more than 300 reported cases and 53 deaths in 1927. This represented a case notification rate of 48.8 per 100,000.<sup>2</sup> A third of these cases occurred in the Edmonton area, while over half originated in rural areas.<sup>3</sup> This epidemic took on added significance since other than "the widespread attack of influenza in 1918 nothing like this had been experienced before in this relatively young and sparsely settled province."<sup>4</sup>

The focus of the 1927 B.C. outbreak, in which 182 cases were reported (at a 29.2 case rate), was the middle interior of the province. But other than noting the "splendid cooperation with the medical profession," the provincial health authorities did little to actively manage the disease.<sup>5</sup> The Alberta Department of Public Health was faced with a more serious epidemic situation that year. In contrast to their western neighbour, as well as Manitoba, Ontario and Quebec over the next five years, Alberta responded with the most aggressive, comprehensive and well-coordinated provincial public health program undertaken in Canada until 1937. As was the case in B.C., convalescent serum was not prepared and used in Alberta because of a lack of detailed

(hereafter CPHJ), 25 (June 1934): 260-74. On the B.C. epidemic see H.G. Mackie, "The Polio Epidemic of 1927," Okanagan Historical Society Annual Report, 29 (1965): 43-48.

To compare, in New York State a case rate of 128.7 was reached in 1916, while in New York City itself a rate of 234 was recorded. The highest rate ever recorded in an urban population of over 200,000 was 340 in Newark, New Jersey, also in 1916. One of the worst polio epidemics in history hit in Manitoba in 1953 when a provincial case rate of 286.4 was reported with Winnipeg registering a case rate of 318, second only to Newark in the polio record books; Ontario Department of Health, Report on Poliomyelitis in Ontario, 1937, (Toronto: Ontario Department of Health, March 1938), p. 1; Foley, "The 1932 Epidemic of Poliomyelitis in Quebec," p. 260; R.G. Cadham, "The Poliomyelitis Epidemic in Winnipeg, 1953," Canadian Journal of Public Health, 45 (May 1954): 185.

Outside of North America, countries hit hardest by polio include: Iceland (a peak case rate of between 450 and 500 in both 1924 and 1949), Denmark (peaks of 130 in 1934 and 1952), New Zealand (a peak of 87.3 in 1925). Sweden (a peak of 70.9 in 1953), Austria (a peak rate of 50.6 in 1947), Australia (peak rates of 39 in 1937 and 58 in 1952); M.-J. Freyche and J. Nielsen, "Incidence of Poliomyeltis Since 1920," in World Health Organization, *Poliomyelitis* (Geneva: World Health Organization, 1955), p. 59-106.

- R.B. Jenkins, "Some Findings in the Epidemic of Poliomyelitis in Alberta, 1927," CPHJ, 20 (May 1929): 219-24; See also Maureen Riddell, Towards a Healthier City: A History of the Edmonton Local Board of Health and Health Department, 1871-1979 (Edmonton: Board of Health, 1980), p. 34-5; courtesy of the City of Edmonton Archives.
- 4 F.H.H. Mewburn, "Some Experiences With the After Care of Poliomyelitis," *Canadian Medical Association Journal* (hereafter *CMAJ*), 61 (Sept. 1949): 286.
- 5 B.C. Board of Health, Annual Report, 1926-27, p. K5-6.

information about it. The Alberta Department further recognized that even if serum were made available, "the public, in spite of the Department's educational efforts, did not realize the significance of the early symptoms," and in most cases called the physician only after paralysis appeared. The Department strictly enforced a 21-day isolation period for all cases in the acute stage, and a 10-day quarantine for all contacts. Provincial health regulations also required the concurrent disinfection, and "proper disposal of nasal and throat excretions and the excretions of the kidneys and bowels." Local health boards in most of the affected areas prohibited all public gatherings and kept schools closed in accordance with provincial recommendations.<sup>6</sup>

The practice of closing schools during polio epidemics to keep children away from crowds proved to be one of the most controversial strategies used to prevent the spread of the disease. The issue would remain unsettled across Canada through the entire epidemic era, largely due to intense public pressure from parents, coupled with a lack of understanding of polio's mode of spread and degree of contagiousness. Indeed, this question was the focus of almost all of the initial editorials that discussed the British epidemics of 1925 and 1926.<sup>7</sup> In North America, closing schools during epidemics had last been widely ordered during the 1918 influenza epidemic. The Alberta government had been very strict in enforcing their closure, as was the case with almost all public places and businesses.<sup>8</sup> Such harsh public health measures against influenza were enacted to protect the general population, all of whom were vulnerable to the disease. With polio, since children were its principal victims, the issue of school closings took on more public urgency.

<sup>&</sup>lt;sup>6</sup> Jenkins, "Some Findings in the Epidemic of Poliomyelitis in Alberta, 1927," p. 222.

In Britain the issue was complicated by a system of public boarding schools and the danger of spreading the disease if schools were closed and infected students were sent home and dispersed around the country. For highlights of this debate see: Editorial, "Epidemic Poliomyelitis in England," CMAJ, 17 (Jan. 1927): 104-5; Editorial, "On Acute Poliomyelitis," CMAJ, 17 (Apr. 1927): 453-4; Editorial, "On Poliomyelitis," CMAJ, 17 (June 1927): 716-18; Editorial, "On Poliomyelitis," CMAJ, 17 (Oct. 1927): 1206-7.

<sup>&</sup>lt;sup>8</sup> Eileen Pettigrew, *The Silent Enemy: Canada and the Deadly Flu of 1918* (Saskatoon: Western Producer Prairie Books, 1983), p. 64-71.

The public health question centred on whether children would be better served under medical and nursing supervision provided in most urban schools, or kept under a kind of voluntary quarantine in their homes under the watchful eyes of their parents. But if schools were closed to keep children from crowds, in order to be consistent, this created the potentially thorny economic and political problem of having to close all public places, such as churches, theatres, parks and public swimming pools. If students were kept at school under medical supervision, in light of the diagnostic problem of recognizing polio's early and most communicable stage, "despite the most efficient inspection," cases would "escape notice sufficiently frequently to be a serious menace to the community." In an effort to balance these medical and political uncertainties, the province recommended closing schools, especially in the rural areas. But in the larger centres where children's movements could not be enforced, "the schools should be kept open and thorough, daily inspections of the children should be made." In one small community the local board of health went further and ordered that no child would be allowed on the street without a permit. This action was believed to have limited subsequent cases in the town to only two.9

The severity of the epidemic provoked the Alberta Board of Health to order similarly drastic action on a provincial scale. Inspired by the tactics imposed during the 1916 New York City polio epidemic,<sup>10</sup> the Alberta Board imposed strict travel restrictions for children under eighteen years of age in the affected areas. In Canada such a strategy was unique to this epidemic. Children were not permitted to move their residence outside the affected area without a permit from their local board of health indicating that the child had not "suffered from, nor been exposed to infantile paralysis." The local health board also required written consent from its counterpart

<sup>&</sup>lt;sup>9</sup> Jenkins, "Some Findings in the Epidemic of Poliomyelitis in Alberta, 1927," p. 223.

Naomi Rogers, Dirt and Disease: Polio Before FDR (New Brunswick, N.J.: Rutgers University Press, 1992), p. 33-38; Guenter B. Risse, "Revolt Against Quarantine: Community Responsed to the 1916 Polio Epidemic, Oyster Bay, New York," Transactions and Studies of the College of Physicians of Philadelphia, Medicine and History, Series 5, 14 (Mar. 1992): 23-50.

in the community where such individuals planned to move. Rail, bus and highway travel was also restricted for children without permits. Copies of the order were distributed to all local health authorities and to all postmasters for prominent display.<sup>11</sup>

With or without convalescent serum, Alberta's, and all subsequent provincial strategies against polio, depended upon public and professional education. Because it was clear that the public, and most physicians, had little understanding or experience with this disease, the Department undertook an extensive educational campaign through the press. It was crucial that "the widest possible publicity" be given to all available information about polio's prevalence, its transmission, the significance of non-paralytic carriers, and the need to closely supervise the activity of children. Further bulletins were distributed by the Department to physicians that summarized recent literature on the disease, and detailed its "after-treatment."<sup>12</sup>

Manitoba's polio experience became the most severe in Canada in terms of the frequency and intensity of epidemics, beginning with its first in 1928 centred in the Winnipeg area. In that year 434 cases and 37 deaths were reported in the province at a notification rate of 65.4.<sup>13</sup> A formal Department of Health and Public Welfare had just been established in the province in 1928,<sup>14</sup> but during the epidemic it exercised less aggressive public health measures than were used in Alberta. Instead, reflecting an awareness of recent developments in polio research, a more focused approach was employed based almost exclusively on the study and unrestricted use of convalescent serum. Isolation and school closings were recommended to local health boards, but the Department "recognized that this measure was of doubtful efficacy, as regar-

<sup>&</sup>lt;sup>11</sup> Jenkins, "Some Findings in the Epidemic of Poliomyelitis in Alberta, 1927," p. 223-24.

<sup>12</sup> Ibid., p. 222; Alberta Department of Health, Annual Report, 1927, (Edmonton, 1928), p. 11. See also: "Infantile Paralysis - Acute Poliomyelitis," Alberta Public Health Bulletin, (Sept. 1927); "After Treatment of Poliomyelitis," Alberta Public Health Bulletin, (Oct. 1927), Provincial Archives of Alberta, 85.454 GSE.

<sup>13</sup> J.D. Adamson and M. Bowman, "History of Poliomyelitis in Manitoba," *Manitoba Medical Review*, 35 (June-July 1955): 339-46.

<sup>14</sup> Ross Mitchell, "Public Health in Manitoba," in R.D. Defries (ed.), The Development of Public Health in Canada, (Toronto: Canadian Public Health Association, 1940), p. 91.

ds prevention of spread.<sup>\*15</sup> Moreover, a "lack of accurate knowledge of the mode of transmission... tends to make efforts directed at control somewhat empirical in nature.<sup>\*16</sup>

Public education about polio was imperative for the general management of the epidemic and for the successful preparation and use of the serum. Appeals for convalescent blood donors through the press quickly became necessary to insure an adequate serum supply. More importantly, parents were relied upon to recognize the initial symptoms in their children early enough to immediately call a doctor so that the serum could be given as early as possible. However, the potential for arousing public anxiety and even panic in this situation was widely acknowledged by health authorities. As an Attending Physician of Winnipeg's Children's Hospital stressed in a paper read before the Ontario Medical Association in May 1929:

I do not believe that there is any disease that can frighten the people so profoundly, as poliomyelitis. In Winnipeg, last year, it incited a terror among them much like that caused by the air raids during the war [*ie.* World War I]<sup>17</sup>

The role of the press in preventing such panic from developing was more explicitly discussed in Manitoba than elsewhere in Canada. Unlike many other more deadly diseases to which the public seemed "complacent," physicians were aware that "the public is decidedly perturbed by the knowledge that poliomyelitis is about."<sup>18</sup>

Health authorities could respond in one of two ways: they could ignore the public, and conceal any information about an epidemic, or provide full information through the press. It was decided to do the latter. In what became a frequent response in subsequent Canadian epidemics, special medical symposiums on polio were held.

18 Ibid..

A.J. Douglas, "Methods of Control in the City of Winnipeg," in Manitoba Department of Health and Public Welfare, *Report on the Poliomyelitis Epidemic in Manitoba*, 1928 (Winnipeg: Department of Health and Public Welfare, Feb. 1929), p. 71.

<sup>16</sup> T.A. Pinnock, "Methods of Control Recommended by the Department of Health and Public Welfare," in Manitoba, *Report on the Poliomyelitis Epidemic in Manitoba*, 1928, p. 75.

<sup>17</sup> O.J. Day, "Poliomyelitis in Manitoba in 1928," CMAJ, 21 (Nov. 1929): 555.

The Winnipeg Medical Society called such a meeting and set up a Committee to prepare "suitable" newspaper articles that were published around the province, and were also reprinted in the medical press.<sup>19</sup> There was a natural tendency among the medical profession and health authorities to limit public discussion of epidemic diseases when they struck. With polio, however, "nothing was held back; the seriousness of the situation was not minimized, but no scare stories or exaggerated statements were printed."<sup>20</sup> There was thus a delicate though practical relationship between epidemic polio and the intense publicity that surrounced it. Provincial governments had to recognize and control this as best as possible. The Manitoba authorities were confident that if

the public is educated by carefully edited descriptions of the early stage of the disease and the matter is brought to the attention of the physicians by medical meetings, or suitable pamphlets, there is, in our mind, no reason why 95 per cent of the cases cannot be diagnosed before paralysis sets in.<sup>21</sup>

Thus, a strong faith in the value of the serum in Manitoba, and an even greater faith in the public's ability to understand and respond to the early symptoms of polio by quickly seeing a physician, limited the need for potentially disruptive public health tactics as used in Alberta. Such faith would, however, soon prove naive because there were underlying scientific doubts about the efficacy of the serum.<sup>22</sup>

Ontario's first major polio epidemic came in 1929, somewhat expectedly after Manitoba's. It was followed, unusually, by an even more serious outbreak in 1930. A total of 558 cases and 26 deaths occurred in 1929 (at a 14.8 case rate), with the Ottawa area especially hard hit. In 1930, a total of 671 cases and 71 deaths were reported (at a

<sup>&</sup>lt;sup>19</sup> "Report of the Poliomyelitis Epidemic in Manitoba, 1928," Canadian Nurse, 25 (June 1929): 297; "Poliomyelitis," Canadian Nurse, 25 (Aug. 1929): 408-11.

<sup>20</sup> Day, "Poliomyelitis in Manitoba in 1928," p. 555.; Douglas, "Methods of Control in the City of Winnipeg," in *Report on the Poliomyelitis Epidemic in Manitoba, 1928*, p. 71-2; M.M. Seymour and W.J. Bel!, "Convalescent Serum in Epidemic Poliomyelitis," CPHJ, 19 (Oct. 1928): 480-83.

J.M. McEachern and L.G. Bell, "Lessons From the Poliomyelitis Epidemic in Manitoba, 1928," CPHJ, 20 (Sept. 1929), p. 429.

<sup>22</sup> Paul, History of Poliomyelitis, p. 190-95.

19.8 rate), the main focus being the Toronto area. As was readily acknowledged, the Ontario Department of Health profited significantly during both epidemics from Manitoba's experience with convalescent serum. The Ontario Department played a more direct role in controlling the collection and distribution of the serum, and in assessing its value. Connaught Laboratories prepared the province's supply. Unlike the situation in Manitoba, the press was not actively utilized to recruit donors, or for public education about the disease, as both activities were left to local heath boards. Instead, letters were issued by the Department directly to every physician in the province describing the dispase, its early features, and how they could obtain serum. Both epidemics were managed almost entirely through a reliance on serum, with little reference to other provincial control measures.<sup>23</sup>

Successive epidemics struck Quebec in 1931 and 1932 and were centred in and around the Montreal and Quebec City areas respectively. The 1931 epidemic was worse and affected 1,105 cases (at a rate of 37.5), 744 of which and 74 deaths occurring in Montreal. A total of 784 cases and 105 deaths occurred in the province in 1932. The severity of the 1932 epidemic in the Quebec City area was particularly alarming as the notification rate for the district approached 170 per 100,000. Despite the seriousness of the situation in both years the public health approach of the Quebec Bureau of Health differed little from Ontario, relying primarily on providing serum free to every case and evaluating its therapeutic effects. Local public health authorities were left with the primary responsibility of managing the epidemics.<sup>24</sup>

<sup>R.P Hardman and A.L. McKay, "Poliomyelitis in Ontario, 1929," CPHJ, 21 (Feb. 1930): 76-90; T.A. Lomer and W.T. Shirreff, "Report of an Epidemic of Poliomyelitis in Ottawa, 1929," CPHJ, 21 (Feb. 1930): 53-67; A.L. McKay and R.P. Hardman. "Poliomyelitis in Ontario, 1930," CPHJ, 22 (Apr. 1931): 202-5; Ontario Department of rlealth, Annual Report, 1929 (Toronto: 1930), p. 12-26; Ontario Department of Health, Annual Report, 1930 (Toronto: 1931), p. 28-35.</sup> 

A.R. Foley, "The Present Outbreak of Poliomyelitis in Quebec," CPHJ, 23 (Oct. 1932): 494-7;
Foley, "The 1932 Epidemic of Poliomyelitis in Quebec;" Montreal Department of Health,
Annual Report, 1931 (Montreal: 1932), p. 38-41; E. Couillard, "La Poliomyelite dans la
Ville de Quebec en 1932," CMAJ, 30 (May 1934): 527-32;

From the relative distance of Nova Scotia, the Provincial Bacteriologist, Dr. D.J. MacKenzie, viewed the polio epidemics in the west with alarm. "The disease is very widely disseminated, but a wave of almost epidemic proportions seems to be approaching the Atlantic seaboard of Canada." Fortunately this much-feared wave did not hit Nova Scotia, or the rest of the Maritimes, for another decade. Yet, the potential for a polio epidemic was acutely felt among the medical profession. MacKenzie recognized that "[t]here are few, if any, direases at the present time that are more dreaded than Polionyelitis."<sup>25</sup>

Despite efforts of health departments to inform the public about polio, ignorance, misinformation, and the sense that polio struck "somewhere else," were common in Canada during this first epidemic wave. According to some polio survivors from isolated regions, another factor in limiting public education was that the weekly press often carried little local news about polio. Also many rural families had little access to the media because, as was pointed out, they could not afford magazines or batteries for their radios.<sup>26</sup>

How was polio understood by those it actually affected? A poor immune system and poor nutrition is how one polio survivor from 1910 explained his illness.<sup>27</sup> An unusual polio threat seemed to be sick cats. This was the case for two children stricken in 1927 in Alberta and Ontario.<sup>28</sup> The source of the virus could be more obvious since the onset of paralysis frequently followed exposure at school or contact with "dirty neighbourhood children."<sup>29</sup> In some cases the disease seemed linked to a bad

D.J. MacKenzie, "Some Phases of Poliomyelitis," Nova Scotia Medical Bulletin, 8 (Sept. 1929): 415.

Patricia M.C. T.(1938, age 8, Restigouche, County, NB), June 1993; Mary G. (1953, age 33, Mission, BC), September 1993; Sandra L. D. (1955, age 9, Central Blissville, NB), June 1993.

<sup>&</sup>lt;sup>27</sup> E. Conyers B. (1910, age 1.5, Toronto, Ont.), September 1993.

Paul H. (1926-27, age 4 or 5, Peterborough, Ont.), September 1993; Frances M. D. (1927, age 2, Calgary. Alb.), October 1993.

<sup>29</sup> George S. (1930, age 7, Dane, Ont), May 1993; Robert A.J. M. (1938-39, age 2, Windsor, Ont.), August 1993; Yvonne H. (1953, age 25, Winnipeg, Man.), July 1993.

fall and not being able to get back up.<sup>30</sup> Others believed they had caught polio by drinking from a contaminated garden hose, from sharing an ice cream cone with a child who had broken a polio quarantine, or from an infected rose bush sent from Ontario to Nova Scotia.<sup>31</sup> Other more commonly perceived dangers during polio season included mosquitoes and unwashed fruit, and the best protection was thought to be clean hands.<sup>32</sup> Another threat was swimming in the "bad" water of public swimming pools, rivers, lakes and cold creeks.<sup>33</sup>

The limited knowledge about polio created unusual problems for general practitioners. Many parents thought they knew as much about polio as their family doctors. The intensive public education efforts centering around convalescent serum, in addition to general press coverage, led to some parents pressuring their family doctor about the diagnosis and treatment of their children who were suspected of having polio.

### 2.2) Convalescent Serum, Publicity and the State

Canadian enthusiasm for convalescent serum was reinforced by a new level of diagnostic confidence among the medical profession in recognizing polio's pre-paralytic stage. But as the diagnostic problem of polio was otherwise so problematic, this rise in confidence actually reflected only marginal and exaggerated improvement in an almost impossible situation.

<sup>30</sup> Sandra L. D. (1955, age 9, Central Blissville, NB); Jaunita S. (1949, age 4, Castalia, Grand Manan, NB), June 1993.

Jennie-Grace M. (1952, age 18, Oakland Car County, NB), June 1993; Lillian J. F. (1953, age 28, Knutsford, BC), August 1993; Beatrice E. T. (1951, age 26, Truro, NS), May 1993.

Frances M. D. (1927, age 2, Calgary, Alb.); Cora W. (1940, age 10, New Liskeard, Ont.), June 1993; Les G. (1941, age 14, Portage La Prairie, Man.), "The Bug And I" essay, June 1993; Shirley S. (1953, age 18, Calgary, Alb.), July 1993; Paul Martin Jr. (age 8, 1946, Windsor, Ont), Interview with Mrs. Nell Martin, September 21, 1993, for CBC Prime Time News Documentary, "Conquering the Crippler," broadcast December 7, 1993.

Margaret M. C. (1928, age 7, Niagara Falls, Ont.), May 1993; Beryl G. (1937, age 4, Toronto, Ont.), July 1993; Barbara D. W. (1951, age 11, Toronto, Ont.); Jim McLeish, (1953, age 26, Neepawa, Man.), "The 20 Who Can't Forget the 1953 Polio Epidemic," Winnipeg Tribune, (Nov. 21, 1978).

After the publication of an influential article in August 1928 on preparalytic polio and convalescent serum by Aycock and Luther of the Harvard Infantile Paralysis Commission, 34 most diagnostic concerns largely disappeared from the medical literature for the next four years. This article was based on the experience of a Massachusetts epidemic in 1927 and linked the use of the serum with a more precise elaboration of the three phases of the disease than had been published before. This article appeared just as the 1928 Manitoba epidemic began. Aycock's description of the pre-paralytic symptoms seemed to leave "no question that poliomyelitis can be recognized in this stage." A number of key pre-paralytic symptoms were stressed: prostration to a greater degree than the fever would indicate; a flushed face and anxious expression; a mildly infected throat; rapid pulse; a coarse and striking tremor when the child moved; distinct rigidity in the neck and stiffness in the spine. Canadian medical journals were quick to reprint large sections of Aycock and Luther's description, or to discuss it in detail.<sup>35</sup> Of particular importance in lending authority to Aycock's paper, and his results with the serum, was an endorsement by Simon Flexner. As Paul notes, by this stand "Flexner in effect said that at last the Rockefeller Institute, almost the highest scientific authority in the nation, was giving the nod to practicing doctors to use serum therapy."<sup>36</sup>

Manitoba's enthusiasm for the serum in 1928 emerged after these reports were published in the Journal of the American Medical Association. The ``nitoba govern-

<sup>&</sup>lt;sup>34</sup> W.L. Aycock and E.H. Luther, "Preparalytic Poliomyelitis: Cibservations in one hundred and six cases in which convalescent serum was used," *Journal cf the American Medical Association* (hereafter *JAMA*), 91 (Aug. 11, 1928): 387-93.

<sup>35</sup> Seymour and Bell, "Convalescent Serum in Epidemic Poliomyelitis," p. 480-3; J.M. McEachern B. Chown, L.G. Bell, and M. Mackenzie, "Summary of Symptomatology and 'aboratory Findings in Acute Poliomyelitis in the Manitoba Epidamic, 1528," in Manitoba, *Report on the Poliomyelitis Epidemic in Manitoba*, 1928, p. 61-2; McEachern and Bell, "Lessons from the Poliomyelitis Epidemic in Manitoba, 1928," p. 429-30; Editorial, "Poliomyelitis," CPHJ, 21 (Feb. 1930): 93-4.

<sup>36</sup> Paul, History of Poliomyelitis, p. 197; S. Flexner and F.W. Stewart, "Protective Action of Convalescent Poliomyelitis Serum," JAMA, 91 (Aug. 11, 1928): 363-4; S. Flexner and F.W. Stewart, "Specific prevention and treatment of epidemic poliomyelitis," Transactions of the Association of American Physicians, 43 (1928): 252-57.

ment was inspired by an accompanying editorial that suggested "the results of careful observation appear to justify fully the further trial of convalescent serum in preparalytic poliomyelitis."<sup>37</sup> Recognizing that "no previous local test of its efficiency had been made..." the Department financed what it believed would be a valuable scientific evaluation of the serum. A Medical Research Committee at the University of Manitoba was delegated with "all matters connected with the scientific aspect of the problem."<sup>38</sup>

This study stressed the need for the centralized supply, distribution and administration of the serum, along with a system of standardized records and follow-up for each case. The most immediate requirement was a supply of serum for which former polio cases were required to donate blood. This was not an issue with other immune serums, such as diphtheria antitoxin, a large and uniform national supply of which was prepared from horses at Connaught. Similarly large supplies of antimeningitis serum, tetanus antitoxin, and antipneumococcus serum were possible from rabbits.<sup>39</sup> The Research Committee was forced to explore every possible channel in search of polio serum after it encountered difficulties tracing former cases from an extensive Winnipeg list. Help from the United States was ruled out since their supplies were very limited, while appeals to Edmonton, Toronto and British Columbia involved too much of a delay in receiving the serum. Connaught was only able to send a small amount. Frustrated, the Committee finally turned to "judicious newspaper publicity" in the Winnipeg daily press, which published a lead article with the headline, "Blood Urgently Needed." This article emphasized the simplicity and safety of the procedure. Moreover, all donors were "remunerated" at a rate of \$5.00 for each 50 cc. of

<sup>37</sup> Editorial, "Convalescer.t Serum in Epidemic Poliomyelitis," JAMA, 91 (Aug. 11, 1928): 398.

<sup>38</sup> C.R. Gilmour and A.T. Cameron, "The Organization of the Work Concerned with the Preparation and Distribution of Convalescent Serum and the Investigation of its action during the Winnipeg Epictem.c of Poliomyelitis, 1928," in Manitoba, Report on the Poliomyelitis Epidemic in Manitoba, 1928, p. 11, 17

<sup>39</sup> Defries, First Forty Years, p. 17-20, 58-9, 112-19.

blood. The response from this article was surprisingly good and prevented any further shortages.<sup>40</sup> This experience was significant and demonstrated that

The newspapers of a community can, as in Winnipeg, be of the utmost service in obtaining donors in such emergencies, and can, if they desire to cooperate properly, as they did in Winnipeg. carry out this service without unduly exciting public anxiety.<sup>41</sup>

To ensure the most efficient use of the serum, a number of consultants were appointed, who, upon request, assisted physicians with the early diagnosis of polio and the administration of the serum.<sup>42</sup> Once the diagnosis was confirmed the serum was usually injected intramuscularly into the buttocks in a standard dose of 25 c.c. This system worked well in the Winnipeg area, where the epidemic was focused, but in the rural areas where case rates tended to be higher, efficiently distributing the serum became more of a challenge. There was often an unavoidable 24-hour or more delay between physicians requesting and receiving the serum. The distribution of cases across the province was too irregular to justify setting up a network of serum depots. Nor was the supply large enough "to warrant indefinite amounts being sidetracked at such depots and uncontrolled centrally."<sup>43</sup> For the Manitoba government, it was crucial that it distribute the limited supply of serum as uniformly and equitably as possible.

This system appeared to be justified by the encouraging results of the study, in which a series of 161 cases were followed. There were 87 cases who did not receive the serum, or received it after paralysis appeared, and 56% of this group showed residual paralysis and 19.5% died. Among 57 cases who received the serum in the pre-paralytic stage in a 25 c.c. intramuscular injection, only 7% showed residual

<sup>40</sup> McEachern and Bell, "Lessons from the Poliomyelitis Epidemic in Manitoba, 1928," p. 428; Gilmour and Cameron, *Ibid.*, p. 15-16.

<sup>41</sup> Gilmour and Cameron, *Ibid.*, p. 16-17.

<sup>42</sup> McEachern and Bell, "Lessons from the Poliomyelitis Epidemic in Manitoba, 1928," p. 427.

<sup>43</sup> Gilmour and Cameron, "The Organization of the Work Concerned with the Preparation and Distribution of Convalescent Serum..." in Manitoba, *Report on the Poliomyelitis Epidemic in Manitoba*, 1928, p. 18-19.

par ysis, and no deaths occurred. The study thus concluded that "Convalescent serum is of value when administered in the pre-paralytic stage of the disease."<sup>44</sup>

Manitoba's experience with the serum created the impression among the Canadian medical profession, that "it can be definitely asserted that we are by no means helpless in the combat of poliomyelitis." Although future epidemics could not be predicted, preparedness with a scrum supply each polio season was the only logical position for public health authorities to assume. This was "a position... somewhat different from that of even a few years ago." The Manitoba experience reinforced the perception that doctors could recognize the pre-paralytic stage "and convalescent serum treatment instituted if paralysis and death in many cases are to be prevented." Moreover, the "co-operation of the public health department, the practicing physician and the general public, is essential in the fight against poliomyelitis." $^{45}$  But such cooperation depended upon education and in this area the provincial governments acted as the source, both for the public and for physicians. The federal government also became involved by publishing a booklet on polio for public distribution.<sup>46</sup> Physicians were thus on the receiving end of an increased flow of information from the state which contributed to a heightened sense of professional confidence in facing polio. This had the effect of exaggerating publipectations that family physicians were able to respond to individual cases effectively with but one weapon: convalescent serum.

In the subsequent polio epidemics in Ontario and Quebec, and to a lesser extent in other provinces, the Manitoba experience largely defined how the serum was to be used and justified and polio epidemics generally managed.<sup>47</sup> In Ontario, an epidemic

<sup>44</sup> J.M. McEachern, B. Chown, LG. Bell and M. McKenzie, "The Results of Convalescent Serum Therapy in Acute Poliomyelitis in the Manitoba Epidemic, 1928," in Manitoba, *Report on the Polionyelitis Epidemic in Manitoba, 1928*, p. 43-53; McEachern and Bell, "Lessons From the Poliomyelitis Epidemic in Manitoba, 1928," p. 430.

<sup>45</sup> Editorial, "The Poliomyelitis Situation," CPHJ, 20 (May 1929): 247-8.

<sup>46</sup> Editorial, "Essentials in Poliomyelitis Control," CPHJ, 20 (Sept. 1929): 456-57.

<sup>&</sup>lt;sup>47</sup> Meeting, Dominion Council of Health, June 3-5, 1930, p. 21, Archives of Ontario (hereafter AO), RG10-05-03, Box 1. See also Editorial, "Essentials in Poliomyelitis Control," p. 456-7.

was expected in 1929 and preparation of the serum was authorized by the Minister of Health in the spring. Blood donor clinics were arranged by the province with donors recruited through local health departments and service clubs. The provincial government paid the full cost of collecting, distributing and providing serum to each diagnosed case, including paying donors at a rate of \$1.00 per 10 c.c. donation up to \$20.00. The serum was prepared by Connaught.<sup>48</sup> and its distribution was controlled by the Department through its network of Provincial Laboratories and local Medical Officers of Health. As in Manitoba, physicians could not keep their own supply and upon diagnosing a case, physicians had to contact the nearest distributing centre and "a supply of serum was then sent with the utmost possible dispatch." There were no special diagnostic consultants deployed in Ontario in 1929 or 1930. Physicians in Ontario were relied upon to heed the Department of Health's advice on the early diagnosis outlined in a circular it sent out, follow the direction sheet enclosed with each vial of serum, and for each case return a questionnaire to the Department after giving the serum.<sup>49</sup> This was a common pattern in most provinces as serum distribution records and physicians' reports were the most efficient method of keeping accurate statistics of polio incidence and mortality. In Quebec this information was duplicated and controlled by the Bureau's medical officers who then "made a special and complete investigation of each case." After six months these officers followed up each case and reported on the degree of recovery, the results of which seemed to echo the Manitoba and Ontario experience.<sup>50</sup>

The Ontario Department did not insist that a spinal tap be done to confirm a diagnosis before releasing the serum. It felt that "in many instances this would have

<sup>&</sup>lt;sup>48</sup> See, Poliomyelitis Serum Filling Cards, August-September 1929, Connaught Archives (CA), 83-015-06, file 1/1; K. Halpern, Notebook: Chicken-pox Serum, Polio Serum, Measles Serum, Mumps Serum, Diphtheria Cultures, Pertussis Vaccine, June-July 1929, CA, 83-010-22.

<sup>&</sup>lt;sup>49</sup> Hardman and McKay, "Poliomyelitis in Ontario, 1929," p. 77; McKay and Hardman, "Poliomyelitis in Ontario, 1930," p. 203.

<sup>&</sup>lt;sup>50</sup> Foley, "The 1932 Epidemic of <sup>P</sup>O<sup>l</sup>iomyelitis in Quebec," p. 270; Foley, "The Present Outbreak of Poliomyelitis in Quebec," p. 496-97.

been impractical and valuable time would have been lost in the early administration of the serum."<sup>51</sup> Despite some questions about dosage size and the serum's potency that were raised during the 1930 epidemic, the Department was confident that after two years of use the serum was "of considerable value." Moreover, a "policy of continuing the preparation of this serum and its free distribution must be maintained until such a time as animal serum may be prepared, or other forms of treatment giving better results have superseded it."<sup>52</sup> Beyond any therapeutic effect, the seriousness and political potency of epidemic polio reinforced the Ontario government's determination to offer the serum as evenly and expeditiously as possible across the province.

The serum issue was discussed by provincial and federal deputy ministers of health at a June 1930 meeting of the Dominion Council of Health. These concerns were raised by the New Brunswick deputy minister and arose out of the aggressive promotion of the serum. He felt there was "an inclination to be a little too dogmatic" about its value, particularly in recently published Federal health pamphlets on polio. Such "statements regarding treatment... are rather irritating to the general practitioner, because if one detail is left out by the physician, they are going to be picked up by the parents and the doctor is going to be held to blame." It was clear that doctors needed educating, but he felt "we are getting on dangerous ground if we put too much detail of treatment into the hands of the parents."<sup>53</sup> This became increasingly impossible to control as the public had to be informed in order that the serum could be quickly and effectively administered. Parents had no choice but to "suspect everything" since no one could predict which case would prove mild, "or which will cripple hopelessly." This was not a time to take chances but to call the doctor immediately.<sup>54</sup>

<sup>51</sup> Hardman a. 1 McKay, "Poliomyelitis in Ontario, 1929," p. 87.

<sup>52</sup> McKay and .lardmar "Poliomyelitis in Ontario, 1930," p. 205.

<sup>53</sup> Minutes, Dominion Council of Health, June 3-5, 1930, p. 22, AO, RG10-...-03, Boy 1.

B. Davies, "Death Walks in Summer," Canadian Magazine, 82 (July 1934): 7, 34-35.

By this time, however, there were growing scientific doubts about the serum's value and the need for fully controlled studies. As noted earlier, such studies were problematic because the serum would have to be withheld from some cases, and "To withhold serum treatment for this purpose would be unwarranted in such a disease as polio with its far reaching and permanent disabilities."<sup>55</sup> This was also something parents, nor the press would not stand for; "Human nature recoils from such an experiment and the physician who would withhold serum would be regarded as a monster."<sup>56</sup> It was these visible and permanent disabling effects that most clearly distinguished infantile paralysis from other childhood diseases since "Death is not its deadliest work." For the middle and upper class readers of the *Canadian Magazine*, the personal threat of polio was thus graphically personified as

...a grim terror that is more menacing, more sinister than death itself. Indeed, death will seem almost a beneficent figure compared with the hitand-run monster that will creep unseen into Canadian homes and strike in the dark a blow that can mean fifty or sixty or seventy years of suffering and limitations.<sup>57</sup>

Of all provinces, Alberta remained the most skeptical in it., attitude toward the serum. When another outbreak struck in 1930, with 150 cases and 30 deaths, the province elected to use the serum, but with much less enthusiasm than Manitoba or Ontario. Among a group of 39 cases that received the serum early, it was reported that 80% made a satisfactory recovery. But the Department's report emphasized the practical difficulties physicians had in making an early diagnosis. Moreover, the serum was likely to have been used on some patients not suffering from polio, and even without serum "some thirty per cent of the acute cases usually recover from the acute paralytic stage without recidual paralysis." Thus, giving credit to the serum in all cases might not 'e justified.<sup>58</sup>

<sup>55</sup> McKay and Hardman, "Poliomyelitis in Ontario, 1930," p. 205.

<sup>56</sup> Davies, "Death Wal's in Summer," p. 35.

<sup>&</sup>lt;sup>57</sup> Ibid., p. 7, 34-35; Fraser Sutherland, The Monthly Epic: A History of Canadian Magazines, 1789 1989 (Markham: Fitzhenry & Whiteside, 1989), p. 98-111.

<sup>58</sup> A.C. McGugan, "Anterior Poliomyelitis in Alberta in 1930," CPHJ, 22 (Dec. 1931): 598-99.

Other questions surrounding the serum began to emerge in Canada after about 1930. Besides the difficult issue of alternate controls, practical concerns about the methods of serum administration, dosage, and the standardized antigenic potency of each dose grew in importance within the Canadian medical community. In the latter case, because of a variable supply and the need for monkeys, no measurements had yet been made of the serum's potency.<sup>59</sup> In 1931, Connaught undertook the first serum potency tests in Ontario. This effort required the installation of equipment to accommodate a number of monkeys. Forty-one monkeys were used to for potency neutralization tests using the spinal cords of polio-infected monkeys. The results highlighted the variability in the potency of serum from different sources.<sup>60</sup>

By 1932 a larger reaction was growing against convalescent serum, especially in the U.S., sparked primarily by the researchers who had been among the serum's strongest advocates. In 1931 Aycock's group reported carrying out "controlled" clinical trials of the serum during major polio epidemics in New York City and Connecticut. Alternate cases who did and did not receive serum were closely evaluated to a degree not previously attempted. The researchers "failed to obtain statistical evidence that convalescent serum is effective. However, it is not possible to draw the reverse conclusion, namely that the serum is of no value."<sup>61</sup> These and similar results from others had a significant effect on undercutting American medical enthusiasm for the serum, although its use continued in some centres until about 1934.<sup>62</sup>

<sup>&</sup>lt;sup>59</sup> Ontario Department of Health, Annual Report, 1930, p. 32.

<sup>&</sup>lt;sup>60</sup> "Report of Testing of Convalescent Serum for Poliomyelitis in Connaught Laboratories," in Meeting, Dominion Council of Health, December 15-17, 1931, Appendix, p. 12; AO, RG10-05-03, Box 1. These cests marked Connaught's first use of monkeys for polio research.

<sup>61</sup> S.D. Kramer, W.I. Aycock, C.I. Solomon and C.I. Thenebe, "Convalescent Serum Therapy in Preparalytic Poliomyelitis," New England Journa. of Medicine, 206 (Mar. 3, 1932): 435.

<sup>62</sup> Paul, History of Poliomyelitis, 198-99. Convalescent serum was used extensively in California during an epidemic in 1934; J.F. Kessell, A.S. Hoyt and R.T. Fisk, "Use of Serum and the Routine and Experimental Laboratory Findings in the 1934 Poliomyelitis Epidemic," *American Journal of Public Health*, 24 (Dec. 1934): 1215-23. See also, T. Madsen and C. Jensen, "Anti-poliomyelitis Convalescent Serum: Preliminary Report on a Proposed International Standard Anti-Poliomyelitis Serum," *League of Nations, Quarterly Bulletin of the Health Organization, Biological Standardization II*, Special Number (Nov. 1936): 708-12.

While Aycock's results did not seriously diminish Canadian confidence in the serum, they sparked a scientific debate that highlighted many of the problems with using the serum. But they also reinforced the necessity for the continued use of the serum despite its cost to the provinces, until something better came along. Even Aycock, despite his reservations, felt that "its use needs no apology."<sup>63</sup>

There was one major international champion of convalescent serum, Dr. (Dame) Jean Macnamara of Apperfillia, where influence and frequent presence in Canada helped to moderate concerns over the serum  $\frac{1}{2} \frac{1}{2} \frac{1$ 

As far as the popular press in Canada was concerned, "Science" had finally "provided a sure, safe and widespread means to combat... Infantile Paralysis," and it was "our own fault if paralysis sets in." By the start of polio season in 1934, as was stressed in a national magazine article dramatically entitled "Death Walks in Summer," "Canada, in proportion to population, is the point of utmost danger" from infantile paralysis. The article cited a League of Nations report and compared Canada's

<sup>63</sup> Quoted in Editorial, "Poliomyelitis," CP4J, 23 (June 1932): 279.

<sup>64</sup> J. Macnamara, "Serum Therapy in Acute Poliomyelitis," CPHJ, 23 (July 1932): 319-26; N.H. Sutton, "The Value of Immune Serum in Poliomyelitis: Case Notes on a Localized Outbreak in Prince Edward County, Ontario," CPHJ, 24 (Aug. 1933): 360-67.

<sup>65</sup> Editorial, "Poliomyelitis," CPHJ, 23 (June 1932): 279.

polio experience between 1927 and 1932 with other industrialized countries that had also experienced major polio epidemics.<sup>66</sup> It was clear there was as yet no way to prevent polio from stealing "like a ragged gray ogre across the country pointing here and there to its victims with fiendish impartiality." But polio was "not a poverty disease." Its victims, as pictured in this article, were usually charming, "well-nourished, happy, round-faced children," and "The damage done w.'l last a lifetime." However, with convalescent serum widely available "Ignorance c." negligence is to blame if 1934 adds one paralytic cripple to the population of this country."<sup>67</sup>

Although the serum debate caused many in Canada to at least reconsider their faith in it, a more important outcome of the controversy was that the broader problems surrounding epidemic polio were opened up once again. When confidence in the serum had been high there was little thought about the natural epidemiology, etiology, or immunology of the disease, or the problems of after-care. By the summer of 1932 it seemed as though all the problems, confusion and complications surrounding polio had reemerged simultaneously. Of particular concern were the frustrating problems of early diagnosis, and especially the lack of a specific diagnostic test for polio. This situation was contrasted sharply with diphtheria. As successful diphtheria toxoid trials in Ontario had recently demonstrated, the real control of polio required more than a diagnostic test and more than convalescent serum. An equivalent to diphtheria toxoid, that is a method of active immunization against polio, was needed in order to prevent the disease. However, as a lead editorial in the *CPHJ* admitted,

In the present stage of our knowledge of poliomyelitis... we must look for a significant, in fact a large addition to the number of crippled persons in Canada, in spite of the broadening use of immune serum... No means of specific immunization and, therefore, no adequate means of control, as far as we recognize it to-day, is in sight.<sup>68</sup>

<sup>66</sup> Davies, "Death Walks in Summer," p. 7.

<sup>67</sup> Ibic...

<sup>68</sup> Edi orial, "The Poliomyelitis Problem," CPHJ, 23 (Nov. 1932): 546.

Dr. FitzGerald, Director of Connaught Laboratories, took a more optimistic position. He argued before the Dominion Council of Health that despite "some failures in serum treatment of poliomyelitis...[these] need not discourage the use of serum." Furthermore, the lack of an active vaccine against polio "should be a spur to learn more of the disease, of the incubation period, its period of infectivity, etc.." The outstanding challenge of understanding and properly treating the paralytic effects of polio led FitzGerald to stress that "efforts should be redoubled to control the production of cripples through inadequate and delayed treatment after the disease has passed."<sup>69</sup> This problem took on particular importance during the early 1930s and the worst years of the Depression.

Canadian medical and political attention to the problems of polio after-care between 1928 and 1932 was limited primarily due to the hopes placed in convalescent serum. But by 1932, doubts about the serum grew to the point that for provinces to rely on it alone was no longer justifiable as the actual tragedy of paralytic polio gained a higher public profile. Fortunately, the period of escalating provincial polio epidemics in Canada that began in British Columbia in 1927 ended in Quebec in 1932. Polio incidence levels remained low in 1933, 1934 and 1935, and while the provinces continued to prepare serum, as the Depression set in the "large expenditure" of maintaining this service increasingly became an issue that had to be justified.<sup>70</sup> For example, during the 1930 epidemic the Ontario government paid out \$7,589 for 472 blood donors.<sup>71</sup> But with low incidence levels the issue of polio after-care in Canada lost some of its urgency after 1932, and it did not intensify again until 1937. It is important, however, to trace how polio treatment was managed in Canada through the first epidemic wave in order to measure the level of political interest in the prob-

<sup>69</sup> J.G. FitzGerald, "Anterior Poliomyelitis," paper read at Meeting, Dominion Council of Health, October 31-November 2, 1932, Appendix, p. 5, AC, RG10-05-04, Box. 1.

<sup>&</sup>lt;sup>70</sup> Minutes, Meeting Dominion Council of Health, November 29-December 1, 1934, p 15, AO, RG10-05-05, Box 1.

<sup>71</sup> Ontario Department of Health, Annual Report, 1930, p. 28.

lem, and in particular the state's awareness of the serious personal costs paralytic polio often imposed on families.

#### 2.3) The Provinces and Paralysis Management

In the wake of the 1927 epidemic, the Alberta government established specialized hospital "after-treatment" of polio patients. This was something no other province seemed actively interested in until major epidemics struck Saskatchewan and Ontario in 1937, and not on a large scale until the 1940s. In Alberta there were "no facilities at hand to take care of any large number of cases that might result from such an outbreak from this new and strange disease."<sup>72</sup> Thus, a special measure for the adequate after-treatment for affected children was needed, "many of whom could ill-afford prolonged medical care."<sup>73</sup>

After gaining the early support of the Edmonton Academy of Medicine, and conducting a survey of the situation, the province moved quickly to build a sixty-bed "Provincial Special Hospital for Infantile Paralysis" on grounds near the University of Alberta Hospital in Edmonton. This orthopaedic hospital was fully equipped and staffed by specialists, with specialized treatment given at cost.<sup>74</sup> It was felt that if the hospital was supervised by a specialist, physicians would "prefer to hand over these cases to one who would have the care of them all and who would be in a position to actend the cases from day to day." Furthermore, the hospital was open to all provincial cases, with financial assistance available in cases of necessity.<sup>75</sup> This effort effectively took considerable pressure and responsibility, which they seemed anxious to shed, off the shoulders of private physicians, . The seriousness of the epidem-

<sup>72</sup> Mewburn, "Some Experiences With the After Care of Poliomyelitis," p. 286.

<sup>&</sup>lt;sup>73</sup> Jenkins, "Some Findings in the Epidemic of Poliomyelitis in Alberta, 1927," p. 224; "After Treatment of Poliomyelitis", *Aiberta Public Health Bulletin*, p. 2-3.

<sup>&</sup>lt;sup>74</sup> *Ibid.*; Alberta Department of Health, Annual Report, 1927, p. 12. The survey found that out of 131 patients seen, 67 required considerable after-care. Construction began on the hospital on November 15, 1927 and it admitted its first patients on January 31, 1928.

<sup>&</sup>lt;sup>75</sup> Edmonton Academy of Medicine, Minutes of Special Meeting, October 12, 1927, University of Alberta Archives, 69-121-10, p. 49-50.

ic demanded action and in the absence of specific treatments, such as convalescent serum, Alberta took a broad approach upon which it and other provinces would later build.

A number of factors, beyond the shock of the epidemic itself, help to explain Alberta's policy. There were few hospitals large enough and with the necessary specialized staff and equipment for the long-term care of a large number of cases. Experience gained during World War I had demonstrated "that the segregation of one type of case in a special hospital produced a more efficient staff and greatly improved the handling and treatment of the cases." Such segregation allowed for more systematized care than in a general hc spital. This reduced the costs of hospitalization, especially since many cases required hospitalization for months, or often years, and if they were "admitted to a general hospital at the rates which of necessity must prevail, the financial burden would be greater than most can bear."<sup>76</sup>

Dr. F.H.H. Mewburn, the orthopaedic surgeon appointed to take charge of this special hospital, later recalled that up until the 1927 epidemic the number of crippled individuals in the west was very low, and physicians were only beginning to appreciate the special problems of the aged, indigent, and disabled. When the polio epidemic struck, and with no facilities available to manage all the cases, "it is no wonder that the people began to get panicky and the Provincial Department of Health was appealed to in order to obtain some aid." The new hospital was designed to accept cases once they had come out of the quarantine period. Until this point the diagnosis and acute treatment was the responsibility of the family and their physician. Once admitted to the new hospital, each family paid what it could, but the province helped those who could not afford to pay the \$1.75 per day charged for in-patients.<sup>77</sup>

While Alberta was the only province to establish a specific plan for managing polio after-care, the issue surfaced periodically within the Canadian medical litera-

<sup>&</sup>lt;sup>76</sup> "After Treatment of Poliomyelitis,' Alberta Public Health Bulletin, p. 2.

<sup>&</sup>lt;sup>77</sup> F.H. Mewburn, "Some Experiences with the After-Care of Poliomyelitis," p. 286.

ture during the 1927-1932 period, despite the dominant interest in the serum. The Ontario Department of Health found that the serum "lends itself to cases which are widely scattered where no hospital facilities are immediately available."<sup>78</sup> Thus, as long as the serum was widely available and appeared useful to physicians and the province, there was little discussion of the issues of after-care and hospitalization. Quebec seemed more aware of the potential financial hardships of polio. Some hospitals voluntarily lowered their rates for polio cases, and the "Bureau of Public Charities was very broad in its interpretation of the law for these pitiful victims, and was of material assistance to a large number of families."<sup>79</sup>

Whether or not provincial governments were involved, the proper after-care of paralytic polio cases depended upon "adequate hospital facilities"<sup>80</sup> to handle them. During this period, however, such hospital facilities that could serve the longterm needs of paralytic polio patients were rare in Canada. For example, in the city of Winnipeg during the 1928 epidemic, hospitalization was resorted to only when "home surroundings were not satisfactory."<sup>81</sup>

Before the major epidemics of 1937, most polio cases were never admitted to a hospital during the acute stage of the illness. Many later entered hospital for orthopaedic surgery, but it was normal for polio cases to be cared for in their own home, with or without the direction of the family physician. For these families, hospitals were either not considered at all, were physically inaccessible from isolated homes and small communities, or were perceived as financially inaccessible. In some cases the local hospital did not admit polio cases due to limited facilities or space, a recognition that it had little to offer polio cases during the acute stage, or as was frequently the case, an explicit fear of the disease. A polio survivor from Kelowna, British

<sup>&</sup>lt;sup>78</sup> Hardman and McKay, "Poliomyelitis in Ontario," p. 90; Ontario Department of Health, Annual Report, 1930, p. 28-35.

<sup>&</sup>lt;sup>79</sup> Foley, "The Present Outbreak of Poliomyelitis in Quebec", p. 496-7.

<sup>80</sup> Editorial, "On Infantile Paralysis," CPHJ, 19 (Apr. 1928): 176.

<sup>&</sup>lt;sup>81</sup> Douglas, "Methods of Control in the City of Winnipeg," in Manitoba, *Report on the Poliomyelitis Epidemic in Manitoba, 1928*, p. 71.

Columbia, who was struck in 1928 at age five, along with her nine-month-old brother, recalled that "Due to the epidemic we were not wanted in the hospital..."<sup>82</sup>

Almost invariably the responsibility for home care fell to mothers who frequently demonstrated heroic efforts based on a powerful emotional need to do something practical to help their suffering children. For most this involved massage, heat and water, either separately, or in combination. Many polio survivors reported how their mothers, and sometimes their fathers, spent hours each day massaging and exercising the affected muscles.<sup>83</sup> Spring water baths were also used,<sup>84</sup> but more often hot baths were given.<sup>85</sup> Sometimes a heat lamp was directed on the paralyzed muscles.<sup>86</sup> Careful attention was also given to diet, "brief fresh air," and above all, bed rest.<sup>87</sup> Although family doctors offered advice, it was not always followed or acceptable. Thus parents turned to relatives and friends for information. In 1920, the mother of a six year old girl in Waldorf, Ontario, after being unable to obtain a correct diagnosis from the nearest hospital, wrote to her sister in Austria for help from a doctor there, which she received.<sup>88</sup>

This kind of treatment often became overwhelmingly burdensome and some parents had difficulty accepting the physical limits polio imposed on their children. In the absence of special hospitals for long-term care in the pre-1937 period, many families resorted to charity hospitals, such as those run by the Red Cross and the Shriner's Clubs. The Shriner's Hospital in Montreal was chosen for some cases in

<sup>&</sup>lt;sup>82</sup> Marion B. (1928-29, age 5.5, Kelowna, BC). June 1993.

 <sup>&</sup>lt;sup>83</sup> William H. D. (1915, age 5, Dundas, Ont.), May 1993; Raymond H. (1929, age 8, Hamilton, Ont.), July 1993; Joy, M. (1937, age 10, Toronto, Ont.), September 1992; Cora W. (1940, age 10, New Liskeard, Ont.), June 1993.

<sup>&</sup>lt;sup>84</sup> Lawrence A. (1924, age 1.5, Ottawa, Ont.), May 1993.

<sup>&</sup>lt;sup>85</sup> Margaret M. C. (1928, age 7, Niagara Falls, Ont.), May 1993; Warren M. (1939, age 5, Toronto, Ont.), July 1993; Heather L. (1953, age 6, Barrie, Ont.), June 1993.

<sup>86</sup> Charles L. B. (1942, age 9, Windsor, Ont.), May 1993.

<sup>&</sup>lt;sup>87</sup> Marion B. (1928-29, age 5.5, Kelowna, BC); Heather L. (1953, age 6, Barrie, Ont.).

<sup>&</sup>lt;sup>88</sup> Mia K. (1920, 2ge 6, Waldorf, Ont.), August 1993.

New Brunswick and Ontario.<sup>89</sup> In 1927, before the Alberta polio hospital opened, the already overburdened parents of a two-year-old girl from Calgary resorted to a Red Cross Hospital, despite being urged by a close friend to give daily massages to their daughter. She remained in the hospital for most of the next three years wbore she received "absolutely no therapy" and a series of painful operations. As her sister later wrote, "In essence it was a three-time butchery of her right foot."<sup>90</sup> The situation was better for another young Alberta girl who was stricken in 1928, and who benefited from the government support at the provincial polio hospital.<sup>91</sup>

The treatment paralytic polio patients received during the first epidemic wave, and until the early 1940s, was based on two fundamental principles: absolute rest and immobilization by splinting of the affected limbs. This program stressed the need to relieve muscles of all strain so that the damaged motor neurons in the spinal cord had time to recover and, it was hoped, heal to some degree. The splints were designed to prevent deformities caused by the imbalance of paralyzed and healthy muscles, which could contort the bone and muscle structure of the affected and adjacent limbs. In Canadian medical journals it was stressed that the patient should be strapped for weeks, and where the legs were paralyzed the patients should not attempt to walk for months. It was also apparent to some doctors that "Many hospital cases are due to relaxing treatment too soon."<sup>92</sup> Official press statements warned that "much harm will result from neglect or from following bad advice," while special diets,

Frances M. D. (1927, age 2, Calgary, Alb.), October 1993; George S. (1930, age 7, Dane, Ont.), May 1993; Jean D. S. (1937, age 6, Moncton, NB), May 1993; Patricia M.C. T. (1938, age 8, Restigouche County, NB), June 1993.

<sup>&</sup>lt;sup>90</sup> Frances M. D. (1927, age 2, Calgary, Alb.), attached to an eight page biographical narrative written by her sister Helen Maxwell in 1993; p. 4.

<sup>91</sup> Denise B. (1928, age 6, Drumheller, Alb.), November 1993.

<sup>92 &</sup>quot;Infantile Paralysis," Manitoba Medical Bulletin, #85 (Sept. 1928): 3.

electrical treatments, and massage were of minor importance and "must be carefully prescribed by the doctor...."<sup>93</sup>

By 1932 it was clear that convalescent serum alone was not going to prevent polio epidemics and their paralytic effects, and no vaccine was foreseen. Thus a growing concern of the medical community became the potential "economic problem" that disabled individuals and their future presented. The Depression helped focus attention on the future of children who did not get proper treatment, since their ability to be independent and "avoid becoming a public charge, depends on that treatment..." Without it "an attitude of hopelessness" can develop. Thus, the need for providing such treatment was thought to be "urgent" and the responsibility for giving it "rests upon all branches of organized medicine -- the general physician, the surgeon, the officials of the public health social services, the university and the teaching hospital."

Dame Macnamara, who outlined the principles of such treatment, asked in late 1932, "What are we trying to do?" and "Are we doing it?" For the editors of the *CPHJ*, "Seeing our cripples increasing as they are, seeing paralysis untreated, or treated too late, or inadequately treated, we are almost forced to admit that we are not 'doing it.'<sup>94</sup> However, other than in Alberta, most Canadians would have to wait until major polio epidemics hit their province more seriously, or more often, before provincial governments started "doing it" in a more comprehensive way.

<sup>93 &</sup>quot;Appendix II: Treatment of the Paralysis," in Manitoba, Report on the Poliomyelitis Epidemic in Manitoba, 1928, p. 81. These articles were reprinted in "Poliomyelitis," The Canadian Nurse, 25 (Aug. 1929): 409-11.

<sup>&</sup>lt;sup>94</sup> Editorial, "The Poliomyelitis Problem," *CPHJ*, 23 (Nov. 1932): 546-47; J. Macnamara, "The Treatment of the Paralyses of Poliomyelitis," *CPHJ*, 23 (Nov. 1932): 517-45.

# CHAPTER 3:

# The Second Wave, 1935-1940: Science, Technology and Government Polio Treatment

The second wave of high polio incidence in Canada was dominated by two major provincial epidemics: Manitoba in 1936, and Ontario in 1937, while a number of other provinces were also severely affected in 1937 (Tables 2 and 3). The management of the Ontario epidemic by the provincial government was marked by the most comprehensive preventive treatment, hospitalization and after-care program yet deployed against any infectious disease in Canada.

These outbreaks also coincided with the peak of the dominant neurotropic model of experimental polio, based almost exclusively on the laboratory study of artificially infected monkeys. The Ontario government's responer to the disease, in close association with Connaught Laboratories, the School of Hygiene and Toronto's Hospital for Sick Children, played an important scientific role in undermining this conception of polio and helped signal a paradigm shift into a new era of broader polio research. The influence of the monkey model was exaggerated during the 1930s by three main factors: a sharp decline in support for convalescent serum, especially in the U.S.; an expansion of laboratory research into the virology and immunology of polio; and a number of major American polio epidemics in 1934 and 1935 which inflamed public demand for any preventive agents to replace, or at least supplement, immune serums.<sup>1</sup> More generally, during the mid-1930s there were high expectations that modern science and technology would solve the world's social and medical problems. In order to win the "war on polio," science and the media promised new

On the major U.S. epidemics of 1934 and 1935, see: J.P. Leake (et al.), "Epidemiology of Poliomyelitis in California, 1934," American Journal of Public Health (hereafter AJPH), 24 (Dec. 1934): 1204-06; A.T. Legg, "An Analysis of the 1935 Epidemic of Infantile Paralysis in Massachusetts," New England Journal of Medicine, 217 (Sept. 23, 1937): 507-11; C.V. Reynolds and J.C. Knox, "Poliomyelitis in North Carolina in 1935," AJPH, 26 (Feb. 1936): 95-7; S.O. Levinson, "A Five Year Review of Anterior Poliomyelitis in the Chicago Area," Illinois Medical Journal, 70 (Set. 1936): 296-301.

and powerful weapons in what otherwise seemed a losing battle against the worsening ravages of this dramatic disease.

Three such polio weapons emerged between 1934 and 1937: two different and premature types of polio vaccines in 1934-35, and nasal sprays of varying chemical compositions in 1936-37. Because 1934 and 1935 were non-epidemic years in Canada, there was little interest in the vaccines north of the border; thus there was a non-conjunction, unlike the parallel that occurred with convalescent serum during the first epidemic wave in Canada. Such a non-conjunction was fortunate for Canadians in light of the danger these vaccines posed. In 1936-37 a conjunction did occur with the somewhat less dangerous nasal spray, but this time Canadian evaluative efforts played a decisive role in shattering hope that it might prevent polio, and weakening the science upon which such hope was based.

In 193C Manitoba established a new level of state interest in polio management by arranging for free diagnosis and treatment, despite, and also because of the economic hardships of the Depression. Howevc, the even greater emergency of the 1937 epidemic and the powerful need to do something about polio, pushed the Ontario Department of Health significantly further. Beyond testing the nasal spray and providing "homemade" iron lungs, the province set out to prevent "unnecessary deformities" through financing and standardizing a program of treatment and hospitalization for all polio patients, regardless of income.

This substantial growth in "state medicine" during the 1930s occurred within a context of expanding government diagnostic and treatment programs against tuberculosis, and especially cancer. Prompted by rising cancer incidence and the need to provide "modern" treatment as broadly as possible, primarily with the extremely expensive radium, provincial governments increasingly intervened during this period with cancer commissions and cancer clinics, first in Saskat-

chewan and Ontario, followed by Alberta.<sup>2</sup> Polio epidemics in 1937 in these provinces, although to a lesser degree than in Ontario, also prompted significant government treatment and hospitalization programs. An important difference between provincial polio and TB or cancer programs was that the latter were means tested to limit free treatment to the indigent poor, while state assistance to polio cases was largely free and unconditional.

The seriousness of the 1937 polio epidemic, in particular, helped focus the attention of the Ontario Department of Health and other Canadian public health authorities on an important question: just how far should any government be compelled to go to ensure the advantages of modern treatment for its people? The Ontario government's high level of financial involvement in polio treatment and after-care support reinforced the growing value of "state medicine," and set important precedents in its subsequent expansion, especially in the face of worsening polio epidemics in the 1940s and 1950s across Canada.

### 3.1) Experimental Polio and the Monkey Model

By the early 1930s the scientific understanding of poliomyelitis was dominated by the ideas of Simon Flexner of the Rockefeller Institute and the model that the poliovirus was completely neurotropic; *ie.* present and pathogenic only in nervous tissues. The high expense of monkey-based research, which significantly limited the numbers of serious researchers working in the field, effectively magnified the apparent value and utility of his results. Also important was the limited understanding of the nature of viruses and immunology generally in the 1930s. Viruses remained

<sup>R.O. Davison, "Saskatchewan's Programme for Cancer Control," CPHJ, 24 (Dec. 1933): 566-71; A. H. Sellers, "Cancer Control in Ontario," CPHJ, 29 (Feb. 1938): 92-3; A. H. Sellers, "The Contribution of the Ontario Cancer Clinics to the Control of Cancer," CPHJ, 31 (Feb. 1940): 72-6; News Items, Alberta: CMAJ, 38 (Apr. 1938): 409; 40 (Apr. 1939): 412; 43 (Oct. 1940): 398; 44 (Jan. 1941): 94; Medical Economics, "A Brief on Cancer Control," CMAJ, 49 (July 1943): 54-7. See also Barbara Natalie Clow, "The Problem of Cancer. Negotiating Disease in Ontario, 1925-1945," Ph.D. Thesis, University of Toronto, 1994.</sup> 

defined only by their negative properties in relation to bacteria; *ie*: their invisibility, filterability, and their inability to multiply in the absence of susceptible living cells.<sup>3</sup>

Flexner's influence was continued by Dr. Harold K. Faber of Stanford University, a "militant proponent of the strict neurotropism of [the] poliovirus."<sup>4</sup> Faber went further and traced a complex path for the virus in man based on monkey pathology. The virus seemed to travel from infected droplets in the nose, through the olfactory nerve and then into the brain and spinal cord. Faber was also confident that he could explain the various symptoms and often limited progress of the disease by the effect of "halting," as the body's immune system stopped the virus at particular points before paralysis was evident. The detail of this neural pathway model was 'mpressive to other polio researchers, despite the recognition that the methods of inoculation of the virus into monkeys were "artificial." The virus was most often directly injected into the brain intracerebrally, but direct nasal inoculation was also successful if the nasal passages were specially treated.<sup>5</sup>

This laboratory model of polio had little practical value for many physicians and confidence in it had earlier been eroded by the work of George Draper. Building on the work of Wickman, Draper, through his 1917 text, *Acute Poliomyelitis*, reinforced in the minds of physicians the concept that polio was a generalized systemic infection with paralysis "but an accidental and incidental occurrence."<sup>6</sup> By 1935

<sup>&</sup>lt;sup>3</sup> Alfred Grafe, A History of Experimental Virology (Translated by Elvira Reckendorf) (Berlin: Springer-Verlag, 1991); Ton van Helvoort, History of Virus Research in the Twentieth Century: The Problem of Conceptual Continuity," History of Science, 32 (1994): 185-235.

<sup>&</sup>lt;sup>4</sup> Paul, History of Poliomyelitis, p. 383. See also Margaret L. Grimshaw, "Scientific Specialization and the Poliovirus Controversy in the Years Before World War II," Bulletin of the History of Medicine, 69 (1995): 44-65.

J. Craigie, "The Second Blackader Lecture on Some Aspects of Virus Infection, With Special Reference to Virus Diseases of Childhood," *CMAJ*, 31 (Oct. 1934): 347-56. Dr. James Craigie of Connaught Laboratories and the School of Hygiene was one of the leading virologists of the 1930s, who in this keynote address on virus diseases placed a particular emphasis on the virology of polio.

<sup>6</sup> Ibid..

and the second edition of his text, even Draper "had been led astray" by the neurotropic model.<sup>7</sup> Nevertheless, many physicians could not reconcile the acute polio symptoms they saw in their patients with the idea that only the nervous system was involved.<sup>8</sup> This inconsistency remained a strong undercurrent which increasingly surfaced to challenge the orthodox model as epidemics grew larger.<sup>9</sup>

In the 1930s the prevailing understanding of polio immunity was that it was primarily general, innate and cellular. Moreover, the development of poliovirus antibodies was thought to have little to do with whether or not a person was actually immune to the paralytic effects of the virus. The theory of latent immunization was the most widely accepted hypothesis that best explained how individuals became immune to polio. It assumed

1) that the virus is extensively distributed and that the chances of contact with the virus are therefore frequent, 2) that the virus is transferred from person to person by droplet infection, 3) that the innate resistance of most individuals is high, 4) that infection and disease are not identical.<sup>10</sup>

This theory satisfied most questions about polio immunity, but it also left a number of others unexplained, especially the natural epidemiology of the disease. Droplet infections were usually confined to winter, which was in sharp contrast to polio's apparently exclusive summer incidence pattern. The most serious problem with the model was the issue of how to prevent the disease in the community, and in the individual through immune serums or active immunization.

<sup>7</sup> Paul, History of Poliomyelitis, p. 244-45.

<sup>8</sup> Craigie, "Blackader Lecture," p. 354.

<sup>&</sup>lt;sup>9</sup> Levinson, "A Five Year Review of Anterior Poliomyelitis in the Chicago Area," p. 296-30; W.W. Waddell and C.W. Purcell, "Poliomyelitis in Charlottesville, Virginia," AJPH, 26 (Feb. 1936): 104-12. The Virginia report, concluded: "We cannot consider poliomyelitis solely in terms of its neurological manifestations as is the current medical tendency. We think it proper to consider it a systemic disease with neurological manifestations in the majority of instances. To think otherwise precludes the probability of diagnosis of early abortive and non-paralytic cases and interferes very materially with a proper conception of its probable incidence" (p. 112).

<sup>10</sup> J. Craigie, "Some Problems of Poliomyelitis," CPHJ, 27 (Jan. 1936): 8.

On a more practical level the "urgent" question of the value of convalescent serum could not be satisfactorily settled on the basis of this theory. In order to have an effect the serum had to neutralize the virus before it invaded the nervous system, implying that circulating polio antibodies played an immunizing role. More "completely controlled" trials were thus needed using the direct intravenous route and if the serum proved valueless, "the sooner the fact is definitely established the better, and all our efforts against this disease may be directed into other channels."<sup>11</sup> This issue was also pertinent to the prospects of a vaccine, which seemed to depend upon the stimulation of circulating antibodies by the specific virus. But if polio immunity was more dependent upon non-specific cellular immunity of nerve cells, circulating antibodies may have little effect in preventing paralysis. Moreover, the theory of latent immunization assumed that the poliovirus is a simple antigen of only one basic type that behaves similarly in experimental monkeys and humans.

In 1910, Flexner had demonstrated that immunity could be stimulated when monkeys were injected under the skin with small amounts of live poliovirus over a period of time. These results and similar work with bacterial vaccines led to unsuccessful attempt: between 1910 and 1914 to inactivate the poliovirus with heat and/or various chemicals such formalin, a 40% formaldehyde solution.<sup>12</sup> The expense of monkeys, time and labour prevented further work after 1914. In the early 1930s, however, there was a sudden reawakening of interest in vaccine research with monkeys and in humans using two competing types of polio vaccines. As developed later between Salk and Sabin, the issue of polio vaccination during the 1930s was characterized by strong personalities and intense scientific competition and rivalry.

The first to renew active polio vaccine research was Dr. Maurice Brodie, a Canadian who began to experiment with monkey immunization and virus inactivation in Montreal in 1929. In 1932 he moved his work to the New York City Health

<sup>11</sup> Craigie, "Blackader Lecture," p. 355.

<sup>12</sup> Paul, History of Poliomyelitis, p. 252-54.

Department's Laboratory and continued his experiments using formalin. Interest in formalir, had recently been revived by the successful use of diphtheria toxoid. Formalin was used to detoxify, or inactivate the diphtheria bacteria toxin, which was then injected as an effective immunizing antigen. In 1924, Gaston L. Ramon, of the Pasteur Institute in France, was the first to demonstrate the value of the formalized diphtheria toxoid in children.<sup>13</sup>

Brodie was soon able to induce poliovirus antibody production in monkeys using a formalin-inactivated vaccine. Duplicating the methods and success of diphtheria toxoid with the poliovirus, about which very little was known, was a very different and more complex problem. Neverthelesss, in the summer of 1934, aware of similar research being done by Dr. John A. Kolmer in Philadelphia using an attenuated vaccine, Brodie pressed ahead with human trials of his inactivated vaccine.<sup>14</sup> After finding an increase in antibody concentration among a group of 19 volunteers, he decided to use the vaccine more widely.<sup>15</sup> An editorial in *JAMA* confidently pointed out that "Here is a well controlled scientific experiment in which the safety of all those concerned is guaranteed by modern scientific methods."<sup>16</sup> So encouraged, Brodie expanded his trials in mid-1935 in various U.S. states that were suffering from major epidemics,<sup>17</sup> some with the participation of the United States Public Health Service.<sup>18</sup> Among the 11,000 children who received the vaccine in 1935,

<sup>13</sup> Robert D. Defries, The First Forty Years, 1914-1955: Connaught Medical Research Laboratories, University of Toronto (Toronto: University of Toronto Press, 1968), p. 76-9; R.D. Defries, "Diphtheria Toxoid (Anatoxine-Ramon)," CPHJ, 19 (May 1928): 211-19; N.E. McKinnon, Mary A. Ross and R.D. Defries, "Reduction in Diphtheria in 36,00 Toronto School Children as a Result of an Immunization Campaign," CPHJ, 22 (May 1931): 217-23.

Paul, History of Poliomyelitis, p. 254-56; Lawrence B. Berk, "Polio Vaccine Trials of 1935," Transactions and Studies of the College of Physicians of Philadelphia, 11 (1989): 329-30.

<sup>15</sup> Berk, "Polio Vaccine Trials of 1935," p. 330-31.

<sup>16</sup> Topics of Current Interest, "A Poliomyelitis Vaccine," CMAJ, 31 (Oct. 1934): 441, reprinted from Editorial, "A Poliomyelitis Vaccine," JAMA, 103 (July 28, 1934): 264.

<sup>17</sup> Berk, "Polio Vaccine Trials of 1935," p. 331; M. Brodie and W.H. Park, "Active Immunization Against Poliomyelitis," AJPH, 26 (Feb. 1936): 119-25.

Berk, Ibid.; C.V. Reynolds and J.C. Knox, "Poliomyelitis in North Carolina in 1935," AJPH, 26 (Feb. 1936): 95-97; A.G. Gilliam and R.H. Onstott, "Results of Field Studies With Poliomyelitis Vaccine," AJPH, 26 (Feb. 1936): 113-18.

along with some 5,000 controls, there were no clear vaccine associated polio cases, while antibody levels seemed higher. However, these trials were not large enough to demonstrate any clear protective effect in the presence of polio outbreaks.<sup>19</sup> Brodie's vaccine was essentially harmless, but its principles foreshadowed those demonstrated by Salk twenty years later.

The principles behind Kolmer's vaccine were less sound and much more dangerous.<sup>20</sup> Kolmer's interest in polio was sparked by an epidemic in Philadelphia in 1932 when he tried, unsuccessfully, to infect small animals with the poliovirus. He then turned to the question of immunization, but unlike Brodie, believed that only a live virus could induce immunity. He experimented with "devitalizing" or attenuating live poliovirus so that when injected it stimulated immunity without causing the disease. Kolmer's use of the term "attenuated" was unlike its later application to Sabin's vaccine. Sabin cultured attenuated poliovirus strains, while Kolmer used chemicals that only diluted the infectivity of a dose of live poliovirus. Kolmer's model was closer to Pasteur's treatment for rabies.<sup>21</sup> He felt that the monkey virus he had been working on was less virulent to humans, but could not prove this without human testing. To insure safety, Kolmer "attenuated" the virus with various chemicals so that it would stimulate immunity without being infectious to monkeys.<sup>22</sup> Kolmer then injected himself and his assistant with this "witches brew", which seemed to induce an immune response.<sup>23</sup> After giving his vaccine to over 100 children "without ill effect" in 1934, in the spring and summer of 1935 he rapidly

T.M. Rivers, "Immunity in Virus Diseases with Particular Reference to Poliomyelitis," AJPH.
26 (Feb. 1936): 142. See also Craigie, "Some Problems of Poliomyelitis," p. 11-12.

<sup>20</sup> Berk, "Polio Vaccine Trials of 1935," p. 326.

Paul, History of Poliomyelitis, p. 257; J.A. Kolmer, "Vaccination Against Acute Anterior Poliomyelitis," AJPH, 26 (Feb. 1936): 126; Rivers, "Immunity in Virus Diseases With Particular Reference to Poliomyelitis," p. 141; Defries, First Forty Years, p. 17-18; Harry F. Dowling, Fighting Infection: Conquests of the Twentieth Century (Cambridge, Mass.: Harvard University Press, 1977), p. 24.

<sup>22</sup> Berk, "Polio Vaccine Trials of 1935," p. 326-27; J.A. Kolmer, "An Improved Method of Preparing the Kolmer Poliomyelitis Vaccine," AJPH, 26 (Feb. 1936): 149-57.

<sup>23</sup> Paul, History of Poliomyelitis, p. 258; Berk, "Polio Vaccine Trials of 1935," p. 327-28.
expanded its use through physicians. Some 12,000 vaccinations were done in 32 states, as well as in Canada, although it is not known precisely where. Unlike Brodie, Kolmer did not use control groups, did not monitor this vaccination program, nor instruct physicians how to properly administer the vaccine and report side effects.<sup>24</sup>

The results soon became tragic. Kolmer found some ten cases of polio among vaccinated children, five of whom died. He expected some polio cases would develop among those who were vaccinated too late after an infection to be of value. He went to great lengths to defend his vaccine against charges that it directly caused these cases and deaths.<sup>25</sup> Kolmer was harshly criticized at an American Public Health Association meeting, as was Brodie.<sup>26</sup> These trials were not large enough and "were made without what most of us would consider proper controls." Most worrisome to the medical community was "the style of advertisement which has been given to these vaccines, particularly in the lay press." There were thus calls for "some authoritative body" to sponsor a public statement on the status of polio vaccines.<sup>27</sup>

After 1935, in light of the evident dangers and lack of knowledge about the disease in humans, further research into active polio vaccination remained effectively dead until 1952-53. These early vaccine trials demonstrate how the public potency of polio intensified scientific rivalry and commercial interests, stimulated an overconfidence in an experimental model of a disease, and heightened the sense of urgency to test and provide a premature vaccine that might prevent polio's crip-

<sup>&</sup>lt;sup>24</sup> Berk, "Polio Vaccine Trials of 1935," p. 328; Kolmer, "Vaccination Against Acute Anterior Poliomyelitis," p. 128-29. There is an indication that the Kolmer vaccine was used in Nova Scotia as the Nova Scotia Medical Bulletin, 14 (Dec. 1935): 665, carried a short note about the controversy surrounding the vaccine and stated "Our local press, which some few months ago lauded the Kolmer Vaccine as a God-send and featured one of our local nurses as one of the heroes of Medicine, now comes out with headlines telling us the vaccine is not safe."

<sup>&</sup>lt;sup>25</sup> Kolmer, "Vaccination Against Acute Anterior Poliomyelitis," p. 129-35.

Rivers, "Immunity in Virus Diseases With Particular Reference to Poliomyelitis," p. 140-42; J.P. Leake, "Discussion of Poliomyelitis Papers," AJPH, 26 (Feb. 1936): 148, held during Annual Meeting, Southern Branch, American Public Health Association, St. Louis, November 19, 1935.

<sup>&</sup>lt;sup>27</sup> Editorial, "Poliomyelitis," AJPH, 26 (Feb. 1936): 181-83.

pling effects and death among children.<sup>28</sup> This dangerous situation emerged again when scientific, medical and popular enthusiasm quickly built for preventive nasal sprays during 1936 and 1937. This time such pressures were strongly evident in Canada and coincided with major polio epidemics in Manitoba and Ontario.

3.2) Second Wave Epidemics and the Provincial Response, 1936-1937

In 1933 and 1934 Canadian polio incidence remained low. Alberta was hardest hit in 1935. In 1936 epidemic polio was confined to Manitoba, but in 1937 serious infections struck Alberta, Manitoba, New Brunswick, Saskatchewan,<sup>29</sup> and most severely in Ontario. Nationally, 1937 was the second worst polio year in Canadian history with a reported case rate of 35.4 per 100,000, which represented almost 4,000 cases across the country. The majority occurred in Ontario, although the seriousness of the Alberta and Saskatchewan situations provoked similar provincial responses as in Ontario. During 1938 only two provinces, Alberta and Manitoba, reported significant polio outbreaks, while in 1939 and 1940 calm returned nationally as all provinces escaped major outbreaks (see Figure 1 and Tables 1, 2, 3 and 4).

The experience of Manitoba in 1936, and especially in Ontario in 1937, were the most significant in the determination of the provinces to manage epidemics strictly and to utilize the latest scientific and technological weapons against polio to demonstrate that something concrete was being done about it. Also evident was the expanding interest of provincial health departments in the standardization of treatment

Paul, History of Poliomyelitis, p. 260. Kolmer had more than just a scientific interest as the vaccine was manufactured by the Institute for Cutaneous Medicine, of which he was Director, and the William Merril Company, holder of the sodium ricineolate patent. Brodie's vaccine was prepared by the New York City Department of Health Laboratory where Brodie was based under the direction of Dr. William H. Park.

<sup>29 &</sup>quot;Entire Dominion Affected by Infantile Paralysis," Toronto Telegram, (Sept. 10, 1937); Alberta Department of Public Health, Annual Report, 1937 (Edmonton: 1938), p. 11; Report, District No. 1, Alberta Medical Bulletin, 2 (Oct. 1937): 22-23; Saskatchewan Department of Public Health, Annual Report, 1937 (Regina: 1938), p. 14; New Brunswick Department of Health, Annual Report, 1937 (Fredericton: 1938), p. 13-15.

methods used against "paralysis," as well as a developing trend towards the hospital as the proper environment for their employment.

During the summer and fall of 1936 poliomyelitis was a "disease of outstanding importance" in Manitoba, and was worse than in 1928. A total of 525 cases and 37 deaths were reported across the province, with most rural areas involved.<sup>30</sup> One major difference from the 1928 experience was that the Manitoba Department of Health and Public Welfare, under the leadership of the Deputy Minister, Dr. Fred W. Jackson,<sup>31</sup> assumed a much broader and more direct role in the management of the epidemic in terms of strict disease control measures, diagnosis, prophylaxis and after care. An epidemiologist was appointed to work in the hardest hit area of Boissevain and was given the "power to insist on rigid observance of quarantine regulations" and act as a diagnostic consultant for the affected area. As the situation deteriorated more special investigators were appointed to expand these services across the province. Public Health Nurses were also assigned for an intensive education program to urge parents to call a doctor quickly in the event of symptoms of the disease appearing. Some municipal governments passed local by-laws to prevent "the ingress of individuals from the infected areas." Despite such strict measures, Jackson felt they "do not seem to be of great value, at least such would appear to be the case."<sup>32</sup>

<sup>30</sup> Manitoba Department Health and Public Welfare, Annual Report, 1936 (Winnipeg, 1937), p. 60; F.W. Jackson, "Infantile Paralysis in Manitoba - 1936," Meeting, Dominion Council of Health, Ottawa, November 2-3, 1936, Appendix I, p. 1, Provincial Archives of Ontario, AO, RG1-05-06; C.R. Donovan, "Poliomyelitis in Manitoba 1936," Manitoba Medical Association Review, 17 (Aug. 1937): 143.

<sup>31</sup> Jackson held a Diploma of Public Health (DPH, 1929) from the University of Toronto School of Hygiene and became Manitoba Deputy Minister of Health and Public Welfare in 1933; M.R. Elliott and R.D. Defries, "The Manitoba Department of Health and Public Welfare," in R.D. Defries, Federal and Provincial Health Services in Canada, (Toronto: Canadian Public Health Association, 1959), p. 95; P.A. Bater with A.J. Rhodes, Within Reach of Everyone: A History of the University of Toronto School of Hygiene and the Connaught Laboratories, Vol. I, 1927-1955, (Ottawa: Canadian Public Health Association, 1990), p. 137-38.

Jackson, "Infantile Paralysis in Manitoba - 1936," Dominic Council of Health Minutes, p. 2;
 F.W. Jackson, "The 1936 Epidemic of Poliomyelitis in Manitoba: Control Measures," CPHJ, 28 (Aug. 1937): 364-66.

In Manitoba the serum remained central to the government's polio strategy. The medical community, and especially the public, demanded that the serum be used, "whether or not [it] is of value...<sup>33</sup> However, early in the epidemic, physicians remained overly dependent upon spinal tap confirmation before giving the serum. This often led to "disastrous results." The Department of Health stressed to doctors that a clinical diagnosis alone was enough to justify immediate serum administration. Further bolstering confidence in the serum, many physicians claimed that the general clinical results obtained from it were "quite comparable to those secured when diphtheria antitoxin is given in a case of diphtheria."<sup>34</sup>

The most significant problem Jackson faced in managing the epidemic was its severity in the "dried-out area[s]" of the province during the Great Depression. Many parents refused to call a doctor simply because they could not afford to pay for their services. As the serum's effectiveness was thought to depend upon early administration, if parents could not afford to see a doctor, it became "very apparent that something had to be done to ensure that everyone in the district who became ill had medical attention at the earliest possible moment."<sup>35</sup> Through Jackson's personal efforts, the municipal governments of each of the affected areas were convinced to provide free diagnostic and treatment facilities unconditionally to every resident, with the municipality paying the doctor's fee. Physicians were paid  $\epsilon$  special scale of fees which was about two-thirds the normal charge. Special resolutions were passed by local governments to offer and also widely advertise this service.<sup>36</sup> As the

Jackson, "Infantile Paralysis in Manitoba - 1936." [ ominion Council of Health Minutes, p. 4.

Jackson, "The 1936 Epidemic of Poliomyelitis in Manitoba: Control Measures," p. 364-66;
 A.J. McIntyre, "Infantile Paralysis in Manitoba - 1936," Bulletin of the Toronto Academy of Medicine, 11 (Dec. 1937): 61.

<sup>35</sup> Donovan, "Poliomyelitis in Manitoba 1936," p. 144.

Jackson, "The 1936 Epidemic of Poliomyelitis in Manitoba: Control Measures," p. 363-64; McIntyre, "Infantile Paralysis in Manitoba - 1936," p. 62. The by-law passed by the municipal councils read: "On and after this date any resident of this municipality who believes he or any member of his household may be developing infantile paralysis, the symptoms of which are upset stomach, headache, fever, rapid pulse and stiffness in the neck or back, has the right to call his own doctor at the expense of the municipality to make a visit to decide

epidemic spread this program was expanded into other municipalities, with "truly remarkable co-operation on the part of the Municipal officials."<sup>37</sup> This was a unique achievement, particularly as the province did not cover the costs and local governments were under intense financial pressures for basic relief in one of the worst years of the Depression.<sup>38</sup>

The 1937 Ontario polio epidemic recorded a total of 2,546 cases, at a case rate of 70 per 100,000, and 119 deaths. Of this total, 758 cases and 31 deaths were registered in the City of Toronto (population 648,309) at a case rate of 117.<sup>39</sup> Since the majority of cases occurred among children under 10 years of age, the age-specific incidence rate in this group in Toronto was 510. Just over half of the number of provincial cases exhibited paralytic symptoms, and by the following March, 839 remained paralyzed to varying degrees. The size, severity and dramatic intensity of this epidemic came as a major shock to Ontario, and which has not been repeated in the province by polio or any other infectious disease.<sup>40</sup>

As had been the case in 1929, an epidemic in 1937 was not unexpected because it followed Manitoba's in 1936. Using the general Canadian trend of epidemics moving from west to east since 1927, and an apparent seven year epidemic cycle,<sup>41</sup> the

what the illness is. If it should be infantile paralysis the municipality will also be responsible for the cost of any further medical attention required."

<sup>41</sup> This striking geographic and epidemiologic pattern can be explained by the relative regional differences in immunity levels to the three distinct types of the poliovirus. This situa-

Jackson, "Infantile Paralysis in Manitoba - 1936," Dominion Council of Health Minutes, p. 2-3.

<sup>38</sup> See for example, James H. Gray, *The Winter Years: The Depression on the Prairies*, (Toronto: Macmillan, 1966), p. 111-13.

Ontario Department of Health, Report on Poliomyelitis in Ontario, 1937 (Toronto: Ontario Department of Health, March 1938); City of Toronto Department of Public Health, Division of Public Health Nursing, "Summary, Poliomyelitis Epidemic, 1937," October 26, 1937, City of Toronto Archives (hereafter TA), RG11, F1, Box 2; F.F. Tisdall, A. Brown, R.D. Defries, M.A. Ross and A.H. Sellers, "Zinc Sulphate Nasal Spray in the Prophylaxis of Poliomyelitis," CPHJ, 28 (Nov. 1937): 523-43; Toronto Department of Public Health, "Annual Statement, 1937," p. 1, 16-27, from volume of Statements, 1935-1940, (Toronto: 1941).

<sup>40</sup> An excellent summary is A.B. LeMesurier, "The Methods Used in Handling the Epidemic of Poliomyelitis in Ontario in 1937," *Journal of Bone and Joint Surgery*, 21 (Oct. 1939): 867-78, read before the Annual Meeting of the American Academy of Orthopaedic Surgeons, Memphis, Tennessee, January 17, 1939.

Ontario Society for Crippled Children (OSCC)<sup>42</sup> predicted a significant outbreak and devoted the entire June issue of its newsmagazine, *The Horizon*, to articles on polio.<sup>43</sup> This issue included articles by the Minister of Health, Dr. J. A. Faulkner, his Chief Medical Officer of Health, Dr. J.T. Phair, and the Director of Preventable Diseases, Dr. A.I. McKay. The tone of these and other articles stressed the value of "the most rigid quarantine," and the continuing use of convalescent serum. McKay was aware of the serum debate, but argued that "Even ten children escaping paralysis as the result of the use of the serum certainly was any effort in time and money expended in making it readily available."<sup>44</sup>

The press coverage of the serum was as hopeful as ever, but, as the epidemic escalated, clear signs of public controversy emerged among physicians and local health officials over its value.<sup>45</sup> Such unusually open debate went beyond the serum issue, with some doctors questioning the seriousness of the epidemic itself.<sup>46</sup> The

tion shifted from west to east through the first decades of the twentieth century with the establishment of new and isolated settlements, particularly in the west and northern regions, along with rising population levels and increased personal mobility through the growing use of automobiles and air travel.

<sup>&</sup>lt;sup>42</sup> On the history of the Ontario Society for Crippled Children, see Reg Hopper, "History, Ontario Society for Crippled Children," unpublished manuscript, undated (c. 1967), Ontario Easter Seals Foundation, Toronto (hereafter referred to a OSCC Archives).

<sup>&</sup>lt;sup>43</sup> F.A. Logan, "Address of the President: Report on Poliomyelitis", Minutes of Annual Meeting, Ontario Society for Crippled Children, March 18, 1938, Archives of the Ontario Society for Crippled Children, p. 1, located in the files of the Executive Secretary, OSCC Archives.

<sup>&</sup>lt;sup>44</sup> The articles were: J.A. Faulkner, "Infantile Paralysis - A Social Menace;" A.I. McKay, "The Use of Convalescent Serum in Ontario and Elsewhere;" E.C. Janes, "Prevention of Needless Deformity;" R.W. Hopper, "Editorial", *The Horizon*, 2(4) (June 1937): 5, 9, 10, 1, National Archives of Canada (hereafter NAC), RG29, Vol. 194, file 311-P11-3, part 1.

<sup>45 &</sup>quot;75 Give Blood for Serum," London Free Press, (Aug. 27, 1937); "Doctors Doubtful of Serum's Effect: Hamilton Physicians Claim Value in Paralysis Not Tested," Toronto Star, (Aug. 27, 1937); "Serum is Used in All Cases by Hospital: Certain Early Treatment Wards Off Paralysis, Superintendent [of HSC] Declares," Toronto Telegram, (Aug. 28, 1937); "To Use More Serum in Paralysis Cases: Province Grants Permission to Consultants Where Seriousness Warrants," Toronto Star, (Sept. 10, 1937). See also J.W.S. McCullough, "The Baby Clinic: Fighting Infantile Paralysis," Chatelaine, (Oct. 1937): 63-64, which was less enthusiastic about the serum.

<sup>46 &</sup>quot;Near Panic... Parent's Imagination is Blamed for Influx of Tots to Hospital," Globe and Mail, (Aug. 18, 1937); "Competent Medical Group Will Decide Definite Plan In Fight Against Paralysis," Toronto Telegram, (Aug. 30, 1937); "Undue Alarm Is Needless Doctors Say," Toronto Telegram, (Sept. 2, 1937); "Disease Data is Overdrawn Doctors Feel," Toronto Telegram, (Sept. 2, 1937); "Will Not Hide Epidemic Data Board Assures: Full Details of

serum policy outlined by the Minister of Health to every physician in the province stressed that "The serum has no value as a preventive agent and should not be used except for the treatment of children showing the early signs of the disease."<sup>47</sup> When the serum was given, such cases were required to be treated as official polio cases and thereafter were subject to provincial and local health regulations.<sup>48</sup> Later they were also eligible for free diagnosis, treatment and hospitalized after-care for a limited period. Once diagnosed, provincial health regulations required isolation of the patient for three weeks and all family contacts quarantined; "rigid adherence to the regulations" was required.<sup>49</sup>

Early in the Ontario epidemic, local medical officers of health (MOHs) requested special diagnostic consultants from the province. Thirteen full-time physicians were appointed and given a three-day course on polio's epidemiology, diagnosis and the early treatment of paralyzed cases. They were each assigned a defined region and by August a total of sixteen consultants provided much needed clinical assistance to MOHs province-wide. They also gathered detailed statistical and other types of information which were later used in the most detailed report ever published on a polio epidemic in Canada.<sup>50</sup>

With three major daily newspapers in Toronto, in an era when the public relied on newspapers for the majority of their news,<sup>51</sup> the emerging polio story was

Paralysis Situation Given Out, Controllers Told by M.O.H.," *Toronto Telegram*, (Sept. 2, 1937).

Letter, J.A. Faulkner, Ontario Minister of Health, to all Ontario physicians, August 4, 1937.
 NAC, RG29, Vol. 192, file 311-P11-1, part 1.

<sup>48</sup> B.T. McGhie, "The 1937 Outbreak of Poliomyelitis," Minutes, Dominion Council of Health, October 15-16, 1937, p. 13, NAC, Microfilm, Reel C9815.

<sup>49</sup> Letter, Faulkner, to Ontario doctors, August 4, 1937.

<sup>50</sup> Report of Extension Committee, "Poliomyelitis Epidemic", Ontario Society for Crippled Children, Minutes, Semi-Annual Meeting of Board of Directors, September 28, 1937, p. 2, OSCC Archives; J.T. Phair, "Present Incidence of Poliomyelitis in Ontario," CPHJ, 28 (Sept. 1937): 420; J.T. Phair, "Anterior Poliomyelitis in Ontario," CPHJ, 37 (Oct. 1937): 387; Ontario Department of Health, Report on Poliomyelitis in Ontario, 1937, p. 59-60.

<sup>51</sup> Carleton McNaught, Canada Gets the News (Toronto: Ryerson Press, 1940), p. 1-35; W.H. Kesterton, A History of Canadian Journalism (Ottawa: Carleton University Press, 1984);

a big issue by mid-August. The Department was determined to provide an extensive education program and was confident that it could control how the press covered the epidemic. Carrying out both efforts soon proved difficult, if not impossible. In early August, the Toronto Board of Control, fearing the economic impact the epidemic could hav? on city business and trade, instructed the Toronto Board of Health to limit public information and statistics on the outbreak. Within a day, however, Toronto MOH, Dr. Gordon Jackson, was forced to lift the ban.<sup>52</sup> Provincial health authorities were disturbed by the controversy and assured the public that there would "be no putting the lid on" information about the disease or current epidemic.<sup>53</sup> In the Department's effort to keep the public informed, "the newspaper publicity was changed to suit the peculiarities of the editors." A detailed full-page "Statement by the Ontario Department of Health on POLIOMYELITIS ("INFANTILE PARALYSIS")" was placed in all daily papers in the province.<sup>54</sup> The Department held daily press conferences during the peak weeks of the epidemic to insure "that accurate information would be available to the public at all times."<sup>55</sup>

The local management of the epidemic in Toronto was the focus of further controversies over the delaying of school openings, the closing of public pools, parks and churches, and whether or not to cancel "Children's Day" at the Canadian National Exhibition (CNE). The issue of postponing public school openings beyond Labour Day to minimize contact among children developed into a debate between health

Paul Rutherford, The Making of the Canadian Media, (Toronto: McGraw-Hill Ryerson Ltd., 1979).

<sup>&</sup>lt;sup>52</sup> "Clamps Censorship on News of Paralysis Cases," London Free Press, (Aug. 11, 1937); Editorial, "Statistics Should Be Published," *Globe and Mail*, (Aug. 12, 1937); "Censorship on Illness Lifted," London Free Press, (Aug. 12, 1937).

<sup>&</sup>lt;sup>53</sup> "No Lid on Paralysis Says Health Deputy: Planning Educational Campaign, McGhie States," *Toronto Star*, (Aug. 26, 1937).

<sup>54</sup> McGhie, "The 1937 Outbreak of Poliomyelitis," Dominion Council of Health minutes. p. 13. The "Statement" appeared in the *Toronto Star*, (Aug. 28, 1937); *Globe and Mail*, (Aug. 28, 1937); *London Free Press*, (Aug. 30, 1937).

<sup>55</sup> Ontario Department of Health, Report on Poliomyelitis in Ontario, 1937, p. 59.

authorities and physicians inside and outside the city.<sup>56</sup> Much as it had in Alberta a decade earlier, this debate highlighted the uncertainty within the medical community between the neurotropic and systemic models of the disease.<sup>57</sup> The systemic model of polio led some doctors and local MOHs to argue that unless health authorities were prepared to strictly apply consistent control measures by restricting children from all potential places of contact, and in effect closing down the entire city of Toronto, there seemed little hope of successfully managing the epidemic.<sup>58</sup> It was the economically and politically charged issue of canceling the popular "Children's Day" at the CNE which brought these models into conflict.<sup>59</sup>

This issue first arose in Toronto Board of Education with a motion to make an official statement asking parents to at least keep their children at home during the "Ex."<sup>60</sup> The motion failed, but the issue was taken up by Dr. R.H. Saunders of the Toronto Board of Health. Saunders suggested that Children's Day alone should be canceled, since schools, public parks, pools, theatres and churches had been closed to children during the epidemic. The Board of Health had been vociferous in its pleas for parents to keep their children at home, and it seemed that to be consistent 200,000

<sup>&</sup>lt;sup>56</sup> "Epidemic will Close Schools," Globe and Mail, (Aug. 24, 1937): "Hoping Cooler Weather and Drastic Measures Clears up Paralysis: Advisability of Closing Schools is Challenged by Hamilton M.O.H.," Toronto Telegram, (Aug. 25, 1937): "York Authorities Divided Over Closing of Schools," Toronto Star, (Aug. 30, 1937); "Toronto Schools Not To Open Until Sept. 13: Public Places May Be Banned to Children," Globe and Mail, (Aug. 27, 1937); "York Authorities Divided Over Closing of Schools," Toronto Star, (Aug. 30, 1937); "Will Keep Schools Closed in Toronto Until Sept. 20: Health Board Advice Followed by Trustees... Question Legality," Toronto Star, (Sept. 10, 1937).

<sup>&</sup>lt;sup>57</sup> "Doctor Raps Stand Taken on Paralysis: Hamilton Medico Sees Folly in Closing Schools and Allowing C.N.E. Children's Day," *Toronto Telegram*, (Aug. 30, 1937); "Sees No Cause For Alarm in Paralysis Epidemic: Rest is Strongly Urged: May Have the Disease But Never Know it, Declares Dr. R.G. Armour of University Staff," *Toronto Telegram*, (Aug. 25, 1937); "Epidemic in Toronto Held Not Paralysis: Dr. Ira de la Matter, Long Branch, Believes Common Toxic Condition Mistaken for Dread Disease," *Globe and Mail*, (Aug. 25, 1937).

<sup>58 &</sup>quot;Doctor Raps Stand Taken on Paralysis...," Toronto Telegram, (Aug. 30, 1937); "Hamilton M.O.H. Raps Closing Schools Here: Sees Toronto Action Illogical," Toronto Star, (Aug. 30, 1937).

<sup>&</sup>lt;sup>59</sup> For a more detailed discussion on the CNE issue see, Lorraine O'Donnell, "A 'Dread Disease': The 1937 Polio Epidemic in Toronto," unpublished MA research paper, Department of History, York University, Toronto, August 1989, p. 33-40.

<sup>60 &</sup>quot;Infantile Paralysis Continues to Increase," Globe and Mail, (Aug. 25, 1937).

children should not be encouraged to mingle freely at the CNE on Children's Day.<sup>61</sup> The 1937 edition of the CNE was expected to be large, particularly to celebrate the Coronation Year of King George VI. The local economy had recently improved and an extensive international advertising campaign had been launched to attract the largest crowds possible.<sup>62</sup> The epidemic had forced the closure or postponement of smaller local fairs across the province, but any thoughts of doing the same with the CNE were vigorously resisted by CNE and city officials. The mayor of Toronto attacked the idea and denounced its supporters as "unfit representatives of the public." MOH Jackson found himself in a difficult position in advising parents to keep their children at home, but admitting that he had no power to compel them to do so.<sup>63</sup> Children's Day went on as scheduled, the CNE doing very little to meet concerns about the epidemic other than offering free tickets to children good for the duration of the fair.<sup>64</sup> Nevertheless, parental concerns and the publicity about "paralysis" had the effect of keeping attendance for the day to 78,000 less than the previous year, and down by 300,000 over the entire 1937 run of the CNE.<sup>65</sup>

<sup>61</sup> Special Meeting, Toronto Board of Health, August 27, 1937, City of Toronto Archives, RG20, Series A, Box 2. See also "Health Board to Consider Barring Children to Shows," *Toronto Star*, (Aug. 27, 1937).

<sup>62</sup> Canadian National Exhibition Association, Toronto, Annual Report and Financial Statements, Year 1937, Report of the Proceedings of the 59th Annual Meeting, February 23, 1938 (Toronto, 1938), p. 12-18, Canadian National Exhibition Archives.

<sup>63 &</sup>quot;Proposal to Bar Children on Special Day at C.N.E. Arouses Anger of Mayor," Toronto Telegram, (Aug. 27, 1937); "'Do You Want to Kill Ex?' 'I Don't Want to Kill Tots!': Mayor, Ald. Saunders Exchange Tart Dialogue at Paralysis Discussion: Plea is Lost," Toronto Star, (Aug. 28, 1937); "Health Board Refuses to Debar Children From the Exhibition: No Justification in Medical Reports for Such Action, Doctors Jackson and [Beverley] Hannah Maintain," Globe and Mail, (Aug. 28, 1937).

<sup>&</sup>lt;sup>64</sup> "Free Tickets for Children are Extended: Will be Good for Admission any Day after Monday at C.N.E.," *Globe and Mail*, (Aug. 28, 1937); "Ex to Honour Tickets for Children Daily: Move Adopted to Avoid Concentrating in Paralysis Danger," *Toronto Star*, (Aug. 28, 1937). The CNE also canceled its annual Baby Show Contest. See also *CNE Annual Report*, 1937, p. 12-13.

<sup>65</sup> CNE Annual Report, 1937, p. 12, 54-55. Note the headlines and the differing perspectives of each of the three Toronto newspaper's reports on "Children's Day": "Keeping Young From Centre of Paralysis: Only Handful of Children Arrive for C.N.E. Station Attendants Reveal," Toronto Telegram, (Aug. 30, 1937); "Children Flock to C.N.E. For Their Own Big Day," Toronto Star, (Aug. 30, 1937); "Paralysis Scare Dams Usual Great Crowd for Children's Day: Best

This controversy and intense press attention reflected the confused medical and scientific understanding of polio, the frustrating lack of progress in developing effective measures to prevent and control epidemics, and the profound fear "paralysis" generated among parents and the community. Mothers felt this fear and frustration the strongest and their voices were frequently heard in the newspapers, in painful letters to the editor and through poignant articles.<sup>66</sup> One front page article published in the *Toronto Star* at the peak of the epidemic dramatically captured this situation. The headline read, "Mothers of the World Again Must Bear Brunt in War With Paralysis," the article couching maternal fears in war imagery. "All we can do is wait until the enemy cracks us down. Then we play stretcher bearers. Just carrying off the stricken." Although trying to ease parent's anxieties, the article admitted that "the truth unquestionably is that after 57 years, medical science is totally in the dark" on how infantile paralysis originated, was transmitted, and how valuable convalescent serum really was. Indeed, in this war, the article concluded, "the front linetroops are not the scientists of the world, but the mothers of the world."<sup>67</sup>

## 3.3) Medical Science, Technology and Crisis Management a) "Paralysis Nose Spray: Just Squirt and Smile"<sup>68</sup>

During the polio season of 1936 widespread enthusiasm developed around the preventive potential of nasal sprays based on the idea that the portal of entry of the poliovirus was the olfactory nerves of the nose.<sup>69</sup> Interest in the chemical blockade of the nasal mucosa first emerged in 1934 with attempts to protect white mice against

Features Yet," Globe and Mail, (Aug. 31, 1937); "C.N.E. Officers Undaunted In Spite of Financial Loss... Interest of Citizens and Empire Maintained Despite 'Regrettable Circumstances'," Toronto Telegram, (Sept. 13, 1937).

<sup>66</sup> Olive Taylor, Letter to Editor, "A Mother's Plea;" Mother of Three, Letter to Editor, "Protect The Children;" Editorial, "Parental Anxieties," *Toronto Star*, (Aug. 30, 1937). See also Editorial, "The War on 'Infantile'," *Toronto Star*, (Sept. 10, 1937).

<sup>67</sup> Gregory Clark, "Mothers of the World Again Must Bear Brunt in War With Paralysis," Toronto Star, (Aug. 27, 1937).

<sup>68 &</sup>quot;Paralysis Nose Spray: Just Squirt and Smile," Toronto Star, (Sept. 2, 1937)

<sup>69</sup> Craigie, "Some Problems of Policmyelitis," p. 12

an intranasal inoculation of equine encephalitis virus with a tannic acid solution.<sup>70</sup> Similar experiments were conducted with as many as 150 different solutions on mice using the St. Louis type of encephalitis as a "feeler" for polio research with monkeys.<sup>71</sup> A picric acid solution was settled on and in the summer of 1936 Charles Armstrong of the U.S. Public Health Service advocated that such a spray be given a human field trial based on monkey experiments and the repeated spraying of himself "and a small group of volunteers without apparent ill effects." That summer a serious polio epidemic in Alabama presented an opportunity for such a field trial.<sup>72</sup> Federal and state officials had hoped it "would be a test by and under the [medical] profession," but it soon became, "largely through the activity of the people themselves..., a test by the masses, largely uninstructed, with all the many variations of method which such a procedure implies."<sup>73</sup> The USPHS issued a statement on the nasal spray which stressed that "homemade concoctions are not favored." Also, "early applications at least should be administered by a physician." This statement was published in the Manitoba Medical Association Review in September 1936 during the peak of the province's epidemic. $^{74}$ 

The U.S. statement had essentially given permission to Manitoba physicians to use the spray, and it was also encouraged by the Public Health Nurses who had been sent to the affected areas to "[give] instruction where requested, on the use of the

<sup>70</sup> P.K. Olitsky and H.R. Cox, "Temporary Prevention by Chemical Means of Intranasal Infection of Mice with Equine Encephalomyelitis Virus," Science, 80 (Dec. 14, 1934): 566-67.

<sup>71</sup> C. Armstrong, "Experience With the Picric Acid-Alum Spray in the Prevention of Poliomyelitis in Alabama, 1936," AJPH, 27 (Feb. 1937): 103; C. Armstrong, "Prevention of Intranasally Inoculated Poliomyelitis of Monkeys by Intranasal Instillation of Picric Acid," Public Health Reports, 51 (Mar. 6, 1936): 241-43; Editorial, "Prevention of Experimental Poliomyelitis," AJPH, 26 (Apr. 1936): 421.

Armstrong, "Experience With the Picric Acid-Alum Spray in the Prevention of Poliomyelitis in Alabama, 1936," p. 104; Editorial, "Prevention of Experimental Poliomyelitis," p. 421; F.F. Tisdall, "Nasal Spraying as a Preventive of Poliomyelitis," CPHJ, 28 (Sept. 1937): 432.

<sup>&</sup>lt;sup>73</sup> Armstrong, "Experience with the picric-alum spray in the prevention of poliomyelitis in Alabama, 1936," p. 105.

C.R. Donovan, "News Item:: Epidemic Poliomyelitis," Manitoba Medical Association Review, 16 (Sept. 1936): 190.

nasal spray."<sup>75</sup> The Manitoba government did not seem to pay a great deal of attention to the spray and made no attempt to control or evaluate its use. The members of the Dominion Council of Health echoed concerns that only physicians administer the spray, but otherwise the topic generated little discussion.<sup>76</sup> This relative complacency lasted until the inconclusive results of the Alabama trial appeared in early 1937.

As the Alabama trial and the 1935 polio vaccine trials illustrated, carefully controlled field trials of prophylactics were rare prior to the late 1930s, with random selection of control groups not done systematically.<sup>77</sup> This had also been the case in studies of various vaccines against acute respiratory disease between 1921 and 1938. It would not be until after 1940 that "[t]he concept of randomization gradually gained acceptance in clinical medicine...<sup>\*78</sup> The most significant problem in the Alabama trial seemed to be technical and that the spray was not reaching high enough into the nose. A long special tip was thus needed on the atomizer which could only be inserted by a professional nose-and-throat specialist. Furthermore, experiments using a zinc sulphate spray on monkeys reported in June 1937 suggested that this was more effective than the picric acid spray and was worthy of a human trial.<sup>79</sup>

Jackson, "Infantile Paralysis in Manitoba - 1936," Dominion Council of Health, minutes, p.
 By Public Health Nursing Division, Manitoba Department of Health and Public Welfare, Annual Report, 1936, Provincial Archives of Manitoba, G1237, 1936, p. 8.

<sup>&</sup>lt;sup>76</sup> Minutes, Dominion Council of Health, November 2-3, 1936, p. 9, AO RG10-05-06, Box 2.

<sup>77</sup> The history of therapeutic and prophylactic clinical trials has not been given the historical attention it deserves. The limited number of studies that exist include: Harry F. Dowling, "The Emergence of the Cooperative Clinical Trial," *Transactions and Studies of The College of Physicians of Philadelphia*, 4th series, 43 (1975-76): 20-29; Jean Jenkins and Susan Hubbard, "History of Clinical Trials," *Seminars in Oncology Nursing*, 7 (Nov. 1991): 228-34; J. Knowelden, "Prophylactic Trials," in L.J. Witts (ed.), *Medical Surveys and Clinical Trials: Some Methods and Applications of Group Research in Medicine*, (London: Oxford University Press, 1964), p. 130-47; Abraham M. Lilienfeld, "Ceteris Paribus The Evolution of the Clinical Trial," *Bulletin of the History of Medicine*, 56 (1982): 1-18.

<sup>78</sup> Lilienfeld, "Ceteris Paribus: The Evolution of the Clinical Trial," p. 15-16.

M.M. Peet, D.H. Echols and H.J. Richter, "Chemical Prophylaxis for poliomyelitis: technique of applying zinc sulphate intranasally," JAMA, 108 (June 26, 1937): 2184; R.S Pentecost, "Zinc Sulphate as a Chemo-Prophylactic Agent in Epidemic Poliomyelitis: A New Technique for the Application to the Olfactory Area," CPHJ, 28 (Oct. 1937): 493-7.

In Ontario parents grew desperate for any kind of preventive measure as the epidemic spread and news of the potential value of the nasal spray generated increasing demands that it be given by private physicians. Such demands were stimulated by widely-quoted press statements from American enthusiasts for the spray, such as noted virologist Thomas Rivers. He recommended in August 1937: "If I had a child in an area where poliomyelitis appeared, I would take my child to a good otolaryngologist and ask him to apply the spray in the manner set forth by Dr. [Max] Peet," who had developed the newer treatment.<sup>80</sup> Despite the caution of some MOHs, doctors began offering the spray and considered it "both safe and cheap." A London doctor provided the press with the spray's formula and application procedure. Newspapers quickly picked up the spray story and even reported that some desperate parents were spraying their children's noses with salt water. Other physicians were not so sure about the spray, one warning that "until we have definite proof that children contract the disease through the nose," there was "no point in using the spray, which [was] difficult to administer, uncomfortable and possibly dangerous." Despite such controversy, physicians were soon overwhelmed with calls from parents wanting the children treated with the spray.<sup>81</sup>

The Ontario government thus came under intense pressure to provide the spray but did not know if it would work or if it was safe. In order to prevent an "epidemic of spraying,"<sup>82</sup> and more importantly, to be able to offer a definitive opinion about the spray's preventive value, the province gave approval for a plan to carry out a nasal spray trial. This was limited to 5,000 Toronto children, in addition to an

<sup>80 &</sup>quot;Balk Paralysis With Atomizers: N.Y. Expert Urges Zinc-Sulphite [sic] Nose Spray," London Free Press, (Aug. 20, 1937); Time Magazine, (Sept. 6, 1937). See also, Peet, Echols and Richter, "Chemical Prophylaxis for Poliomyelitis," p. 2184.

See: "Paralysis Believed at Peak: Cool Weather Said Helpful," Toronto Star, (Aug. 23, 1937);
 "Specialist in London Uses New Nose Spray to Prevent Paralysis: Method Studies at Ann Arbor and New York by Leading Scientists Tried on London Children," London Free Press, (Aug. 23, 1937); "Fewer Paralysis Cases Admitted," London Free Press, (Aug. 30, 1937).

<sup>82</sup> Editorial, "Zinc-Sulphate Nasal Spray in the Prophylaxis of Poliomyelitis," *CPHJ*, 28 (Nov. 1937): 564.

observed control group of equivalent size. The control group was obtained by Public Health Nurses conducting a canvass of streets in each of Toronto's eight health districts and seemed to provide "a reasonably representative group."<sup>83</sup> This plan was designed to avoid the pitfalls of the Alabama trial, since it was clear that "unless great care is exercised, no really helpful information will be likely to come out of such further work."<sup>84</sup>

The Ontario plan was immediately presented to a group of Toronto otolaryngologists from the city's hospitals who would administer the spray in special clinics.<sup>85</sup> The trial was financed entirely by the province and carried out with the assistance of the Toronto Department of Health. Responsibility for the study was assumed by the Hospital for Sick Children and the School of Hygiene, with the entire trial under the direction of Dr. Robert D. Defries. As was noted after the trial, "In few cities has there been such whole-hearted co-operation on the part of the administrative authorities, the public, and the press in an undertaking which was definitely presented as an experiment. To this extent the study was unique."<sup>86</sup>

The trial was publicly announced in the Toronto press on August 30, its details outlined with "a very conservative statement" that emphasized the limited size of the "experiment" and included a consent form for interested parents to return. A chance to participate in such a hopeful experiment generated intense public and media interest and within three days more than 6,000 forms flooded in from parents who clamored for any kind of protection for their children.<sup>87</sup> Those who could not be

<sup>&</sup>lt;sup>83</sup> Tisdall, Brown, Defries, Ross and Sellers, "Zinc-Sulphate Nasal Spray in the Prophylaxis of Poliomyelitis," p. 531, 537.

<sup>84</sup> E.W. Schultz and L.P. Gebhardt, "Zinc Sulphate in Poliomyelitis," JAMA, 108 (June 26, 1937): 2184.

<sup>&</sup>lt;sup>85</sup> F.F. Tisdall, A. Brown, R.D. Defries, M.A. Ross and A.H. Sellers, "Zinc-Sulphate Nasal Spray in the Prophylaxis of Poliomyelitis," *CPHJ*, 28 (Nov. 1937): 528.

<sup>86</sup> Editorial, "Zinc-Sulphate Nasal Spray in the Prophylaxis of Poliomyelitis," p. 565

<sup>87 &</sup>quot;5,000 Children In City To Get New Nasal Spray: Every Hospital in Toronto to Have Clinic Working Tomorrow," *Toronto Star*, (Aug. 30, 1937). See also Paul de Kruif, "Holds Nasal Nerve Tips Access For Paralysis Germ: When Smell is Blocked, Bacteria Unable to Enter System: Praises Spray," *Toronto Star*, (Sept. 2, 1937).

included in the "experiment" demanded the spray from their doctors.<sup>88</sup> The first clinics opened on August 31 with 5,233 children sprayed by September 5, and 4,585 children sprayed a second time two weeks later.

The trial organizers were concerned about how well the public would respond, particularly since parents had been advised to keep their children away from crowds. The large response was surprising and attributed "in no small measure, to the excellent publicity given to the study by the press who, through suitable articles and news items kept the public informed of the purpose and progress of the effort."<sup>89</sup> The experimental nature of the trial was stressed in the press, "although some measure of hope was offered,"<sup>90</sup> thus effectively raising public expectations and demand for the spray, either within the formal structure of the trial, or on the free market. As was stressed in newspaper coverage of the two-week trial, here then was a clear chance for children and their parents to take part in an important scientific experiment.<sup>91</sup> But such publicity made it very difficult to limit the spray's use and prevent other communities and even some private businesses, from making the spray available to its citizens or employees.<sup>92</sup>

<sup>88 &</sup>quot;Hundreds Seek Spray Paralysis Treatment: Flood of Hospital Mail Shows Parents' Anxiety To Safeguard Children." Toronto Telegram, (Aug. 31, 1937): "Parents Flock To Seek Paralysis Safety: Will Speed Up Clinics to Spray 1,000 a Day, Inventor Offers Help," Toronto Star, (Aug. 31, 1937); F. Griffen, "Mothers Shouldn't Worry If Children Not Among 5,000: Unique Nasal Spray Test Without Parallel in History," Toronto Star, (Sept. 3, 1937).

<sup>&</sup>lt;sup>89</sup> Tisdall, Brown, Defries, Ross and Sellers, "Zinc-Sulphate Nasal Spray in the Prophylaxis of Poliomyelitis," p. 528-30.

<sup>90</sup> Ibid., p. 531.

<sup>91</sup> Ibid., p. 542; "Says Nasal Spray Still On Trial," and "Preston Doctors Say Spray Best Paralysis Check Yet: Urge Zinc Sulphate Treatment as Public Health Measure in Epidemic," Toronto Star, (Aug. 31, 1937); "Parent Can't Spray Nose, Expert States," and "Toronto First to Attempt Mass Use of Nasal Spray," Toronto Star, (Sept. 1, 1937); "Fear Paralysis Epidemic Is Spreading Northward, Nasal Sprayings Pushed," Toronto Telegram, (Sept. 2, 1937); Editorial, "But Why Stop?" Toronto Star, (Sept. 2, 1937); "Paralysis Nose Spray: Just Squirt and Smile," Toronto Star, (Sept. 2, 1937); "Spray and Serum Bring Hope to Mothers and Their Children, Faced With Infantile Paralysis Peril," Toronto Star, (Sept. 2, 1937).

<sup>92 &</sup>quot;Spray Noses at Orangeville: Medicos Offer Free Treatment to Stem Paralysis Spread," Toronto Telegram, (Sept. 3, 1937); "Workers Get Spray Against Paralysis: Hamilton Firm Institutes Wholesale Nasal Treatment for Employees," Toronto Star, (Sept. 2, 1937); "Await Results: Nasal Spray: No Clinic Will Be Opened at Brampton for Time Being," Toronto Telegram, (Sept. 3, 1937); "Seeks Nasal Spray Clinics But York Council Demurs: Is Left to

The trial demonstrated that the spray was ineffective as a polio preventive, and also potentially dangerous to those treated. Eleven cases of polio were reported among those sprayed, while nineteen cases occurred in the control group, suggesting that the differences between the attack rates in each group were not statistically significant.<sup>93</sup> As was the case with the 1936 Alabama trial, the Toronto report blamed faulty administration methods for the failure of the spray. The objective of the nasal spray was to block the poliovirus from entering the olfactory nerve, and thus a temporary loss of the sense of smell was expected. When this was tested during and after the trial no more than 25 per cent of the children sprayed reported losing it.<sup>94</sup> Most devastating, it was found that among those children losing their sense of smell and/ or taste (anosmia) soon after the trial, many had not regained it months later. As well, the practical problems of organizing, deploying and administering the spray quickly and safely during the emergency of an epidemic largely undermined enthusiasm for its further scientific study or use.<sup>95</sup>

Despite its lack of success, the Toronto field trial marked an important step in polio research with its relatively high standards of professionalism, methodology and administrative and public cooperation. This was reinforced by the close physical proximity between the provincial health department, the Hospital for Sick Children and the University of Toronto's School of Hygiene, along with the experience of, and close professional, academic and personal links between, Defries and the others involved. These were features lacking with the earlier use of the spray in Manitoba, and especially in Alabama, and with other prophylactics used against polio, such as

York Township Health Board - Difficulties are Outlined: Held Not Practical," Toronto Star, (Sept. 4, 1937).

<sup>&</sup>lt;sup>93</sup> Tisdall, Brown, Defries, Ross and Sellers, "Zinc-Sulphate Nasal Spray in the Prophylaxis of Poliomyelitis," p. 539-41.

<sup>94</sup> F.F. Tisdall, Alan Brown and R.D. Defries, "Persistent Anosmia Following Zinc Sulphate Nasal Spraying," Journal of Pediatrics, 13 (July 1938): 60-62.

<sup>&</sup>lt;sup>95</sup> "Nasal Spray Ineffective as Paralysis Preventive Toronto Test Discloses... Method is Held Too Slow," (Globe and Mail?), (Dec. 1, 1937).

convalescent serum, and the Brodie and Kolmer polio vaccines. In the wake of the trial it also became clear that "the problem of preventing human poliomyelitis was not to be easily solved on the basis of evidence deduced from the experimental disease in the rhesus monkey." Combined with other evidence, "the experience in Toronto aroused uneasiness about the whole hypothesis of a nasal portal of entry in man."<sup>96</sup> Indeed, soon after the Toronto trial, success was quietly reported in the long standing problem of isolating the poliovirus from human intestinal washings, results which were highly significant for later epidemiological and immunological research.<sup>97</sup>

b) "Miraculous Metal Monsters"98

One of the most serious and unexpected developments of the 1937 epidemic was the large number of "bulbar" cases of respiratory and/or throat paralysis, which impaired breathing and swallowing and usually caused death.<sup>99</sup> Polio mortality statistics averaged about four percent of reported cases, but the management of bulbar cases was a major medical and technological challenge. It was during the 1937 epidemic that the image of the "iron lung" was first ingrained into the Canadian public consciousness.

The first "iron lung" or electric tank respirator designed for severe polio cases was built in 1928 at Harvard University by Philip Drinker.<sup>100</sup> It was essentially

<sup>96</sup> Paul, History of Poliomyelitis, p. 248.

<sup>&</sup>lt;sup>97</sup> Ibid., p. 279-90. P.H. Harmon, "Correspondence: The Use of Chemicals as Nasal Sprays in the Prophylaxis of Poliomyelitis in Man," Journal of the American Medical Association, 109, (Sept. 25, 1937): 1061.

<sup>98 &</sup>quot;Seven Tiny Heads in a Row Tell of Fight With Disease," Toronto Telegram, (Sept. 18, 1937): Susan B. Sepples, "Polio Nursing: The Fight Against Paralysis," Nursing Connections, 5 (1992): 33.

<sup>&</sup>lt;sup>99</sup> Frederick Edwards, "Iron Lungs: The thrilling story of how a Canadian hospital won a desperate race with Death by building its own 'polio' lungs," *Maclean's Magazine*, (Jan. 15, 1938): 12, 29-31. Agnes Armstrong, "War on Polio Speeds up Iron Lung Production," *Saturday Night*, (Oct. 9, 1937): 2. See also Max Braithwaite, *Sick Kids: The Story of the Hospital for Sick Children in Toronto*, (Toronto: McClelland and Stewart, 1974). p. 94-103.

<sup>&</sup>lt;sup>100</sup> James H. Maxwell, "The Iron Lung: Halfway Technology or Necessary Step?" The Millbank Quarterly, 64 (1986): 7.

a metal tank into which all but the head of an individual was sealed. A motor, or hand crank, operated a set of bellows and since the head remained outside of the lung, the negative pressure inside acted like the human diaphragm and forced the lungs to expand and contract to allow regular breathing. The first iron lung in Canada was an original Drinker model that arrived at Toronto's Hospital for Sick Children (HSC) in 1930, and it apparently remained the only one in the country until August 1937.<sup>101</sup> Bulbar cases were rarely mentioned during earlier epidemics since most died when there was little that could be done to help them (see Tables 3 and 4).<sup>102</sup>

The Toronto press focused considerable attention on the need for more lifesaving iron lungs as the 1937 epidemic worsened through August. The emergency was leaving "little tots struggling for breath" in hospitals.<sup>103</sup> HSC's single Drinker machine was used for a small number of mild chest paralysis cases, but on August 21, a young girl in critical condition was placed in the lung, which happened to be open, but she would have to remain in it for a long time. This situation greatly concerned HSC's Superintendent, Joseph H.W. Bower. The City of Toronto had ordered one commercial machine for Riverdale Isolation Hospital. London and Hamilton had also ordered lungs. Yet it would be several days at least before Riverdale's lung arrived. and it would be ten days to two weeks before another one would be available.<sup>104</sup> With

<sup>101</sup> J.W. Bower, "Iron Lung and It's Uses," unpublished address to Rotary Club of Toronto, April 29, 1938, HSC Archives, file "Polio." It was reported, however, that during the 1932 Quebec epidemic, "Three children suffering from paralysis of the respiratory centre were for weeks in the *pulmotor machine* until the centre regained normal activity," but no further details were given about this machine. A.R. Foley, "The 1932 Epidemic of Poliomyelitis in Quebec," *CPHJ*, 25 (June 1934): 266, italics mine. This was the only reference to any kind of iron lung in Canada prior to 1937, and there was no further 1...formation on this so called "pulmotor machine."

<sup>102</sup> During the 1932 Quebec epidemic the provincial mortality rate was 13.7%, or 105 deaths out of 766 cases, which was particularly high when compared to the 1937 Ontario epidemic, which was 4.3%, or 119 deaths out of 2,546 reported cases. Death rates from polio varied widely, between about 4 and 30%, and "tend to vary inversely with the number of cases, being relatively low in epidemic years and relatively high in non-epidemic years;" Ontario Department of Health, *Report on Poliomyelitis in Ontario, 1937*, p. 17.

<sup>&</sup>lt;sup>103</sup> "Buy 'Iron Lung' To Help Victims Paralysis Rises," and "Girl, 11, In An 'Iron Lung' Is Fighting For Her Life," *Toronto Star*, (Aug. 25, 1937).

<sup>104</sup> Bower, "Iron Lung and It's Uses," p. 2.

this news, Bower knew he would have to build respirators at the hospital for any bulbar cases that might develop.

Meanwhile a four-year-old boy had been admitted with chest paralysis on the morning of August 26. As the Drinker machine was in use, an experimental respirator for premature infants was modified and coupled with a quickly built wooden box in which the little boy was placed and stabilized. This "emergency-made 'lumber lung'" "saved" the child's life. The boy's mother then turned to the newspapers to plead for the "wealthy to buy iron lungs," each of which was worth some \$2,000. The prominent place of this appeal in the Toronto press reflected the unusual vulnerability to polio among the well-to-do, whose wealth could not protect them from this disease. Two more commercial "lungs" were eventually bought, largely through an "Anonymous Donor."<sup>105</sup> Meanwhile, at HSC, efforts were concentrated on building more lungs. By noon of August 27, plans were complete and enough parts were ordered and delivered by the next evening to start assembling the first iron lung. Two days later this first lung was complete and placed on HSC's Infectious Floor; within fifteen minutes a patient was placed in it. By August 31, four "homemade" iron lungs had been assembled in the hospital's basement.<sup>106</sup>

The Deputy Minister of Health was impressed with the speed of HSC's iron lung production. Just as the first four "welded steel" lungs were completed the Department ordered three more for use by the province, and shortly increased this order to twelve. With production running 24-hours-a-day, they were delivered within the next seven days. Financed by the province at a cost of between \$650 to \$700 each, HSC assembled 27 iron lungs under the close direction of Superintendent Bower, who lived in the hospital for the duration of the epidemic. Most of these lungs were used

<sup>105 &</sup>quot;Child in 'Wooden Lung' Has Chance of Recovery," and Alexander Gibb, "Mother Begs Wealthy To Buy Iron Lungs After Own Son Saved," *Toronto Star*, (Aug. 28, 1937); "Anonymous Donor Buys 2 Lungs: Chain Letters Aid Polio Fight," *Toronto Star*, (Sept. 1, 1937); "New 'Life Pump' Arrives," *Toronto Star*, (Aug. 30, 1937).

<sup>106</sup> Bower, "Iron Lung and It's Uses," p. 2-3; Edwards, "Iron Lungs," p. 31; "Six New Paralysis Lungs Being Made in Province In Fight Against Disease," *Toronto Telegram*, (Sept. 2, 1937).

at HSC or at neighbouring Toronto General Hospital, while the rest were shipped to other hospitals in the province, as well as to Winnipeg, Regina and Edmonton. The original "wooden lung" by this time was no longer in use; in response to an emergency call, the *Toronto Star* arranged to fly it to Denver, thus saving the life of a young girl.<sup>107</sup>

The dramatic story of the feverish manufacture of iron lungs at HSC drew intense press attention. Soon there were riveting stories in the Toronto press describing how "Seven Tiny Heads in a Row Tell of Fight With Disease: Big Steel Monsters Hold Children Battling Bravely to Overcome Paralysis of Lungs." A month later another story detailed the way "Massive Iron Lungs Grotesque, Glorious, Coax Life to Tots: Hushed Rhythmic Action Keeps 7 Tots Alive in Hospital Room: In Gleaming Row."<sup>108</sup> Over the years the press covered the birthdays and even the weddings of "famous" polio sufferers who had been confined to iron lungs indefinitely.<sup>109</sup>

Despite the many stories of lives being saved by wooden or iron lungs, their efficacy in preventing bulbar polio deaths remained controversial. During the 1937 epidemic, 63 polio cases in Ontario were treated in iron lungs, and by the following March, 40 had died, 12 had recovered and 11 still remained in respirators, six of whom "will probably continue to require the respirator indefinitely."<sup>110</sup> Despite this generally grim record, iron lungs had a significant effect on public perceptions, ranging from fascination with the hopeful power of science and technology in an otherwise fruitless war with polio, to terror, as rows of iron lungs encased polio's helpless young victims for weeks, months or years. The iron lung symbolized the disease and

<sup>107</sup> Bower, *Ibid.*, p. 3-4. See also Edwards, *Ibid.*, p. 31; Armstrong, "War on Polio Speeds up Iron Lung Production," p. 37.

<sup>108 &</sup>quot;Seven Tiny Heads in a Row Tell of Fight With Disease," Toronto Telegram, (Sept. 18, 1937). See also Gregory Clark, "Massive Iron Lungs Grotesque, Glorious, Coax Life to Tots," Toronto Star, (Oct. 4, 1937).

<sup>109 &</sup>quot;Birthdays in 'Iron Lungs' at Victoria Hospital," London Free Press, (Aug. 10, 1939); (Associated Press, Chicago), "Famous 'Polio' Victim Marries... In Respirator 3 Years," London Free Press, (Aug. 10, 1939).

<sup>&</sup>lt;sup>110</sup> Ontario Department of Health, Report on Policmyelitis in Ontario, 1937, p. 46-7.

its worst possible effects while at the same time it provided the medical community with a specific and hopeful technological tool against them. The iron lung also gave the provincial government another opportunity to demonstrate that it was doing everything possible against the worst effects of this disease.

In the wake of the 1937 Canadian epidemics the iron lung became a philanthropic symbol when a wealthy British industrialist, Viscount Nuffield, made a "magnificent offer" in late 1938 to supply iron lungs as a gift to every public hospital in the British Empire.<sup>111</sup> Lord Nuffield was inspired by a film he had seen on mechanical respiration that was prepared by Oxford University. His iron lungs were actually made of "five-ply wood" based on the designs of an Australian inventor, E.T. Booth. The "herculean efforts" of HSC were well known and the fear of local hospitals being "caught unprepared" during a polio epidemic was widespread. However, many hospital administrators advised caution in advocating that all hospitals receive a Nuffield lung since most hospitals had never admitted a polio case, much less a bulbar case. It was recommended that the Nuffield lungs be centralized to prevent their rubber collar from drying out and becoming useless before they were ever used. But such concerns were neglected amidst the enthusiasm of hospitals eagerly requesting their free lungs.<sup>112</sup> A total of 279 Nuffield lungs were delivered to Canadian hospitals in all provinces and territories, most of which did in fact stay idle long enough to deteriorate and become forgotten as rapidly improving commercial iron lungs were developed and distributed through the 1940s.<sup>113</sup>

<sup>111</sup> Letter, Dr. R.R. Macintosh, Department of Anaesthetics, Oxford University, to High Commissioner for Canada, London, December 12, 1938, NAC, RG29, Vol. 182, file 302-3-1.

<sup>112</sup> Typed copy of article, "Viscount Nuffield's Offer," from Canadian Hospital, (January 1939); Letter, Dr. Harvey Agnew, Secretary, Canadian Hospital Council, Toronto, to Dr. R.E. Wodehouse, Deputy Minister of Pensions and National Health, Ottawa, February 7, 1939, NAC, RG29, Vol. 182, file 302-3-1.

<sup>113</sup> Report, K.A. McClosky, Accountant, Department of External Affairs, Ottawa, to F.L. Barrow, Office of the Secretary, Department of Pensions and National Health, Ottawa, September 7, 1942, NAC, RG29, Vol. 182, file 302-3-1. "Nuffield" lungs were distributed to the provinces as follows: in Ontario 80 hospitals each received 1 lung; Quebec - 34; New Brunswick -

## 3.4) Standardized Treatment, Hospitalization, and After-Care

Other than the efforts of Alberta in 1927-28, the issue of treatment, hospitalization and after care of paralytic polio cases was rarely addressed by provincial governments for the next decade. After the 1936 Manitoba epidemic the province took a modest step forward in how it viewed the problem of after-care and hired one orthopaedic specialist, Dr. Angus A. Murray. At no charge, he assessed every paralytic case outside of the Greater Winnipeg area, and outlined the required treatment methods to minimize deformities. This service was recognized as "a new departure in the Public Health work of Canada."<sup>114</sup> The issue of hospitalization. however, was rarely mentioned, and was viewed as a last resort for orthopaedic surgery. But as Murray stressed, patients "should be discharged to their homes as soon as they feel well following operation, and so save an enormous amount of public money." He once felt that the state should freely provide splints, appliances and hospital and medical care to the indigent, but his polio work seemed to change his mind. Few such patients took care of free appliances and he thought they were "apt to lose their independence and capitalize on their disability in order to live without work."<sup>115</sup> These older views, likely hardened by the Depression, were not shared by such provincial health authorities as Deputy Health Minister Jackson, whose public health background and recent experience during the epidemic reinforced a more liberal view, since

the State ultimately may have to support most of those permanently and totally disabled by poliomyelitis, it is in the interest of the State that it should make provision for:

<sup>7;</sup> Nova Scotia - 27; P.E.I. - 4; Manitoba - 18; Saskatchewan - 41; Alberta - 40; B.C. - 19; Northwest Territories - 6; Yukon - 3.

<sup>114</sup> Jackson, "The 1936 Epidemic of Poliomyelitis in Manitoba: Control Measures," p. 367; McIntyre, "Infantile Paralysis in Manitoba - 1936," p. 63.

<sup>115</sup> A.A. Murray, "The Prevention and Treatment of Deformities Arising in the Course of Infanile Paralysis," *Manitoba Medical Association Review*, 17 (Sept. 1937): 159.

1. Early and adequate diagnostic and treatment facilities.

2. An adequate supply of immune serum readily available to every practicing physician.

3. Consultant diagnostic service for cases of residual paralysis.

4. Corrective treatment and appliances for indigent persons.<sup>116</sup>

The more serious situation in Ontario in 1937 forced a significant expansion of such state provisions, particularly in the area of hospitalization, and beyond just for the indigent. By early September the emergency prompted the calling of a "Symposium on Poliomyelitis" by the Toronto Academy of Medicine.<sup>117</sup> Of particular interest to many at the symposium, as the number of cases approached 2,000, was the problem of "preventing unnecessary crippling" and deformities. Much of the pressure placed on the government to do something about treating those stricken by "paralysis" originated with the Ontario Society for Crippled Children (OSCC) and its Executive Secretary, Reg Hopper.<sup>118</sup> The OSCC had been founded under the auspices of the Rotary Clubs in 1922 after a number of similar societies emerged in the United States. In Ontario, by 1930 the OSCC recognized that polio was "the most important cause of crippling, accounting for as much as 40% of the total number of handicapped children."<sup>119</sup> This percentage grew significantly in 1937.

In mid-September, at the request of the province, the OSCC called a meeting of orthopaedic surgeons in Toronto. Based on conclusions reached at the earlier sym-

<sup>&</sup>lt;sup>116</sup> Jackson, "The 1936 Epidemic of Poliomyelitis in Manitoba: Control Measures," p. 367-68.

<sup>B.T. McGhie, "The 1937 Outbreak of Poliomyelitis," Dominion Council of Health, minutes, p. 13; The "Symposium on Poliomyelitis," CPHJ, 28 (Sept. 1937) included the following articles: J.T. Phair, "Present Incidence of Poliomyelitis in Ontario," p. 417-20; J. Craigie, "Poliomyelitis: Virus and Experimental Infection," p. 421-3; R.D. Defries, "Some Epidemiological Features of Poliomyelitis," p. 424-6; B. Hannah, "Symptomatology," p. 427-9; N. Silverthorne, "Difficulties in Prognosis," p. 430-1; F.F. Tisdall, "Nasal Spraying as a Preventive of Poliomyelitis," p. 431-4; N.E. McKinnon, "Convalescent Serum Therapy," p. 434-6; Surgical Staff, Hospital for Sick Children, "The Surgical Treatment of Poliomyelitis During its Early Stages," p. 436-41.</sup> 

<sup>&</sup>lt;sup>118</sup> Letter, R. Hooper, Executive Secretary OSCC, to all Chairmen of Crippled Children Committees of the various service clubs in Ontario, September 18, 1937; AO, RG10-106, file 279.16

<sup>119</sup> Reg Hopper, "History, Ontario Society for Crippled Children," unpublished manuscript, undated (c.1967), p. 1-4, 11, OSCC Archives.

posium, Dr. D.E. Robertson, Chief Surgeon and orthopaedic specialist at the Hospital for Sick Children, recommended that,

Every case of muscle weakness or paralysis following poliomyelitis should be placed on a Bradford frame.
 Six months is the minimum period of recumbency. Some cases may require eighteen months or longer.
 Suitable splints are to be worn if required on extremities.
 Massage is to be commenced when it is not uncomfortable for the patient.
 Muscle training is to be begun only after the patient has shown definite and considerable recovery in power.<sup>120</sup>

Until there was evidence of muscle recovery, or until the pain had subsided, the principle of immobilization of the paralyzed limbs and absolute bed rest was the orthodoxy in Canada.<sup>121</sup> The "Bradford Frame" was essential to maintaining immobility and consisted of a rectangular pipe with canvas laced to it. No pillows or cushions were allowed and patients were nursed and carried around while strapped to the frame. To insure immobility, spliuts on the affected limbs were attached to the frame and "maintained until recovery occurs to a degree sufficient to permit useful function."<sup>122</sup>. In most cases, however, this state of immobility lasted for months in the hope that when the damaged anterior horn cells finally recovered, the affected muscles and limbs would be free of deformities and fit to be used again.<sup>123</sup>

At the meeting the province agreed to an aggressive plan to provide standardized frames and splints "without delay for all cases showing evidence of paralysis or muscle weakness."<sup>124</sup> These appliances were manufactured at the government's

120

HSC, "The Surgical Treatment of Poliomyelitis During its Early Stages," p. 441. See also
 "Orthopaedic Surgeons Meet," The Horizon, 2 (6) (Oct. 1937): 11, HSC Archives, file "Polio";
 F.A. Logan, "Address of the President: Report on Poliomyelitis," Annual Meeting, Ontario
 Society for Crippled Children, March 18, 1938, OSCC Archives.

<sup>121</sup> See for example F.H.H. Mewburn, "Institutional Care in the Treatment of Poliomyelitis," CMAJ, 36 (Mar. 1937): 263-67; G.A. Ramsay and R.A. Johnson, "Muscle Conservation and Re-education in Post-Poliomyelitis Paralysis," CPHJ, 29 (Apr. 1938): 158-65.

<sup>122</sup> HSC, "The Surgical Treatment of Poliomyelitis During its Early Stages," p. 436-7.

<sup>&</sup>lt;sup>123</sup> Ontario Department of Health, Poliomyelitis: Epidemiology, Diagnosis, Treatment, (Toronto: July 1938), p. 6-14.

Letter, Ontario Minister of Health to all Ontario physicians, September 20, 1937, NAC, RG29, Vol. 192, file 311-P11-1, part 1; Ontario Department of Health, *Report on Poliomy-elitis in Ontario, 1937*, p. 60.

expense at HSC, and at Hamilton General Hospital and London's Victoria Hospital, and distributed by the Department, free of charge, to all paralysis cases.<sup>125</sup> It was the first time that standardized splints and frames had been prepared. Previously they had been made to order, which took days or weeks, but under this system, when an order arrived giving the size, height, length of leg, or arm, "the frames and splints are on their way in a few minutes."<sup>126</sup> By late November, with some 2,531 cases reported in the province, a total of nearly 2,000 splints and frames had been provided free by the Ontario government.<sup>127</sup> These splints soon became known as "Toronto splints" and until the early 1940s were the North American standard. In 1939 the National Foundation for Infantile Paralysis began stockpiling as many as 15,000 of them in New York City, "ready to be flown wherever doctors demanded them."<sup>128</sup>

The provincial department went further and recognized that "deformity arises from too early attempts to get around, from unsupervised treatment or from no treatment at all." The government therefore decided on September 16,

to provide free of charge for all such cases, a limited period of care... from one to three weeks in hospital following isolation... in order that patients may learn to adapt themselves to the proper use of the Bradford frame and necessary splints. It is of the utmost importance that not only the patient but also the patient's family be fully impressed with the necessity for prolonged and adequate orthopaedic care if unnecessary crippling is to be prevented.<sup>129</sup>

This hospitalization plan was initially available only at HSC, Toronto's General, Western and St. Michael's hospitals, as well as at the general hospitals in most centres

<sup>&</sup>lt;sup>125</sup> McGhie, "The 1937 Outbreak of Poliomyelitis," Dominion Council of Health meeting, p. 14.

<sup>&</sup>lt;sup>126</sup> "Splints and Frames," *The Horizon*, 2 (6) (Oct. 1937): 10, HSC Archives, file "Polio." See also Ramsay and Johnson, "Muscle Conservation and Re-education in Post-Poliomyelitis Paralysis," p. 160.

<sup>&</sup>lt;sup>127</sup> "Poliomyelitis Bulletin," The Horizon, 2 (Christmas 1937): 7, AO, RC10-106, file 279.16.

<sup>128</sup> Victor Cohn, Sister Kenny: The Woman Who Challenged the Doctors (Minneapolis: University of Minnesota Press, 1975), p. 150; Frank R. Ober, "Treatment and Rehabilitation of the Poliomyelitis Patient," in National Foundation for Infantile Paralysis, Infantile Paralysis: A Symposium Delivered At Vanderbill University, April, 1941 (New York City: NFIP, 1941), p. 161-89; LeMesurier, "The Methods Used in Handling the Epidemic of Poliomyelitis in Ontario in 1937."

<sup>129</sup> Letter, Minister of Health to all physicia. , September 20, 1937, NAC, RG29, Vol. 192, file 311-P11-1, part 1.

across the province. However, it soon became "apparent that our children's hospitals could not handle this large number of cases" and, consequently, the province took over the old Grace Hospital in Toronto and placed medical staff and nurses in attendance.<sup>130</sup> The 150-bed "Ontario Orthopaedic Hospital," as it was newly-christened, officially opened on September 29. It was exclusively a children's hospital, staffed by HSC, and under the direction of Robertson and Dr. Alan Brown, HSC's physician-in-chief.<sup>131</sup> By Christmas 1937, it had "graduated" a total of 283 polio patients, while in the province as a whole, "650 patients had three weeks' treatment at the Government's expense."<sup>132</sup> A similar "Poliomyelitis Orthopaedic Service" was implemented in Saskatchewan during its major 1937 polio epidemic, although it is not known if there were any direct links between their respective developments.<sup>133</sup>

The principal purpose of the "Ontario Orthopaedic Hospital" and the orthopaedic wards in the other designated hospitals, was to teach patients and their parents how to manage the effects of "paralysis" at home. During two days in October they were "personally advised and lectured as to the paramount importance of keeping the little patients on the frames and in the splints." Otherwise, parents were barred from seeing their children, except through glass, while nurses and doctors gave the

<sup>130</sup> McGhie, "The 1937 Outbreak of Poliomyelitis," Dominion Council of Health, minutes, p. 14,

 <sup>131 &</sup>quot;Recent Incidence of Poliomyelitis in Canada: Provision of After-care in Ontario," CPHJ, 28 (Oct. 1937): 519; "Poliomyelitis After-care in Ontario," CPHJ, 28 (Nov. 1937): 570-1; J. Henry, "A New Orthopaedic Hospital," The Horizon, 2 '6) (Oct. 1937): 6, 17; HSC Archives, file "Polio."

<sup>132 &</sup>quot;Mothers Train to Nurse Their Children: Anxious Mother Taught Care of Paralysis Cases After Hospital Treatment," *Toronto Telegram*, (Oct. 20, 1937); Henry, *Ibid.*,17; "Address of the President: Report on Poliomyelitis," OSCC Annual Meeting, March 18, 1938, p. 2, OSCC Archives.

<sup>133</sup> News, Saskatchewar, CMAJ, 37 (Dec. 1937): 614; Saskatchewan Department of Public Health, Annual Report, 1937, (Regina: 1938), p. 14, 19-20. The epidemic claimed 512 cases and 22 deaths, the Saskatchewan Department of Public Health freely provided splints and other apparatus to all paralytic cases. Treatment was centralized with 25 beds at Regina's Grey Nun's Hospital. Over half of the reported cases had developed paralysis and in response the province paid for three weeks of hospitalization and treatment in each case and the transport of a guardian to Regina at the end of three weeks to be "trained in the necessary care, massage and the use of splints, in order that the treatment given in hospital might be given in the home."

patients "weeks of routine, to accustom them and to discipline them, to the steep road that lies before them."<sup>134</sup> Parents were instructed to carefully massage the weakened limbs, turn the child regularly and watch for redness of the skin. They were to occupy their child's mind, but warned not to "call attention to his condition, don't pamper him, don't tire him, keep the house quiet, give him plenty of rest and sleep, etc."<sup>135</sup> For many parents, such a regimen was very difficult, if not impossible, and in many cases had to continue indefinitely.

Some parents had difficulty believing in or accepting the prescription of immobility which prevailed in Canada until 1941-42.<sup>136</sup> Recovery was "too slow" for many because they believed immobilization "caused a great deal of muscle atrophy."<sup>137</sup> Among polio survivors, this type of treatment seemed insensitive and often led to dissatisfaction, if not rebellion against medical authority. Objectification was common. One survivor has vivid memories of feeling like "a prisoner" in the hospital and being "tied to my bed" on a Bradford Frame with a straight-jacket. "No one treated me like a person."<sup>138</sup> Frustrated by such treatment, osteopaths were sometimes resorted to, as were chiropractors, much to the chagrin of physicians.<sup>139</sup> In one 1937 case, "we had an osteopath coming in one door while the medical man was going out the other." A watch was kept in case the doctor returned, in which case "we'd quickly put the irons back on."<sup>140</sup> This flouting of medical authority left some paralyzed children confined at home without any medical attention. This happened

<sup>&</sup>lt;sup>134</sup> Gregory Clark, "Georgie Porgie, Pudding and Pie': As 283 victims of Infantile Paralysis Graduate from Hospital, Toronto Star Writer Pens Picture of Lights and Shadows in Orthopaedic Wards," *The Horizon*, 2 (7) (Christmas 1937): 6, AO, RG10-106, file 279.16; Ramsay and Johnson, "Muscle Conservation and Re-education in Post-Poliomyelitis Paralysis," p. 161-65.

<sup>135</sup> Margaret Gould, "It's a Battle for Mothers," *The Horizon*, 2 (7) (Christmas 1937): 13, AO, RG10-106, file 279.16.

Delphine Scholfield (1937, age 18, Smith Falls, Ont.), Leslie Scrivener, "The Plague of '37," Toronto Star (Sept. 6, 1937); Cora W. (1940, age 10, New Liskeard, Ont.), June 1993.

<sup>137</sup> Mary B. (1937, age 19, Grimsby, Ont.), August 1993.

<sup>138</sup> Cora W. (1940, age 10, New Liskeard, Ont.).

<sup>139</sup> Mariene C. (1953, age 5, Toronto, Ont.), June 1993

<sup>140</sup> D. Scholfield, (1937, age 18, Smith Falls, Ont.), "The Plague of '37."

to a 14 year-old boy whose parents constantly turned him over and over again in bed. Fifty years later he vividly remembered how "he would scream and scream" in pain.<sup>141</sup> Parents were nevertheless repeatedly warned "against the bad advice of well-meaning but ignorant relatives and friends and irregular practitioners."<sup>142</sup>

One irregular practitioner who worried Ontario doctors was Sister Elizabeth Kenny, an Australian nurse. In the late 1930s she had become a kind of cult heroine based on press reports of her "miraculous" work for polio patients in Australia and her resultant clashes with orthopaedic surgeons and physicians. The Canadian popularity of Sister Kenny and her methods of active massage and heat, preceded her personal arrival and medical acceptance in North America in the early 1940s. Sharp conflicts frequently occurred between parents and physicians when her methods were applied in the home.<sup>143</sup> In one case in 1939 the mother of a two-year-old boy "asked the surgeon whether the Sister Kenry approach might be beneficial. He ridiculed her and made her cry – his approach was the only one!"<sup>144</sup> Others stricken with polio during the late 1930s felt that "the Kenny Method should have been used on me right from the first, then I wouldn't be so disabled today."<sup>145</sup>

One of the more vexatious clashes over the Kenny methods took place in Toronto during the epidemic of 1937. A ten-year-old child suffering from almost total paralysis, lay at the centre of a battle between her mother, described as a "practical nurse," her family physician, the Hospital for Sick Children and the provincial health department. The conflict was driven by the mother's "stubborn" insistence on nursing her daughter at home using the "non-restrictive" methods she had read

<sup>141</sup> Howard Noble (1937, age 14, Toronto, Ont.), "The Plague of '37."

<sup>142</sup> E.C. Janes, "Prevention of Needless Deformity;" The Horizon, 2(4) (June 1937), NAC, RG29, Vol. 194, file 311-P11-3, part 1; "Peacock Opposed to Splints for Poliomyelitis Patients: Calls Upon Hepburn to Counterattack Medical Prejudice Againt Osteopaths: Anxious to Help," (Toronto Star?), (Sept. 21, 1937).

 <sup>&</sup>lt;sup>143</sup> Joy M. (1937, age 10, Toronto, Ont.), September 1993; Scholfield, (1937, age 18, Smith Falls, Ont.); Warren M. (1939, age 5, Toronto, Ont.), July 1993.

<sup>&</sup>lt;sup>144</sup> Robert A.J. M. (1939, age 2, Windsor, Ont.), August 1993.

<sup>&</sup>lt;sup>145</sup> Patricia M.C. T. (1938, age 8, Restigouche County, NB), June 1993.

about that were being advocated by Sister Kenny in Australia. Sparking what became a year-long struggle was the mother being "forced" to take her daughter to HSC to confirm the polio diagnosis by spinal tap. According to her daughter, "My mother refused to let them admit me and we waited there for hours before they let me go." While at home "My parents let me do whatever I felt I could do, even if I fell or hurt myself." However this clash cost her family financial assistance from the province.<sup>146</sup> Benefits were contingent on cooperating with the standardized system set up by the government. By contrast, the father of a nineteen-year-old woman stricken with polio, who borrowed from his life insurance to pay the hospital bill, was surprised the following spring to receive a government cheque that "reimbursed him for the hospital bill, which included special nurses."<sup>147</sup>

The Ontario Society for Crippled Children cooperated closely with the provincial government's hospitalization and treatment plan with transportation and followup services. It also loaned one of its staff to the new hospital, who served as a link between the Department of Health, the OSCC and other service clubs throughout Ontario.<sup>148</sup> The OSCC executive was concerned, however, that many families might be unaware, unable, or even unwilling to take advantage of the appliances and hospitalization offered by the government. Families needed to be "worked up to demand these free services, as it is apparent that many physicians will not act promptly, if at all." The Department recognized the need to protect its not insignificant investment and agreed "that a follow-up nursing service will be of the utmost importance in conserving surgical treatment which has been instituted in hospital." The province was "prepared to spend a considerable amount of money in hospitalizing children

<sup>146</sup> Joy M. (1937, age 10, Toronto, Ont.).

<sup>&</sup>lt;sup>147</sup> Mary C. (1937, age 19, Grimsby, Ont.).

<sup>148</sup> Frank Chamberlain, "A Voluntary Agency 'Steps in,'" The Horizon, 2 (6) (Oct. 1937): 7; HSC Archives, file "Polio."

and providing them with the necessary equipment."<sup>149</sup> In the wake of the epidemic a high level of public awareness of the paralytic aftermath of polio emerged across Canada.<sup>150</sup>

The follow-up nursing program began in early November 1937, the OSCC taking on two extra public health nurses for a year to meet the Jemands across the province at a total cost of \$7,000. To meet these extra costs the OSCC was forced to launch a major fund-raising campaign in December.<sup>151</sup> This programme was reliant upon the Department keeping track of each paralytic case by using serum records and outlining to the parents and attending physician of the necessary after-care. If necessary, this information was forwarded to the local MOH.<sup>152</sup> By May 1938, OSCC's nurses had visited some 800 paralytic cases across the province, with visits continuing for some 500 of these.<sup>153</sup>

The visiting nurses were first required to check with the local MOH and each patient's private physician in order to get permission to visit and assist with each case.<sup>154</sup> While this procedure generally met with cooperation from the medical profession, the zeal of some nurses, and especially the press statements from OSCC's Reg Hooper, generated conflict with some physicians. Hooper made his concerns public in press statements in December "with respect to the individual patients he had found without proper after-care." To the Deputy Minister of Health, Dr. McGhie, such

<sup>149 &</sup>quot;Report of the Extension Committee: Poliomyelitis Epidemic," Semi-Annual Meeting of the Board of Directors, OSCC, September 28, 1937, p. 2-4, OSCC Archives; "Epidemic Leaves 900 Still Suffering: Ten Patients May Spend Rest of Lives in Iron Lungs," (*Toronto Telegram*?), (Dec. 17, 1937); "Ontario Prepares to Meet Crisis: Spend \$250,000 on 1937 Epidemic," Montreal Star, (May 7, 1938).

<sup>150</sup> Anonymous, "After Paralysis - What?" Canadian Magazine, (Oct. 1937): 52.

<sup>151 &</sup>quot;Women's Institutes and Service Clubs Answer Plea," The Horizon 2 (7) (Christmas 1937):
12, 18; Letter, R.W. Hooper and F.A. Logan to all OSCC members, December 21, 1937; AO,
RG10-106, file 279.16; Ontario Department of Health, Report on Poliomyelitis in Ontario,
1937, p. 61.

<sup>152</sup> McGhie, "The 1937 Outbreak of Poliomyelitis," Dominion Council of Health Minutes, p. 14-15,

<sup>&</sup>lt;sup>153</sup> (Department of Pensions and National Health?), "Planning for 1937 Polio Epidemic - Ontario," May 1938, p. 3, NAC, RG29, Vol. 195, file 311-P11-3, part 2.

<sup>&</sup>lt;sup>154</sup> "Report of Nursing Supervisor," Annual Meeting OSCC, March 18, 1938, p. 3, OSCC Archives.

statements were "a little dangerous," and he worried that "physicians who have been responsible may not react kindly."<sup>155</sup>

One such upset physician was none other than Dr. D.E. Robertson, Chief Surgeon of HSC, who was quite "disturbed" about Hopper's suggestion that the OSCC was responsible for the treatment of convalescent patients. Robertson, who until this point served on OSCC's Board of Directors, was offended when an OSCC nurse approached him for permission to visit one of his private patients. He refused, and as he explained to McGhie, a "voluntary organization can never do a thing as well as a Government Department such as yours did with the polio last autumn."<sup>156</sup> However, Hopper was clearly told just what the OSCC's role was in its follow-up work: 1) continue to uncover unreported cases; 2) gather as much data regarding known cases; and 3) avoid entering the field of treatment. To avoid further embarrassment, all material used for publicity and appeal purposes had to be reviewed by the Department.<sup>157</sup> All this was carefully done without upsetting the Department's close relationship with the OSCC and their important and useful follow-up programme.

While some individual physicians may have been upset with the aggressiveness of the OSCC, this follow-up programme and the Ontario government's overall handling of the epidemic, generally received strong and enthusiastic praise from all who were closely associated with it.<sup>158</sup> Health officials in Ottawa were "greatly impressed" with McGhie's detailed report on the epidemic to the Dominion Council of Health. The Federal Director of Public Health Services, Dr. John J. Heagerty, suggested that "a copy should be sent to the League of Nations for their information," since

<sup>&</sup>lt;sup>155</sup> Memo, B.T. McGhie to J.T. Phair, December 18, 1937, AO, RG10-106, file 279.16.

<sup>156</sup> Letters: D.E. Robertson to B.T. McGhie, January 10, 1938; McGhie to Robertson, January 25, 1938, Ibid

<sup>&</sup>lt;sup>157</sup> Letter, J.T. Phair to R.W. Hopper, January 28, 1938, Ibid.

 <sup>&</sup>quot;For Distinguished Service," The Horizon, 2 (7) (Christmas 1937): 7, AO, RG29-106, file 279.16; Letter, J.W. Bower to Premier M.F. Hepburn, November 19, 1937, AO, RG3, Box 207, file "Health Department, Hepburn General Correspondence, Public, 1937."

he felt that the province's efforts during the epidemic were the "most comprehensive that has ever been undertaken anywhere."<sup>159</sup>

Ontario's experience with polio in 1937 reinforced a significant shift in the Department of Health's larger approach to "state medicine." At a December 1938 meeting of the Dominion Council of Health, Ontario's new Minister of Health, Harold J. Kirby, posed the question, "How far does the responsibility of the Provincial Department of Health go in the treatment of disease?" He reported that recently almost all of his Department's total budget was "spent on activities that are in the main treatment." It seemed increasingly clear to the Minister there was strong public and professional support for the idea that the government might properly assume responsibility for the expense of the more costly methods of recognized treatment. "Frankly, the therapeutic aspect of the public health program is swamping the prophylactic." His report outlined his government's expenditures on biolop'cals and other direct treatment agents, its venereal disease treatment program, cancer treatments, and the costs of hospitalization for polio patients.

In a number of provinces during the mid-1930s, government interest in cancer t catment, in particular, as with polio, was a new extension of provincial health services against a growing public health threat. By 1938 the Ontario government had spent over \$750,000 to set up seven provincial cancer clinics, and bought seven grams of radium (worth \$400,000 alone). The clinics provided diagnostic and treatment services with radium and x-rays, but were designed "for the indigent and nearindigent groups in our population." The fees were kept as low as possible, "having in mind the fundamental objective of establishing the clinics, namely the provision of modern facilities for cancer treatment accessible to all."<sup>160</sup>

<sup>159</sup> Letter, J.J. Heagerty to J.T. Phair, October 18, 1937, AO, RG10-106, file 119.7.

Sellers, "The Contribution of the Ontario Cancer Clinics to the Control of Cancer," p. 72-3;
 A.H. Sellers, "Cancer in Ontario," CPHJ, 29 (Aug. 1938): 387-95; R.O. Davison, "Cancer Control in Saskatchewan," CPHJ, 35 (Apr. 1944): 150-53.

Prior to 1937 the Ontario government spent an average of about \$4,000 per year on polio, mainly to pay blood donors and to make convalescent serum. However, as Kirby outlined, in 1937, "the interest of the Department in the matter of [polio] treatment was expanded far beyond that ever previously conceived." In total, the government spent \$197,000 during the epidemic, "\$152,363 of which was for treatment."<sup>161</sup> Yet the widely-acknowledged success of the government's management of the epidemic left Kirby with a more significant question to consider: "Frankly, how far should any government be compelled to go in ensuring for its people the advantages of modern treatment?"<sup>162</sup> The 1937 epidemic established an important precedent and reinforced a growing trend towards "state medicine." It was clear that polio, despite its relatively minor incidence and mortality compared with cancer, was a disease that, even more than cancer, required that the public be given as much access to the advantages of modern treatment as the state could possibly afford, "regardless of station."

In subsequent years, the Ontario government worried about further polio epidemics that might prove even worse. The polio policy developed during 1937 was maintained and modified over the next decade, and grew into the most comprehensive in the country. Preparations were made for epidemics in 1939 and 1940, but fortunately incidence remained low. In 1939, 219 cases and 13 deaths occurred in the province, and of these some 40% took advantage of free hospitalization.<sup>163</sup> In 1940 there were 86 cases and 9 deaths in the province, but the free hospitalization programme that had been universal, was "limited by the war economy to those cases where the family was unable to provide such hospitalization."<sup>164</sup>

<sup>161</sup> H.J. Kirby, "How far does the responsibility of the Provincial Department of Health go in the Treatment of Disease?" Meeting, Dominion Council of Health, December 6-7, 1938, AO, RG10-106, file 119.8.

<sup>162</sup> Ibid..

<sup>&</sup>lt;sup>163</sup> Ontario Department of Health, Annual Report, 1939 (Toronto: 1940), p. 73.

<sup>&</sup>lt;sup>164</sup> Ontario Department of Health, Annual Report, 1940 (Toronto: 1941), p. 59.

A similar pattern was also evident in some provinces during and after major epidemics. This was most notable in Alberta, where a unique and comprehensive "Poliomyelitis Sufferers Act" came into force in March 1938,<sup>165</sup> despite the government being "quite bitterly assailed by many of our political opponents for giving something for nothing."<sup>166</sup> Alberta had already established a high level of provincial interest in polio after-care in the wake of the 1927 epidemic, but the severity and largely rural distribution of the 1937 outbreak once again brought an aggressive response by the Alberta Department of Public Health.<sup>167</sup> The province had also assumed "full responsibility" for tuberculosis cases. It introduced the polio act "in the hope that [with] the Government assuming responsibility both for prevention and cure, better results will be obtained." Under the Act, which involved a budget of \$20,500 in its first year, the government negotiated with the Board of any hospital in the province that was properly equipped, to pay for the reception, hospitalization. care and treatment of properly certified polio cases. The Act also provided "for the training and instruction of persons who have been afflicted by Poliomyelitis and who are suffering from the consequences thereof," but whose parents were unable to pay for such training.<sup>168</sup> Two Alberta hospitals were authorized to provide free polio treatment, University Hospital in Edmonton, which had absorbed the former "Provincial Special Hospital for Infantile Paralysis" that had been built in 1927-28, and the Junior Red Cross Hospital in Calgary.<sup>169</sup> The costs of such "state medicine"

<sup>165 &</sup>quot;An Act to Provide Facilities for the Rehabilitation and Assistance of Persons who have been Afflicted by Poliomyelitis (The Poliomyelitis Sufferers Act)," 1938, Chapter 70, Statutes of the Province of Alberta, Assented to March 31, 1938.

<sup>166</sup> Canada, House of Commons Debates, 1952-53, Vol. 5, May 8, 1953, (Ottawa: 1953), p. 4986-88; "Total of 54 Bills Facing Legislature," Calgary Albertan, (Feb. 22, 1938); Alberta Department of Public Health, Annual Report, 1938 (Edmonton: 1939), p. 9-10.

<sup>167</sup> Alberta Department of Public Health, Annual Report, 1937, p. 11; "District No. 1," Alberta Medical Bulletin, 2 (Oct. 1937), p. 23.

<sup>168</sup> Alberta Department of Public Health, Annual Report, 1938, p. 9-10; Alberta Department of Public Health, Annual Report, 1939 (Edmonton: 1940), p. 13-14; News, Alberta, CMAJ, 38, (Apr. 1938): 409.

<sup>169</sup> Alberta Department of Public Health, Annual Report, 1939, p. 14.

were financed by a social service tax on all land, which was collected by the municipalities. In 1939-40 this tax was expected to raise \$1,250,000. The Alberta government was also planning to introduce a similar program for cancer treatment modelled after Ontario's.<sup>170</sup>

The aftermath of the major Canadian polio epidemics of 1937 marks the end of another significant period in the history of this disease in Canada, and in how polio was generally understood. During the last half of the 1930s there was a rise and fall of confidence in the neurotropic and nasal portal model of polio marked by the reckless and premature human application of dangerous vaccines. Fortunately they were not widely used in Canada. However prophylactic nasal sprays based solely on experimental work with monkeys were widely used in Canada. The seriousness and scale of the Ontario epidemic of 1937, in particular, provided a clear opportunity to definitively test the nasal spray and thus many of the tenets of the orthodox neurotropic model of polio. This trial not only significantly undermined the nasal portal model, but also demonstrated a degree of public health and government cooperation that seemed lacking in American trials of the vaccines and the nasal spray.

In Canada, by the end of the 1930s a clear trend had also developed which placed increasing provincial government emphasis on the free hospitalization of all polio cases in both the acute and after-care treatment stages. This trend accelerated during the 1940s under the influence of Sister Kenny, as will be examined in the next chapter.

<sup>170</sup> News, Alberta, CMAJ, 40 (Apr. 1940): 412-13. Alberta's cancer program began in January 1941 and provided free radium and x-ray treatment to all patients with "curable" cancer in special clinics in Edmonton and Calgary, with and initial budget of \$50,000; News, Alberta, CMAJ, 44 (Jan. 1941): 94; 44 (Feb. 1941): 205.
## <u>CHAPTER 4:</u>

## The Third Wave, 1941-1946: Provincial Polio Policies and the Sister Kenny Revolution

The third Canadian wave of epidemic polio was defined by two sharp peaks of high national incidence, focused primarily in Manitoba and New Brunswick in 1941. followed by Quebec and Prince Edward Island in 1946. The marked increase in polio incidence in 1941 coincided with the beginning of a revolution in polio therapy in Canada, sparked by the North American arrival of the Australian nurse. Sister Elizabeth Kenny and the popular enthusiasm generated for her unorthodox treatment methods. The prevailing medical confusion surrounding the epidemiology of polio intensified popular and political hopes in Kenny. More specifically, the popularity and medical controversy that surrounded Kenny were also reinforced by her nursing status, the aggressive attitude she took towards doctors that stood in her way, and by her gender. Yet, in Canada, in the absence of anything to control polio's spread, she gave provincial governments something specific to do for children stricken by this fearsome disease. This was politically valuable as practical and effective public health strategies were complicated considerably during the 1940s by the confirmation that the poliovirus was excreted from the gastrointestinal tract of inapparent and abortive cases over long periods of time. In contrast to the earlier, simpler, nasal-neurotropic model, this discovery rendered traditional public health strategies, such as strict isolation and quarantine, highly problematic. What could provincial governments do about worsening polio epidemics under these conditions?

In the years between 1941 and 1946, under the direct and indirect influence of Kenny, most provincial governments increasingly focused upon minimizing the paralytic after-effects of polio by financing treatment and hospitalization schemes for all cases. With hope in convalescent serum and nasal sprays dashed, and polio research seemingly stagnant, parental and political optimism about fighting polio

shifted from the problem of prevention to the promise of recovery, from the apparent impotence of physicians to the hands-on therapy of nurses, symbolized by Kenny, who seemed able to actually do something for polio patients. While Kenny's concepts had a major impact on polio therapy, her methodology also focused medical attention on the important role of nurses, and more generally, revolutionized the practice and status of physical medicine and rehabilitation and the techniques used to treat all physical disabilities.<sup>1</sup>

Kenny's popularity and her initial alliance with the National Foundation for Infantile Paralysis further raised her profile throughout North America. To polio victims and the public alike, she was seen as a heroine, despite, and perhaps the more so, because of her public vilification by many "orthodox" physicians prior to the early 1940s. All the medical profession appeared able to do was splint, immobilize and operate with only passive involvement from the patient. Whether or not her particular concepts about polio were correct, which was very difficult to scientifically prove in light of polio's inherent variability, Kenny's methods were, above all, active and relied on the patient's direct participation in recovery. There was thus an significant psychological element involved in their apparent efficacy. But until her methods were widely accepted, polio patients and their families were left to ask: who was right? This resulted in a distrust of the medical establishment among many polio survivors, which, in recent years, has complicated the medical management of postpolio syndrome.<sup>2</sup>

<sup>&</sup>lt;sup>1</sup> Victor Cohn, Sister Kenny: The Woman Who Challenged the Doctors, (Minneapolis: University of Minnesota Press, 1975), p. 256-58.

Donald W. Mulder, "Post-Polio Syndrome - Past, Fresent, and Future," Colorado Post-Polio Connections, 7 (Spring 1992): 1, 4-6; reprinted from Theodore L. Munsate (ed.), Post-Polio Syndrome (Boston: Butterworth-Heiemann, 1991), chapter one; Lauro S. Halstead, "The Lessons and Legacy of Polio," draft of chapter for L.S. Halstead and Gunnar Grimby (eds.), Post-Polio Syndrome (Hanley and Belfus, forthcoming), draft courtesy of Shirley Teolis of the Ontario March of Dimes, with thanks. See also Fred Davis, Passage Through Crisis: Polio Victims and Their Families, With a New Introduction by the Author (New Brunswick, NJ: Transaction Publishers, 1963, 1991).

In 1946, an even worse epidemic situation marked the beginning of clore interest in the polio problem by the Department of National Health and Welfare in Ottawa. The Canadian epidemics of 1946 coincided with the highest levels of polio incidence to date in the U.S., an escalation in the voluntary and research efforts of the NFIP, and the start of the rapid post-war expansion of the federal government. Ottawa's growing concerns about polio were reinforced by the appointment of a new Minister, Paul Martin, soon after his eight year-old-son was stricken by polio. The practical application of such new federal concern for polio was led by Martin's new Deputy Minister of Health, Dr. G.D.W. Cameron, who was well connected to most of his provincial counterparts through their shared public health background at the School of Hygiene and Connaught Laboratories.<sup>3</sup> Though not as public as U.S. President Roosevelt's polio experience, the Martin encounter with the disease helped bring it close to Ottawa's political heart, while similar struggles with polio among provincial politicians and their families magnified the political currency of the disease.

Worsening epidemics placed increasing pressure on Ottawa to do something to assist the affected provinces, investigate outbreaks, and coordinate a consistent national effort against the disease. The NFIP's high level of financial support for polio research and the publicity surrounding it led many Canadians to ask what research efforts were being done in Canada to solve the polio problem. This situation grew increasingly embarrassing to federal health officials; it was clear that they were conducting little research, not only because of limited money, facilities, experience, and political will, but because of the enormous complexity of the problem.

<sup>&</sup>lt;sup>3</sup> Editorial, "The R.D. Defries Award: George Donald West Cameron," *CJPH*, 57 (June 1966): 274-75. Cameron was the first to receive the Defries Award from the Canadian Public Health Association, "in recognition of outstanding contributions in the broad field of public health."

## 4.1) Epidemic Polio and Provincial Public Health Frustrations, 1941-42

With the outbreak of World War Two, polio incidence declined in Canada from the intense levels reached during 1937 and remained relatively low throughout the war, save for 1941, when Manitoba and New Brunswick were hit with major epidemics; their respective provincial case notification rates, 132.7 and 91.6 cases per 100, 000, were not surpassed in Canada until 1952. British Columbia and Alberta also experienced elevated incidence in 1941, while in 1942 significant outbreaks occurred in New Brunswick, and for the first time in Nova Scotia (see Figure 1 and Tables 1, 2, 3 and 4). Reflecting the confusion surrounding polio's epidemiology, these provinces varied in their public health approach to polio outbreaks. The failure of the nasal sprays and the recovery of the poliovirus from the gastrointestinal tract left health authorities with a broad range of potential vectors of spread - sewage, flies, contaminated water, food and milk -- the control of which seemed impossible. Despite scientific evidence that strict public health measures had limited practical value, some provinces maintained aggressive disease control strategies, while others emphasized parental responsibility to maintain high levels of hygiene and watchfulness among their children. To compensate for this impotence, a strong trend grew in most provinces towards acute and long term hospital care and the development of broader provincial polio policies to cover their costs.

British Columbia recorded 58 cases of polio in 1941 with most cases concentrated in the Okanagan Valley region. It was a comparatively minor outbreak, but it was the largest in the province since 1927. Attempts to control the disease were strict and aggressive, and focused on rigorous sanitation control and a six week quarantine for all cases and contacts. To some this seemed "unduly severe and unnecessary." Little resistance was reported, however, since "the dread of this disease in the public mind [was such] that we had no difficulty in restraining the activities of these persons for the desired length of time." Experience in the province had demonstrated that half-

measures were useless in trying to control polio epidemics, although it was uncertain that such measures were actually responsible for ending the outbreak. But as health authorities stressed, "we at least had the satisfaction of knowing that we were 'doing something' in a district that had suffered heavily in previous epidemics..."<sup>4</sup> A lack of scientific evidence supporting the effectiveness of strict control measures in B.C. did not mean that they should not be used, but rather that they should be more strictly applied to meet the public alarm polio epidemics regularly generated.

During the Alberta outbreak of 1941, which involved 166 cases and 8 deaths, the Alberta Board of Health took notice of the other polio outbreaks in the west and followed a similarly aggressive strategy. All schools were ordered closed and children under 17 years of age were prohibited "from visiting places of public assembly." The effectiveness of such broad measures was an acknowledged open question, but they were nevertheless carried out in a manner that differed little from the approach taken during the 1927 epidemic.<sup>5</sup> In other provinces this uncertainty reinforced a more conservative approach.

Manitoba's 1941 polio epidemic involved almost twice as many cases as in 1936, with the situation complicated by a serious "twin epidemic" of encephalitis (sleeping sickness).<sup>6</sup> This unusual predicament attracted considerable interest and visits from the health authorities from Ontario, Ottawa and Washington, along with a leading polio epidemiologist and the NFIP.<sup>7</sup> A total of 969 cases and 20 deaths occurred during

Jackson, "Poliomyelitis and Encephalitis, Manitoba 1941," p. 244-45. Deputy Minister Jackson was particularly "indebted" to such authorities as: the Medical Director of the

<sup>&</sup>lt;sup>4</sup> J.M. Hershey, "An Outbreak of Acute Anterior Poliomyelitis in the Okanagan Valley, British Columbia," *CPHJ*, 33 (Sept. 1942): 452-60.

<sup>5</sup> Alberta Department of Public Health, Annual Report, 1941 (Edmonton: 1942), p. 15, 29-30.

F.W. Jackson, "Poliomyelitis and Encephalitis, Manitoba 1941," CPHJ, 33 (June 1942), p. 242;
 C.R. Donovan and M. Bowman, "Epidemiology of Encephalitis: Western Equine Type, Manitoba, 1941," CMAJ, 46 (June 1942), p. 525.

There were a total of 509 reported cases and 70 deaths due to encephalitis in Manitoba. Arriving at a definitive diagnosis was difficult. "Not only were these two conditions confused, but influenza, sun stroke, heat stroke, and typhoid fever had to be differentiated;" C.R. Donovan and M. Bowman, "Some Epidemiological Features of Poliomyelitis and Encephalitis, Manitoba, 1941," *CPHJ*, 33 (June 1942): 251; Editorial, "The Poliomyelitis and Encephalitis Epidemics," *Manitoba Medical Review*, 21 (Sept. 1941): 165.

the polio epidemic and were focused in and around Winnipeg, although over half of the cases were spread across the province. Characteristic of the geographic pattern of polio epidemics, most cases were concentrated in districts where few or no cases had been reported in 1936.<sup>8</sup> While the 1941 epidemic was larger, the mortality rate and severity of paralysis were of a lesser degree than experienced in 1936.<sup>9</sup> Provincial health authorities attributed this to a more general recognition of abortive cases, and that most physicians, "luckily," were, "well acquainted with poliomyelitis through their experience in the epidemics of 1936 and 1937."<sup>10</sup> Manitoba's approach to polio control was less dramatic and aggressive than Alberta or B.C., but it was more systematic and involved new cooperative and treatment strategies. A special symposium reflected this more conservative public health stance and concluded that "Nothing new was discovered as to the method of spread of this disease or the means by which it might be controlled."<sup>11</sup> Little was actually attempted in this direction.

Soon after the first polio cases were reported in late June and early July 1941, Manitoba's Deputy Minister of Health, Dr. F.W. Jackson, convened a conference of officials from the provincial Department of Health, the City of Winnipeg and the Armed Forces. A special Poliomyelitis Advisory Committee of nine members was set up as a permanent body to meet weekly. "or as occasion demanded," as long as the epidemic lasted.<sup>12</sup> This committee quickly grew to fifteen and was similar to the University of Manitoba Research Committee which had investigated convalescent

NFIP, Dr. Don W. Gudakunst; the U.S. Surgeon General, Dr. J.P. Leake; Dr. John R. Paul, a leading polio researcher from Yale University; an epidemiologist and neurologist from the Ontario Department of Health; as well as Drs. G.D.W. Cameron and R.J. Gibbons from the Federal Laboratory of Hygiene in Ottawa.

<sup>8</sup> Donovan and Bowman, "Some Epidemiological Features of Poliomyelitis and Encephalitis, Manitoba, 1941," p. 246-47.

<sup>9</sup> Ibid., p. 247-48; C.R. Donovan, "The 1936 Epidemic of Poliomyelitis in Manitoba: Epidemiological Features," CPHJ, 28 (Aug. 1937): 368-71.

<sup>10</sup> Editorial, "The Poliomyelitis and Encephalitis Epidemics," p. 165; Donovan and Bowman, "Epidemiology of Encephalitis: Western Equine Type, Manitoba, 1941," p. 526.

<sup>&</sup>lt;sup>11</sup> "Summary: Poliomyelitis," CPHJ, 33 (June 1942): 313.

<sup>&</sup>lt;sup>12</sup> Jackson, "Poliomyelitis and Encephalitis, Manitoba 1941," p. 242-43; Manitoba Department of Health and Public Welfare, *Annual Report*, 1941 (Winnipeg: 1942), p. 48.

serum during the 1928 epidemic. However, in 1941 this advisory group had a broader scope and was directly answerable to the Minister of Health. It became a model used and further expanded during the major polio epidemics of 1947, 1952 and 1953. It was an approach also adopted in a number of other provinces and cities in Canada.

The Manitoba advisory committee stressed educating doctors directly about the probable epidemic. Public education seemed critical to insure early diagnosis, with the committee exercising more direct control over newspaper publicity through uniform press releases from the Deputy Minister's office.<sup>13</sup> Unlike the 1936 epidemic that struck in the midst of the Depression, in 1941 there were no special arrangements made to provide free diagnostic medical services and acute treatment outside of hospitals. As was customary, convalescent serum was still freely provided to all diagnosed cases, despite questions about its value.<sup>14</sup> Ontario had dropped its "general gratuitious distribution" by 1940, although it would "still be available for those who have confidence in it." Most other provinces still prepared it to varying degrees.<sup>15</sup> By 1941, health authorities also wondered whether the expense of the serum was justified "under the exigencies of war...."<sup>16</sup> Many physicians nevertheless felt it was "incumbent upon them" to administer serum, "fearing criticism if the outcome of the case is unfavorable."<sup>17</sup> Some in Manitoba maintained an almost stubborn faith in the serum's value, but as the provincial symposium on the epidemic concluded, "It was doubtful if there was any advantage in [the serum's] use, except possibly from

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<sup>&</sup>lt;sup>13</sup> Jackson, "Poliomyelitis and Encephalitis, Manitoba 1941," p. 243.

<sup>14</sup> An influential American review of the serum question suggested that "there should be no obligation, moral or legal, on the physician to give [serum]; nor should he be held responsible for having withheld it if the outcome of the case is unfavorable." While this review stressed the lack of scientific proof of the serum's value, it also emphasized American concerns about the expense involved to patients and their families, who usually had to pay for the serum, in addition to paying the physician, and "The financial burden on many patients with poliomyelitis is heavy enough without it." See H.K. Faber, "Serum Therapy and Vaccination," JAMA, 117 (July 26, 1941): 277.

<sup>&</sup>lt;sup>15</sup> News, Ontario, CMAJ, 41 (Aug. 1939): 216; Topics of Current Interest, "The Treatment of Anterior Poliomyelitis With Pooled Convalescent Serum," CMAJ, 42 (Feb. 1940): 191-92.

<sup>&</sup>lt;sup>16</sup> Editorial, "Poliomyelitis Serum," CMAJ, 45 (Nov. 1941): 446.

<sup>&</sup>lt;sup>17</sup> Editorial, "Serum Therapy in Poliomyelitis," CPHJ, 32 (Aug. 1941): 417.

the psychological effect, particularly on parents, in thinking that at least something had been done."<sup>18</sup>

Manitoba's most significant change during the 1941 polio epidemic was the attention given to the issue of acute hospitalization. The problem of hospitalizing paralytic cases was of secondary importance, but this issue grew more urgent later in the epidemic, particularly with the visit of Sister Kenny to Winnipeg, which is discussed below. As the epidemic worsened, the advisory committee's attention focused on trying to insure early diagnosis by hospitalizing as many cases as possible to insure that appropriate treatment was instituted as early as possible.<sup>19</sup> Other than administering serum, such treatment was only symptomatic during three weeks of hospital isolation.<sup>20</sup> All cases were also given a muscle test after the acute stage ended. The province provided this hospitalization and testing free and asked that all cases report to Winnipeg's Children's Hospital for a check  $up.^{21}$  In all, about 80% of cases from the Greater Winnipeg area received hospital care, and 55% of all cases in the province received a muscle test. In the wake of this epidemic, Manitoba, as Ontario and Alberta had done earlier, formalized a government scheme in which three weeks of hospitalization and an initial supply of splints, braces and boots were paid for. By the end of 1941 a total of 143 paralytic cases had been hospitalized under this polio policy.<sup>22</sup>

J.D. Adamson and S. Dubo, "A Clinical Study of Acute Poliomyelitis, Manitoba, 1941," CPHJ, 33 (June 1942): 273; "Summary: Poliomyelitis," p. 313.

<sup>19</sup> Jackson, "Poliomyelitis and Encephalitis, Manitoba 1941," p. 243.

<sup>20</sup> Adamson and Dubo, "A Clinical Study of Acute Poliomyelitis, Manitoba, 1941," p. 273. See also "Introduction: The Kenny Method of Treatment: Experienced at the Children's Hospital of Winnipeg," CPHJ, 33 (June 1942): 275.

<sup>21</sup> Jackson, "Poliomyelitis and Encephalitis, Manitoba 1941," p. 243; H.H. Ross, "Physiotherapy in the Treatment of Infantile Paralysis: Kenny Method," CPHJ, 33 (June 1942): 285. See also Harry Medovy, A Vision Fulfilled: The Story of The Children's Hospital of Winnipeg, 1909-1973 (Winnipeg: Peguis Publishers, 1979), p. 60-2.

<sup>22</sup> Donovan and Bowman, "Some Epidemiological Features of Poliomyelitis and Encephalitis, Manitoba, 1941," p. 247.

In eastern Canada, New Brunswick's experience with a polio epidemic in 1941 was the province's worst ever, with 419 cases (at a 91.6 case rate) and 19 deaths. Fredericton and the central area of the province were hardest hit. The provincial Department of Health delayed school openings and provided convalescent serum to 40% of the cases. The primary focus of the government's approach to the disease was on providing hospitalization for "post isolation treatment," a strategy prompted by the fact that some 65% of reported cases showed at least some degree of paralysis. By the end of the year about 60% of this group had not improved significantly.<sup>23</sup> This situation was complicated by the fact that many cases came from rural areas and from lower socio-economic backgrounds, while most hospitals in the province were private institutions and quite inaccessible to most polio patients.

Faced with such high numbers of paralytic cases, as Gillian Liebenberg has argued, the epidemic forced the province to change its health care procedures.<sup>24</sup> It was clear that "the existing machinery for the care of the sick was totally inadequate to meet this new situation." In response the government established a physiotherapy department at the Victoria Public Hospital in Fredericton, and assisted existing departments in Saint John and Moncton.<sup>25</sup> In Fredericton, a separate clinic, adjoining the hospital, was set up in an old nurse's building that had long been vacant. The province hired four registered physiotherapists, paid for new equipment for the hospitals, and offered "Post Isolation hospital maintenance for a period of three weeks... for those who cannot afford to meet such expenses."<sup>26</sup> As in Manitoba, the

<sup>23</sup> New Brunswick Department of Health, Annual Report, 1941 (Fredericton: 1942), p. 8-10.

<sup>24</sup> Gillian Liebenberg, "Death, Disease and Disability: Poliomyelitis and Social Change in New Brunswick, 1940-1965," paper read at Annual Meeting of the Canadian Society for the History of Medicine, Learneds Conference, Carleton University, Ottawa, June 4, 1993, p. 7. Thanks to Gill'an for the copy of her manuscript.

<sup>25</sup> New Brunswick Department of Health, Annual Report, 1941, p. 9.

<sup>26</sup> Ibid.; Liebenberg, "Death, Disease and Disability," p. 8-9

NFIP assisted in New Brunswick with polio literature, while Dr. John R. Paul of Yale University advised the Department on the disease.<sup>27</sup>

Another, though smaller, epidemic struck New Brunswick in 1942. The province's hospitalization policy continued, but whether it was due to fear of the disease, a lack of space, trained personnel, and proper equipment, or the inability of patients, or local municipalities to pay, "some hospitals refused to admit patients with poliomyelitis." Thus, treatment was often delayed, prompting the government to enlarge the polio clinic in Fredericton.<sup>28</sup> This was also a serious problem in other provinces as broader polio hospitalization policies were instituted during the 1940s. A public impression was created that free care was available at all local general hospitals, but most were not prepared, or willing, to handle large numbers of polio cases.

A similar situation occurred in Nova Scotia during 1942 and its first real experience with a polio epidemic. Inspired by the popularity of Sister Kenny's methods of treatment, and by the severity of the 1941 New Brunswick epidemic, the Nova Scotia government opened a 50-bed wing of the Nova Scotia Hospital in Halifax for the treatment of polio patients. This project had begun in the spring of 1942 and was in place by the time the province found itself "suffering from perhaps the most serious epidemic of poliomyelitis ever experienced here...."<sup>29</sup> A total of 162 cases, at a case rate of 27.6, were reported in the province, 80 of whom were treated in the provincial polio clinic in Halifax using the Kenny treatment, "with good results." The total cost to the province of operating the clinic during the epidemic was \$9,588, and by the following spring the Minister of Health requested a further \$22,000 for its operation during 1943.<sup>30</sup>

<sup>27</sup> New Brunswick Department of Health, Annual Report, 1941, p. 9-10.

<sup>28</sup> New Brunswick Department of Health, Annual Report, 1942 (Fredericton: 1943), p. 9.

<sup>&</sup>lt;sup>29</sup> Editorial, "The Kenny Treatment in Nova Scotia," *Nova Scotia Medical Bulletin*, 21 (Sept. 1942): 272.

<sup>&</sup>lt;sup>30</sup> Public Health Administration News, "Poliomyelitis in Nova Scotia," Canacian Journal of Public Health (formerly the CPHJ, hereafter the CJPH), 34 (Apr. 1943): 186.

In Canada, the "polio seasons" of 1943, 1944 and 1945 were relatively light, ranging from a low of 327 cases (2.8 case rate) nationally in 1943, to 722 cases (6.1 case rate) in 1944. Even though polio was relatively quiet, polio-consciousness continued to grow. It had been stimulated not only by Canadian epidemics, but by the intense publicity about the disease, particularly through the NFIP's "March of Dimes" in the United States. Such publicity revealed just how little of practical significance was really known about polio in the scientific and medical communities. An editorial in the *Canadian Journal of Public Health* during the polio season of 1944, concisely captured this frustrating situation.

We meet the polio' season again this year with little if any clearer understanding of its mode of spread than we had twenty years ago... The wide publicity given, with what we thought was proper purpose, to what we thought we knew of the prevention of paralysis, has created a highly sensitive polio' consciousness on the part of the public and, too, of the profession. It created undue apprehension regarding poliomyelitis and an unwarranted faith in our ability to meet the problem. Very real as the problem is and regrettable and unfortunate as is paralysis, it should be remembered that the actual risk, the chance of paralysis in a population even during an epidemic, is small... This is not to imply that complacency is to be condoned, but excitement and fear add to the problem rather than alleviate it in any way and neither should be encouraged. We must admit humbly and frankly our mistakes and our ignorance, and our inability to control the spread... The very human failing of responding to the urge to do something should be restrained and only such action taken as is compatible with common sense, general knowledge and our meagre knowledge of the specific disease. Ill-balanced enthusiasm and excitement coupled with wellmeaning but misconceived action beget only confusion.<sup>31</sup>

During the major provincial polio epidemics of this period there was an escalation in the investment by provincial governments in the hospitalization of polio patients. Although this trend had been underway since 1937 in Ontario and Saskatchewan, and even a decade earlier in Alberta, Sister Kenny's arrival in North America in 1940, and in particular, her visit to Winnipeg in 1941, sparked an acceleration and expansion of provincial interest in hospitalization for polio cases during the early 1940s. The impact of Sister Kenny in Canada was considerable, and despite the concerns about publicity evident in the *CJPH*, her popularity in many ways echoed

31 Editorial, "Poliomyelitis," CJPH, 35 (Aug. 1944): 331.

earlier enthusiasms for convalescent serum and nasal sprays. The use of the serum and spray demonstrated how provincial health authorities responded to such enthusiasm with attempts to evaluate and unconditionally distribute any potential benefits against polio they offered. Provincial governments' responses to Kenny's "revolutionary" polio treatment methods continued this pattern. Her methods offered a new opportunity for Canadian health authorities to further demonstrate that they were actively doing something specific against the continuing and tragic effects of epidemic polio.

4.2) The Sister Kenny Revolution in Canada, 1941-46

The Sister Kenny phenomenon sparked a major revolution in how polio was treated, and ultimately in the creation of the new field of rehabilitation medicine. Her humble Australian roots,<sup>32</sup> her stubborn insistence in defending her methods despite strong opposition from an orthodox medical profession, her gender, and her overwhelming popularity, climaxing in a Hollywood movie in 1946, all contributed to her legend during the 1940s and early 1950s. As her biographer, Victor Cohn, stresses, "Sister Kenny would spend a lifetime fighting: fighting doctors, the Establishment, men (who were the Establishment) and herself, for she was no simple, sweet angel of mercy but a complex, angry creature." She personified the scientific rebel, and

Elizabeth Kenny was born on September 20, 1880, in a small village in New South Wales, Australia. Her interest in medicine began when she was treated for a broken wrist at age 13 by Dr. Aeneas McDonnell in the nearby town of Toowoomba, and later when her frail brother was injured. Eager to help her brother, Elizabeth "consulted" with Dr. McDonnell, who "suggested exercises and lectured her on muscle structure." During her twenties, after trying a number of traditionally male pursuits, she began to assist nearby families with delivering babies and eventually "a doctor gave her a letter 'certifying' her good work." Armed with this letter, but with no formal schooling in nursing, she had a traditional nurse's uniform made and began to act as a bush nurse for the sparsely settled prairie region she grew up in. And since there were few doctors and "plenty of sick... she just saddled up;" Victor Cohn, "Sister Kenny's Fierce Fight for Better Polio Care," Smithsonian, 12 (Nov. 1981): 182-86.

Like a Freud or a Kepler, she helped open our minds. Doing this – doing it flamboyantly and tartly, once telling eight doctors carrying roses, "It is very gratifying to receive flowers from doctors while I am still here to smell them!" – she became so famous that for ten straight years American women, polled by George Gallup, named her second among women they most admired, next to Eleanor Roosevelt. In 1952, shortly before her death, she was named first.<sup>33</sup>

Elizabeth Kenny's involvement with polio began in 1911 when she came upon a young girl who "lay twisted in pain, with one elbow bent, one knee drawn up, and a foot turned grotesquely downward." Not recognizing the problem, Kenny telegraphed a physician friend, Dr. Aeneas McDonnell, who diagnosed infantile paralysis. She was told that there was no known treatment, but "Do the best you can with symptoms presenting themselves." Remembering that heat relaxed sore muscles, Kenny took a blanket, tore it into strips, soaked them in boiling water, wrung them out and wrapped these hot wool packs around the paralyzed limbs. Almost immediately "the child stopped whimpering." After a day of "hot pack" treatment, and "ignorant of textbook warnings, she began moving the child's now relaxed limbs in normal patterns." Kenny's experience with this and subsequent cases suggested that affected muscles were actually tight and in "spasm" and not flaccid, as was generally believed. She was able to then teach patients how to use "forgotten," or "alienated" muscles, and thus prevent muscle "incoordination," which she believed caused polio's characteristic deformities. Encouraged by McDonnell to experiment further, Kenny started her own country hospital. Her efforts were interrupted by World War I and she served as a nurse, or "Sister," on Australian troop vessels. She did not see another polio case until 1931.<sup>34</sup>

Kenny's subsequent polio work through the 1930s involved post-acute cases with old polio disabilities and she was often able to bring about "miracles" to reedu-

<sup>33</sup> Cohn, "Sister Kenny's Fierce Fight for Better Polio Care," p. 181. For more on Sister Kenny see her full biography by Cohn, Sister Kenny: The Woman Who Challenged the Doctors. On the 1946 biographical movie, Sister Kenny, see Naomi Rogers, review of Sister Kenny, in "Special Section on History of Science in Film," Isis, 84 (1993): 772-74.

<sup>&</sup>lt;sup>34</sup> Cohn, "Sister Kenny's Fierce Fight for Better Polio Care," p. 186-90.

cate paralyzed muscles. In 1934, with the support of the Queensland state government, two official Elizabeth Kenny Clinics were opened. But in these and six other Australian clinics, until 1939, Kenny was prevented from using her methods on acute cases and was always answerable to a male doctor.<sup>35</sup> Her insistence on using only her own methods, and her unwillingness to cooperate with orthodox doctors generated a great deal of tension duri..g and after epidemics.<sup>36</sup> Public support for Kenny and her methods was widespread in Australia, and as noted earlier, was felt in Canada by the late 1930s, but most doctors and some politicians refused to have anything to do with her. In 1939 the controversy led to a Queensland Royal Commission, which concluded that "she had made claims she could not fulfill." A small group of Australian doctors who supported Kenny's methods suggested to the Queensland Premier that she should go to America. "Bloody good riddance," he reportedly said.<sup>37</sup> Kenny had become a political liability, and despite the state spending over £50,000 for her clinics, it was deemed worth spending a little more to "dispatch this troublesome woman to another country, and get public credit for her 'mission'."<sup>38</sup>

Sister Kenny, along with her adopted daughter, arrived in San Francisco in April 1940. Despite being given short shrift in New York City and Chicago, she benefited from a growing dissatisfaction among American doctors with the fashion of immobilization. With worsening polio epidemics in America and the founding of the NFIP, Kenny quickly found herself in a more hospitable environment, especially after offering her services at the University of Minnesota and Minneapolis General Hospital, where she was given a ward and, "for the first time, ungrudging help from several doctors and nurses."<sup>39</sup> One of her strongest supporters noted that "She han-

<sup>&</sup>lt;sup>35</sup> *Ibid.*, p. 190, 192-93.

<sup>36</sup> M. Wilkinson, "Personal Viewpoint: Poliomyelitis Epidemic of 1937: A Recollection," Australian Paediatric Journal, 24 (1988): 112-13.

<sup>&</sup>lt;sup>37</sup> Cohn, "Sister Kenny's Fierce Fight for Better Polio Care," p. 193.

<sup>38</sup> Cohn, Sister Kenny, p. 120.

<sup>39</sup> Cohn, "Sister Kenny's Fierce Fight for Better Polio Care," p. 194-95. See also John R. Paul, A History of Poliomyelitis (New Haven: Yale University Press, 1971), p. 349-40.

dled a limb like a fine watchmaker handling a watch," while another remarked that "I can't get anything out of her writings or lectures, but when she's at the bedside, she's another [Dr. William] Osler."<sup>40</sup>

American medical support for Kenny accelerated in June 1941 when the Journal of the American Medical Association published a preliminary report that was cautiously favorable. It stressed that, while final results were pending, patients were "much more comfortable and cheerful during the acute stage than are those who are immobilized... and it appears that the disability is less severe than would have been expected ordinarily."<sup>41</sup> American support solidified considerably by the end of the year when, "after some pruning of Kenny opponents," a NFIP committee unanimously found that Kenny's treatment methods were superior. JAMA also endorsed her methods and its editor, together with NFIP President, Basil O'Connor, spoke on national radio about Sister Kenny.<sup>42</sup>

In Canada, awareness of Sister Kenny and her methods first developed in Manitoba during the 1941 epidemic. Echoing the introduction of convalescent serum in 1928, doctors at Winnipeg Children's Hospital, where most cases were treated, had heard about Kenny and had discussed the encouraging *JAMA* report. Yet unlike what followed with the serum, this favorable report "failed to move us to a trial of the method." Greater interest was stimulated when NFIP's Medical Director visited Winnipeg during the epidemic and arranged for Dr. Bruce Chown, Superintendent of Children's Hospital, to visit Minneapolis to learn about Kenny's methods first hand. Chown found in Minneapolis "a far warmer feeling for the results" than had been reflected in the initial *JAMA* report.<sup>43</sup> Indeed, he discovered that the editors of *JAMA* had deleted one line from the original manuscript: "This method must form the basis

<sup>40</sup> Cohn, "Sister Kenny's Fierce Fight for Better Polio Care," p. 195-96.

<sup>&</sup>lt;sup>41</sup> W.H. Cole and M.E. Knapp, "The Kenny Treatment of Infantile Paralysis: A Preliminary Report," *JAMA*, 116 (June 7, 1941): 2580.

<sup>42</sup> Cohn, "Sister Kenny's Fierce Fight for Better Polio Care," p. 196.

<sup>43</sup> Introduction, "The Kenny Method of Treatment: Experiences at the Children's Hospital of Winnipeg," p. 275.

of all future treatment of poliomyelitis in the acute stage." As for Elizabeth Kenny herself, Chown found her thinking and movements "ponderous; her mental reactions are set [and] have become completely reflex." More significantly,

She has an iron will. She hasn't the slightest vestige of tact. Nevertheless she is kindness itself... She responds quickly to a sympathetic approach; freezes the cold scientific attitude, which scientific attitude I have observed, is as often evidence of a closed mind as of true knowledge. So far as I am concerned the balance is all in Sister Kenny's favor. Her knowledge of the anatomy of locomotion is superior to that of the anatomists.<sup>44</sup>

Despite an initial distaste for her personally, Chown recognized that Kenny's results were much better than he had ever observed. The experience "left us with but one desire, to have Miss Kenny visit Winnipeg and give us an opportunity to try her method." Kenny "was only too anxious to help," and along with her ward and assistant spent a weekend in Winnipeg, while her assistant stayed for a further two weeks.<sup>45</sup> In the midst of "those two crowded days," the physiotherapists in attendance did not seem to fully grasp the essentials of Kenny's methods. This explained why the initial results afterwards were not as good as Kenny's. According to Chown, better results depended upon hospitals sending a physiotherapist to work with Kenny in Minnesota for at least three months. This recommendation was made to the Federal Director of Public Health Services, Dr. John J. Heagerty.<sup>46</sup> Toward this end, the NFIP stepped in to sponsor the chief orthopaedic surgeon and the chief physiotherapist at Winnipeg's Children's Hospital to visit Minneapolis to consult with Kenny about her methods and their application in Winnipeg.<sup>47</sup>

Kenny's Winnipeg visit prompted a serious reassessment of how polio treatment should be managed during the acute stage. Kenny stressed that her method

<sup>44</sup> Letter, B. Chown, Superintendent, Winnipeg Children's Hospital, to J.J. Heagerty, Director, Public Health Services, Department of Pensions and National Health, Ottawa, November 20, 1941, NAC, RG29, Vol. 201, file 311-P11-15.

<sup>45</sup> Introduction, "The Kenny Method of Treatment: Experiences at the Children's Hospital of Winnipeg," p. 275.

<sup>46</sup> Letter, Chown to Heagerty, November 20, 1941, NAC, RG29, Vol. 201, file 311-P11-15.

<sup>47</sup> Introduction, "The Kenny Method of Treatment: Experiences at the Children's Hospital of Winnipeg," p. 275.

was most effective if applied as early as possible, which was a familiar argument with polio treatments, particularly for convalescent serum. However, public health regulations and the orthodox method of acute polio treatment dictated two-to-three weeks of isolation and immobilization. Hence, applying the Kenny method effectively "may necessitate a radical change in our present methods, namely, as soon as the disease is diagnosed treatment will be started."<sup>48</sup> Suddenly implementing the Kenny methods, en masse, in the middle of an epidemic, was not easy. Nevertheless, Manitoba's health regulations were relaxed and some patients were treated with the Kenny method during the acute stage in Winnipeg's Children's Hospital.<sup>49</sup>

Despite this move, Chown stressed that

The whole disease is in need of reassessment. The fortunate conjunction of the radical new teaching of Miss Elizabeth Kenny with the experimental approach of the National Foundation for Infantile Paralysis has given the needed stimulus. Some have found the stimulus unpleasant, but reaction is taking place.<sup>50</sup>

Chown's acceptance of Kenny's methods, and her concepts of "spasm," "mental alienation" and "incoordination," were difficult to explain. As he confessed to Heagerty, "I dare say this all sounds crazy as hell to you. I don't blame you if it does; I'd be surprised if it didn't. Nevertheless Sister Kenny was able to demonstrate both in Minneapolis and here the clinical evidence for her concepts." Her methods sounded easy to employ but they became expensive primarily because of the constant and labour intensive nursing required for the application and hourly changir 3 of the hot packs.<sup>51</sup> As polio survivors vividly recalled, they were indeed "HOT" packs; as hot as could be withstood without burning.<sup>52</sup> Within a year the Kenny treatment methods in Manitoba seemed to offer a distinct advantage for polio patients; they also

<sup>&</sup>lt;sup>48</sup> "Summary: Poliomyelitis," p. 313.

<sup>&</sup>lt;sup>49</sup> Introduction, "The Kenny Method of Treatment: Experiences at the Children's Hospital of Winnipeg," p. 275.

<sup>50</sup> B. Chown, "The Newer Knowledge of the Pathology of Poliomyelitis," *CPHJ*, 33 (June 1942): 277.

<sup>&</sup>lt;sup>51</sup> Letter, Chown to Heagerty, November 20, 1941, NAC, RG29, Vol. 201, file 311-P11-15.

<sup>52</sup> Les G. (1941, age 14, Portage la Prairie, Man.), July 1993.

saved money. The province found its expenses for splints and other appliances declined sharply through 1941 and 1942.<sup>53</sup>

The Department of Pensions and National Health in Ottawa found out about Sister Kenny and her techniques from Kenny herself. She wrote to the Minister, Ian Mackenzie, just after her Winnipeg visit, saying that she would gladly include Canadian technicians in her classes at the University of Minnesota Medical School. She stressed to the Minister that "I do not seek any personal gain for this offer. I would gladly give this priceless gift to the Dominion of Canada. I am an Australian born British subject."<sup>54</sup> A committee was set up in Ottawa to investigate Kenny's methods, both from her directly and from Winnipeg.<sup>55</sup> It concluded that "the most we can say at the present time is that no harm has resulted from the discontinuance of immobilization and that the treatment is worthy of trial."<sup>56</sup> Heagerty later outlined in a memo that

The medical profession has been loath to express a final opinion on the Kenny treatment but all reports to date indicate that her method of treatment is as good and probably better than the usual treatment applied by the medical profession which consists of splinting... My impression is that the comfort experienced by the patients as a result of the Kenny treatment and the indication that there is apparently less paralysis than by other methods of treatment are an advancement in the treatment of infantile paralysis.<sup>57</sup>

However, the federal government was unable and/or unwilling to do much about implementing the Kenny methods in Canada. All Ottawa could do was inform the provinces and then leave it to them to act since medical treatment was clearly a matter of provincial jurisdiction, a division of power the federal health department was not yet willing to breach.

<sup>&</sup>lt;sup>53</sup> Manitoba Department of Health and Public Welfare, *Annual Report*, *1942* (Winnipeg, 1943), p. 291.

Letter, E. Kenny to Minister of Health, Ottawa, September 4, 1941, NAC, RG29, Vol. 201, file 311-P11-15.

<sup>&</sup>lt;sup>55</sup> Letter, Ian Mackenzie, Minister of Pensions and National Health to Kenny, September 11, 1941, *Ibid.*.

Letter, Heagerty to Chown, November 29, 1941, Ibid..

<sup>57</sup> J.J. Heagerty, "Memorandum re: Kenny Treatment of Infantile Paralysis," December 8, 1941, *Ibid.*.

The Sister Kenny revolution spread to the Maritimes during the spring of 1942, first to New Brunswick, then Nova Scotia. The seriousness of the 1941 New Brunswick epidemic, and a shortage of professional staff, prompted the provincial government to appeal to Montreal's Children's Memorial Hospital for help. A qualified, British-trained physiotherapist, Kathleen Walker, was found there and hired by the province. She arrived in Fredericton at the peak of the epidemic. The province's polio clinic was established under Walker's leadership, although the orthodox treatment methods were initially used. By March 1942, after hearing of the acceptance of Kenny's methods by many in the North American medical community, they were adopted in the Fredericton clinic, after which better progress was reported with the patients.<sup>58</sup>

Soon after New Brunswick had implemented the Kenny methods, and fearful of an epidemic of similar scope, the Nova Scotia Department of Health began planning how the province would handle a large number of cases. The Minister of Health, Dr. Frank R. Davis, was aware of Kenny and sent two provincial nurses to Minneapolis in May 1942 to take part in her courses. The director of the Nova Scotia Hospital in Halifax, Dr. Cecil Kinley, was also aware of Kenny, but undecided on the value of her methods, although he spoke about her concepts to doctors around the province. Soon he was asked by the Minister "to pass surgical judgment" on Kenny's methods and on the value of the courses she gave to the provincial nurses. Kinley was still skeptical when he went to Minneapolis for a week of intensive discussions, lectures, heated arguments and demonstrations of the Kenny method, at the end of which "he was won to ardent approval." The final element was the appointment of Valerie Harvey, a trained Australian physiotherapist and a direct Kenny disciple. With the arrival of Harvey, the Nova Scotia Hospital opened its polio clinic in Halifax in late August, just as the province was hit with its worst polio epidemic to date. The timing was politic-

<sup>58</sup> Liebenberg, "Death, Disease and Disability," p. 8-10. It is not clear whether Walker learned the Kenny method in Minnesota, on her own, or from another source.

ally fortuitous and "reflect[ed] great credit on Dr. Davis and his Department whose astuteness [was] clinical as well as governmental."<sup>59</sup>

Kinley was not the only doctor who was "openly skeptical" of Kenny's methods in 1942, but his change of heart was symbolic of what was taking place across Canada, professionally, publicly and in the popular press. In May 1942, *Saturday Night* Magazine, in an article entitled "Childhood's Merciless Foe," stressed how the "austere medical associations, who not so long ago would not let the Sister set foot inside their hospitals, are now paying homage." Kenny's "quack" treatment for polio victims had rescued "doomed children in Australia and New Zealand[,] [w]hile American and Canadian treatments have been torturing and deforming our children. At last this black page in modern medical history has been turned over." Saluted were "those doctors and nurses, young and old, who practically kicked open the hospital doors for Sister Kenny." By this time "Almost all the great hospitals have now made their tests and are adding their approval to the Kenny method."<sup>60</sup>

A more influential factor in swinging Canadian doctors, and perhaps more importantly, provincial governments, into supporting the Kenny methods, was an address by the NFIP's Medical Director, D.W. Gudakunst, before the Annual Meeting in Toronto of the Canadian Public Health Association in early June 1942. In a wide-ranging paper later published in the *CJPH*, Gudakunst spent the majority of his presentation defending Kenny from the "unjust criticism" that had been directed against her. He stressed that there had developed two schools of thought about the effects of polio. The older, orthodox understanding of polio considered that all muscle disfunction was caused by the destruction of the anterior horn cells. In Kenny's view, such disfunction was the result of other processes, ie. "spasm," "alienation," "incoordina-

<sup>59</sup> Editorial, "The Kenny Treatment in Nova Scotia," *Nova Scotia Medical Bulletin*, 21 (Sept. 1942): 272.

<sup>Dyson Carter, "Science Front: Childhood's Merciless Foe," Saturday Night, (May 23, 1942),
p. 17. See also David G. Johnston, "A Triumph of Nursing," Saturday Night, (Sept. 12, 1942):
21: Dyson Carter, "Hope for 'Polio' Victims," Saturday Night, (Sept. 11, 1943): 16.</sup> 

tion," which were susceptible to appropriate therapy. Of particular importance, however, was that the former model "holds forth limited hope for the patient while the other, as advanced by Kenny, admits of an active corrective and remedial régime." While Kenny's methods seemed radically different from traditional practices, "once the reason for their use as advocated by Kenny is appreciated, they become rational and reasonable. Certainly they are efficacious."<sup>61</sup> Such arguments helped convince the Canadian medical profession and, more importantly, other provincial governments to line up behind her before serious polio epidemics again struck without warning.

Ontario introduced the Kenny methods during the summer of 1942. In May, a University of Toronto Professor of Physiology, Dr. W.J. Gardiner, along with a nurse from Hamilton General Hospital, visited Minneapolis at provincial expense to gain "first-hand knowledge of the Kenny method." Based on their experience a "Course of Instruction to Nurses" was held at the Hospital for Sick Children in July.<sup>62</sup> Gardiner stressed to the nurses that the most significant results of Kenny's methods for the medical profession were the demonstration of the presence of "spasm" during the acute stage of polio, and, more importantly, "the creation, among many in the medical profession, of a better appreciation of the very substantial contribution resulting from the use of physio-therapy in the treatment of this disease." Gardiner noted that during the 1937 epidemic Toronto General Hospital had used heat, massage and muscle re-education on adult polio cases with good results, but did not apply heat during the acute stage. It was therefore imperative that for the Kenny treatment to be effective, it needed to be applied during the initial three week period of isolation. Also of concern to Gardiner, was the need for nurses to do "everything possible to eliminate the

<sup>61</sup> D.W. Gud: kunst, "Poliomyelitis: Control and Treatment," *CPHJ*, 33 (Aug. 1942): 371-72, paper read before the 31st Annual Meeting of the Canadian Public Health Association, Toronto, June 1-3, 1942.

<sup>&</sup>lt;sup>62</sup> "Lecture and Demonstration of Nursing Technique Involved in the Kenny Method of Treatment of Infantile Paralysis," July 6-10 1942, Hospital for Sick Children, Toronto, p. 2, 8, AO, RG10-106-249.3.

growing misconception among the public that the Kenny method of treatment will cure paralysis. This is entirely erroneous." The best that can be said about it was that it was "highly beneficial."<sup>63</sup>

The introduction of the Kenny method into Ontario, and the intense publicity surrounding her, forced a significant expansion of the province's polio policy. The policy since 1937 had stressed the provision of splints, frames and a three-week period of free post-isolation hospitalization to instruct parents on home care. To the Deputy Minister of Health, Dr. B.T. McGhie, such an expansion of provincial interest in treatment was not new. In addressing the nurses at the HSC Kenny course, McGhie, obliquely referring to the U.S., pointed out how in some political jurisdictions "the professions are very jealous of any movement on the part of an official health agency that would seem to indicate that the state is doing anything about the treatment of disease." But in Canada, and especially in Ontario, this had not been the case, as McGhie highlighted with the examples of the province's expanded mental illness treatment programs since 1930, venereal disease since 1920, tuberculosis since 1921, cancer since the mid-1930s, and polio since 1937. If a significant polio outbreak occurred in Ontario in 1942, as was predicted, McGhie noted that "in keeping with the programme in 1937, the Department is desirous of assisting in the prevention of unnecessary crippling." Towards this end and in order to study these new developments first-hand, the province paid to send other selected physiotherapists from Ontario hospitals to Minnesota for Kenny instruction.<sup>64</sup>

The prediction of major Ontario epidemics in 1942 and 1943 did not come true as less than 90 cases occurred. Of these, 64% received some Kenny treatment in 1942.<sup>65</sup>

<sup>63</sup> W.J. Gardiner, address in *Ibid.*, p. 4-5; H.H. Hyland, W.J. Gardiner, F.C. Heal, W.A. Ollie and O.M. Solandt, "Acute Anterior Poliomyelitis: A review of sixty-six adult cases which occurred in the 1937 Ontario epidemic," *CMAJ*, 39 (July 1938): 1-12; and 39 (Aug. 1938): 105-11.

<sup>64</sup> B.T. McGhie, address in "Lecture and Demonstration of Nursing Technique Involved in the Kenny Method of Treatment of Infantile Paralysis," July 6-10, 1942, HSC, p. 1-3; "Kenny Method to be Used Here, London Free Press, (July 14, 1942).

<sup>65</sup> Ontario Department of Health, Annual Report, 1942 (Toronto: 1943), p. 33.

Kenny visited Toronto in June 1943 on the invitation of the Ontario Minister of Health. She visited hospitals and at the University of Toronto addressed the Ontario Registered Nurses Association, the Physiotherapy Association and the Toronto Academy of Medicine. Despite her slides and motion pictures demonstrating her methods, the subject of epidemic polio was "cold" at the time, "hence the attitude of physicians [was] not one of enhusiasm."<sup>66</sup>

Enthusiasm for her methods returned when a serious outbreak finally hit Ontario in 1944, recording 332 cases and 20 deaths, and significantly, 90% of these patients were hospitalized at provincial expense.<sup>67</sup> By this time the Ontario government was no longer as concerned about the wartime economy, and in response to the peak in popularity of Sister Kenny, who visited Ontario again in November 1944,<sup>68</sup> the province provided full and indefinite hospitalization coverage for all polio cases, despite the costs.<sup>69</sup> This policy was often unevenly applied and took time to implement to everyone's satisfaction. During Kenny's 1944 visit she was not hesitant to be critical of how polio patients were being treated by doctors and nurses. She visited Hamilton General Hospital and found her procedures poorly employed and patients flat on their backs for months without even a pillow and little attention given to them. One polio survivor recalled being "flat on my back" since August, but "She had me in my feet the day after her visit."<sup>70</sup> Hard beds and careful support were necessary in some cases, but usually for no longer than a month.<sup>71</sup>

<sup>66</sup> News, Ontario, CMAJ, 49 (Aug. 1943): 154.

<sup>67</sup> Ontario Department of Health, Annual Report, 1944 (Toronto: 1945), p. 19.

<sup>68</sup> Sister Kenny visited London, Ontario in early November, 1944 to publicly premier her 100 minute educational film "Kenny Concept of the Disease, Infantile Paralysis," which had previously only been shown to American doctors; "Kenny Polio Treatment Revealed by Movies," London Free Press, (Nov. 4, 1944).

<sup>69</sup> Introduction in "Lecture and Demonstration of Nursing Technique Involved in the Kenny Method of Treatment of Infantile Paralysis," July 6-10. 1942, HSC.

<sup>70</sup> Joseph E. W. (1944, age 24, St. Catherines, Ont.), May 1993.

<sup>71</sup> Les G. (1941, age 1 <sup>1</sup>, Portage la Prairie, Man.); Madelon F. (1950, age 9, Toronto, Ont.), June 1993; Jean E. K. (1953, age 34, Barrie, Ont.), June 1993; Marlene C. (1953, age 5, Toronto, Ont.), June 1993.

The Kenny methods sharply shifted attention away from splints, which she abhorred, and on to an active hospital-based treatment program. Responsibility for long-term treatment also shifted from the home to the hospital, and from the physicians and parents, and increasingly to nurses and physiotherapists. Indeed, this intensive hospital-based treatment regime increasingly excluded parents until patients were discharged and a strict exercise regime was outlined for them.<sup>72</sup> Polio patients thus found themselves cut off from the outside world of family and friends for long periods of time, usually between six months and one year. This enforced separation and a strict institutional regimen often extend for longer, although restrictions on visits were relaxed over time. The institutional structure of the hospital thus became home for large groups of polio victims.<sup>73</sup> In the wake of major polio epidemics through the 1940s, and particularly during the early 1950s, which often turned whole hospitals into polio hospitals, nursing and medical staff had an "impossible job" and were left overloaded, understaffed and overworked.<sup>74</sup> In such large polio wards, while the stricken child usually had fun with the other polio children, most felt like they were "a million miles from home" and abandoned. In many cases their emotional health was neglected in the herculean effort to restore physical health and mobility.<sup>75</sup> In many cases, this long separation from family had lasting personal effects.<sup>76</sup>

<sup>&</sup>lt;sup>72</sup> Les G. (1941, age 14, Portage la Prairie, Man.).

<sup>73</sup> Davis, Passage Through Crisis. p. 47-80.

<sup>&</sup>lt;sup>74</sup> Les G. (1941, age 14, Portage La Frairie, Man.); Barbara D. W. (1951, age 11, Toronto, Ont.), September 1993; Margaret M. (1951, age 25, Toronto, Ont.), May 1993; Jean H. C. (1952, age 33, Leask, Sask.), June 1993.

<sup>&</sup>lt;sup>75</sup> Cora W. (1940, age 10, New Liskeard, Ont.), June 1993; B. Gail C.-R. (1943, age 6, Ottawa, Ont.), June 1993; Stanley Ralph (1948, age 8, Toronto, Ont.), "Out of the Iron Lung," File, "Polio," Hospital for Sick Children Archives; Barbara D. W. (1951, age 11, Toronto, Ont.). Margaret L (1952, age 6, Toronto, Ont.), June 1993.

<sup>76</sup> David Steen, (1953, age 6, Swan River Valley, Kenville, Man.), interview Sept. 13, 1993 for CBC Prime Time News documentary, "Conquering the Crippler," aired December 7, 1993. See also Steve Whysall, "The 20 Who Can't Forget the 1953 Polio Epidemic," Winnipeg Tribune, (Nov. 21, 1978): Peter Carlyle-Gordge, "Summer of Fear," Winnipeg Magazine, (June 1983): 16-18, and "Polio Terror Ruled a City," Winnipeg Sun, (June 20, 1983); "Commentaries by

In Western Canada, Alberta followed a similar process in introducing the Kenny method in the summer of 1942, although the low number of cases in the province limited the opportunity to try her methods.<sup>77</sup> Saskatchewan followed suit in the spring of 1943 in anticipation of a major epidemic.<sup>78</sup> In August 1943, the province also opened a special Poliomyelitis Clinic at St. Paul's Hospital in Saskatoon, which offered the Kenny treatment to all cases at government expense, covering all hospitalization charges for the clinic cases.<sup>79</sup>

Ir. British Columbia, complacency over polio was shattered when an outbreak in 1942 brought 35 polio cases to Vancouver General Hospital in rapid succession. The country had suddenly become "Kenny conscious" and Dr. Alice J. McDonald, of the "hysiotherapy Department at Vancouver General, was ordered to treat the patients with the Kenny method. McDonald only knew of Kenny and her methods by what she had read in the newspapers, and did not have the benefit of any preparation or support from the provincial government. "It meant complete abandonment of all my medical school training and teaching, and a confused groping to understand the Kenny way." Nevertheless, even with her "home-made brand of Kenny treatment," the patients seemed to get along better than if they had been given the old orthodox splints and casts.<sup>80</sup>

McDonald had to wait until October 1943 for the B.C. government to pay her way to Minneapolis to take part in a week-long Kenny course specially designed for

Ex-Patients," University of Manitoba Medical Journal, 50 (1980): 97-101. See also, Davis, Passage Through Crisis, p. 173.

<sup>&</sup>lt;sup>77</sup> Memo, R.O. Davison, Deputy Minister of Public Health, Saskatchewan, to J.M. Urich, Minister of Public Health, Saskatchewan, October 24, 1942, attached to a Report by F.C. Middleton, Director, University Hospital, Edmonton, "Re. Kenny Treatment for Polio Cases in Alberta," received October 20, 1942, Saskatchewan Archives Board (hereafter SA), R97, file 12.

<sup>78</sup> Letter, R.O. Davison, Deputy Minister of Public Health, Saskatchewan, to Bertha G. Oxner, Director of Women's Work, University of Saskatchewan, Saskatoon, October 5, 1942, Ibid..

<sup>&</sup>lt;sup>79</sup> Saskatchewan Department of Public Health, Annual Report, 1943 (Regina: 1944), p. 20.

Letter, Alice J. McDonald, Vancouver General Hospital, to Kinsmen Club of Vancouver, December 10, 1944, in "Brief on the 'Prevention and Treatment of Poliomyelitis'," presented to National Association of Kinsmen Clubs, Post War Projects Committee, January 19, 1945, p. 4-5, attached to Letter, H.G. Wardell, Kinsmen Club of Vancouver, to Dr. Brock Chisholm, Deputy Minister of Health, Ottawa, January 29, 1945, NAC, RG29, Vol. 201, file 311-P11-11.

doctors. This trip left McDonald keenly aware of the need for more training for herself, and the recognition "that I could do nothing without a trained technician." In February 1944, the Vancouver Kiwanis Club sponsored McDonald and a physiotherapy technician to take a three-month Kenny course, after which Vancouver General Hospital became the first Canadian hospital to have a Kenny-trained doctor-technician team. Illness soon sidelined the technician, leaving McDonald without any trained assistance for some time. There were no other Kenny technicians in the province, and none available elsewhere in Canada. This situation left McDonald very concerned about any new cases that might arise in 1945, forcing her to consider the larger polio problem in Canada. She discovered that,

The whole situation in British Columbia, and indeed in the whole of Canada, is so unorganized, and the whole present approach to it in the light of recent advances in Polio treatment is so inadequate, that any sign of aroused interest is most encouraging -- a ray of light in the gloom.<sup>81</sup>

While Canadian governments were adopting the Kenny treatment methods between 1941 and 1944, she did not generate the same level of direct government interest in the U.S. and had more difficulty keeping her medical supporters. Most serious was her "schism" with the NFIP. The public clearly defended her efforts, as did most doctors, at least publicly, but beginning in 1943 a reaction emerged among some orthopaedic physicians who questioned the validity of Kenny's methods. Some stressed that there was never a single "orthodox" polio treatment, and that aspects of her methods were not new, particularly the value of heat, which was exaggerated by Kenny. Hot packs may relieve stiffness and pain, but as was pointed out, so would rest. An effective argument was also employed ageinst her that was similar to criticism of convalescent serum. Most polio cases actually recovered without any kind of treatment, and Kenny was unfairly taking the credit for many of these.<sup>82</sup> Others decried the publicity surrounding her. However, many doctors admitted that "she

<sup>81</sup> *Ibid.*.

<sup>82</sup> Cohn, Sister Kenny, p. 181-82. See also J.A. Toomey, "Observations on the Treatment of Infantile Paralysis in the Acute Stage," CMAJ, 54 (Jan. 1946): 4-5.

has knocked us so completely out of our complacent groove of thought about infantile paralysis that some worthwhile advance is bound to result both from the revolutionary ideas and the frantic efforts of her opponents to refute them."<sup>83</sup>

More serious for Kenny was the sharp split that emerged between her and the NFIP's President, Basil O'Connor in 1943.<sup>84</sup> This split was perhaps inevitable as Kenny had ambitions of "taking the NFIP under her own wing." Coupled with the growing medical opposition to her, "almost, it would seem, out of professional jealousy," Sister Kenny soon assumed the role of the persecuted martyr. In the process a large group rallied to her support, resulting in the founding of the rival Sister Kenny Foundation. This fight would continue for some years, but by the mid-to-late 1940s "the principles and practice of the *treatment* of poliomyelitis became lost in the shuffle."<sup>85</sup>

The Kenny/NFIP split did not have a serious effect in Canada, largely because of the interest of the provincial governments in supporting her methods, or at least appearing to favour them. Still, medical enthusiasm in Canada moderated under the influence of the American criticisms. In Ontario, as the provincial government expanded its polio policy under Kenny's influence, it tried not to mention her by name. The Minister of Health stressed in his June 1945 policy outline to hospitals that "the Department [of Health] does not formally subscribe to any special treatment." Treatment methods were to be decided upon by the special Poliomyelitis Medical

<sup>83</sup> Paul, History of Poliomyelitis, p. 342.

<sup>84</sup> This "schism" began when the government of Argentina asl ed President Roosevelt to send Sister Kenny to help them manage a polio epidemic. She was not trusted to go alone, and the NFIP also sent one of its clinical experts. Kenny was eager to train nurses there, but when she arrived, "all the rich people in Argentina gobbled up these therapists to care for their own children, and the purpose of the trip — to instruct the doctors in Argentina in the Kenny method — went by the board." There was pressure for her to extend her stay, but O'Connor, believing that she was treating more than teaching, was worried about "a kind of possibly endless foreign aid that he did not want to begin," and decided to pull the Kenny team out. After getting a full report on the trip O'Connor got upset and "He and Sister Kenny had a blow-up, and from that time forward they hated each other." *Ibid.*, p. 343; Saul Benison, *Tom Rivers: Reflections on a Life in Medicine and Science*, (Cambridge, Mass.: M.I.T. Press, 1967), p. 282-83; Cohn, *Sister Kenny*, p. 172.

<sup>85</sup> Paul, History of Poliomyelitis, p. 343.

Boards that were required in order for a hospital to qualify as an approved polio hospital. Such Boards consisted of the chief of the medical staff, an orthopaedic surgeon, a paediatrician and a neurologist, who were collectively responsible for providing free medical services to all polio cases upon admission. Until 1945, Ontario's polio hospitalization policy had been set at three weeks, which was similar to most other provinces. Beginning in 1945 Ontario went further than what most other provinces ever attempted. Under the new policy, for cases requiring a prolonged period of treatment, the Ontario Department of Health was "prepared to entertain requests for whatever period of time the Medical Board feel is likely to be involved, e.g. two months, three months, etc...." The policy was designed "to pay the local per diem cost," which included laboratory services, medicines, physiotherapy, and extra nursing care that was required for respirator cases. The Department did not pay when patients were cared for by their family physician, or for transportation costs.<sup>86</sup>

Ontario was fortunate in not having to severely test this policy during 1945 as only 184 cases and 11 deaths were reported. Reflecting the popularity of the policy, 93% of these cases received hospital treatment at the expense of the province.<sup>87</sup> Ontario was not so lucky in 1946 when 518 polio cases and 31 deaths occurred, its worst epidemic since 1937. The 1945 policy remained in place, and 88.4% of these cases took advantage of its benefits now available in ten hospitals across the province. The average case remained in hospital between 15 and 43 days.<sup>88</sup>

<sup>&</sup>lt;sup>86</sup> Letter, J.T. Phair, Ontario Deputy Minister of Health, to Superintendents of Approved Hospitals for Treatment of Poliomyelitis," June 25, 1945, AO, RG10-106-250.8.

<sup>&</sup>lt;sup>87</sup> Ontario Department of Health, Annual Report, 1945 (Toronto: 1946), p. 17-18.

Letter, "Re. Poliomyelitis Cases," Phair to W.T. Shirreff, Superintendent, Strathcona Hospital, Ottawa (and all Superintendents of Approved Polio Hospitals), July 4, 1946, AO, RG10-106, file 250.22; Ontario Department of Health, Annual Report, 1946 (Toronto: 1947), p. 14-15. The approved hospitals were located in Hamilton, Kingston, London, Ottawa, Toronto and Windsor, and "Should a case of polio occur in a municipality where no approved hospital is located and hospitalization is desired, the medical officer of health of the municipality in which hospitalization is to be arranged should be notified;" Letter, "Re. Poliomyelitis, 1946-47," D.S. Puffer, Assistant Chief Medical Officer of Health, to All Medical Officers of Health in Ontario, June 27, 1947, AO, RG10-106-250.22.

The American controversy surrounding Sister Kenny during the mid-1940s did not seem to have reached Ottawa and the newly restructured Department of National Health and Welfare. As the Department of Pensions and National Health, veterans hospitalization, old age pensions and the Depression minimized federal health initiatives. The establishment of a separate Department of Veterans Affairs and the family allowance program in 1944 prompted the creation of the new Department of National Health and Welfare in which health matters gained a higher priority in a context of growing political interest in a national health insurance plan.<sup>89</sup>

The Director of the new Department's Division of Child and Maternal Health, Dr. Ernest Couture, after attending a conference in December 1945 called by the Kenny Institute in Minneapolis, was left "deeply impressed with the outstanding results obtained by Sister Kenny's method." A new session of nursing courses in the Kenny methods was to begin in January 1946 and the Kenny Institute offered scholarships to Americans and Canadians on an equal basis for the two-year course. Couture recommended that, as there were very few nurses fully trained in the Kenny methods, the federal government should "find ways and means of training one or two nurses in order to be prepared for an epidemic."<sup>90</sup>

In following up on Couture's "glowing report," and recommendations, G.D.W. Cameron, the Federal Director of Health Services, asked Manitoba's Deputy Minister of Health, F.W. Jackson, whether he felt it was worthwhile to take advantage of these scholarships. Cameron was hesitant since many trained nurses were needed "to

<sup>89</sup> Paul Martin, A Very Public Life. Volume II, So Many Worlds (Toronto: Deneau Publishers, 1985), p. 30. The Department, formerly known as the Department of Pensions and National Health, was restuctured in October 1944 with Brooke Claxton, Minister, Dr. Brock Chisholm, Deputy Minister of Health, and Dr. G.F. Davison, Deputy Minister of Welfare; G.D.W. Cameron, "The Department of National Health and Welfare," in R.D. Defries (ed.), The Federal and Provincial Health Services in Canada (Toronto: Canadian Public Health Association, 1956), p. 5; Robert D. Defries, "Canada's Public Health Program," The C.-E.A. Winslow Lecture, Yale University, February 22, 1956, p. 4, Connaught Archives, R.D. Defries Biographical Files.

<sup>90</sup> Memo, E. Couture, Director, Division of Child and Maternal Health, Department of National Health and Welfare, to C.B. Chisholm, Deputy Minister, December 12, 1945, NAC, RG29, Vol. 201, file 311-P11-15. See also Provincial Archives of Manitoba (MA), file H-4-9-2.

make an substantial contribution in the face of an epidemic."<sup>91</sup> Jackson hoped to send some nurses, but an ongoing nursing shortage prevented such plans. He felt that each province should have someone trained in the Kenny method. Based on the experience at Winnipeg's Children's Hospital, those who have had this instruction have done "excellent work."<sup>92</sup>

Jackson's advice left Cameron realizing that if the Federal government sent two nurses, they could do little more than attend to the few patients they could handle. A more significant restraint was that the general attitude of orthopaedic surgeons was that "they wish to do the instructing and have the nurses practice according to their direction."<sup>93</sup> Therefore, a shortage of nurses, and the medical profession's interests in controlling them, prevented Ottawa from getting more actively involved in the polio problem by taking advantage of the Kenny scholarships. However, broader public and political demands for federal involvement in the polio problem accelerated in 1946. They were fueled by a new peak in Canadian polio incidence, the larger philanthropic and voluntary efforts of the NFIP that many hoped to duplicate in Canada, and the need for a stronger commitment to solve the many outstanding research questions surrounding polio. As World War II ended, the federal government was prepared to take a more aggressive stance against polio and involve itself more directly in all of these areas.

<sup>91</sup> Letter, Dr. G.D.W. Cameron, Director of Health Services, Department of National Health and Welfare, to Dr. F.W. Jackson, Manitoba Deputy Minister of Health and Public Welfare, December 28, 1945, NAC, RG29, Vol. 201, file 311-P11-15.

<sup>92</sup> Letter, Jackson to Cameron, January 5, 1946, Ibid.

<sup>93</sup> Memo, Cameron to Couture, January 9, 1946, Ibid..

## 4.3) The Polio Challenge and Rising Federal Interest, 1946-47

The last three years of the War and the relative quiet with respect to epidemic polio were shattered during the polio season of 1946 as Prince Edward Island and Quebec were each hit with their worst polio epidemics ever. For Americans, 1946 was the worst they had experienced since the great epidemic of 1916,<sup>94</sup> and for Canada, the worst since 1937, the bulk of the cases this time coming from Quebec, especially the Montreal area.<sup>95</sup> By 1946 the publicity surrounding Sister Kenny had faded somewhat, leaving the public with little on which to focus their hopes of preventing polio or curing its effects. Encouraged by the interventionist activities deployed by the federal government in Canada's general economic and social fabric during World War II, in the area of health policy generally.<sup>96</sup> and the fight against polio in particular, Ottawa began to fill the void and assume greater responsibility.

In P.E.I, 80 cases were reported in 1946, at a case rate of 85.1, making it "the most severely hit province of our Dominion..."<sup>97</sup> Following on the models developed by their Maritime neighbors, the P.E.I. Department of Health and Welfare established a 20-bed "Treatment Centre for Crippled Children" by the end of the year, which was part of the Provincial Sanatorium set aside for polio treatment. A Halifax orthopaedic

<sup>94 (</sup>Associated Press, Chicago), "Infantile Paralysis Wave in U.S. Worst Since 1916," London Free Press, (Aug. 7, 1946).

 <sup>95 (</sup>Canadian Press), "Polio Increase Likely, Ottawa: Warning Voiced in Commons; 121 Montreal Cases: More At Windsor, Sarnia," London Free Press, (Aug. 9, 1946); (Canadian Press), "Polio Reaches Epidemic Stage," London Free Press, (Aug. 21, 1946); (Canadian Press), "Emergency Polio Session Held As Montreal Outbreak Spreads," London Free Press, (Aug. 22, 1946).

<sup>96</sup> See for example: Robert Bothwell, Ian Drummond and John English, Canada 1900-1945 (Toronto: University of Toronto Press, 1987),p. 349-98; Robert Bothwell, Ian Drummond and John English, Canada Since 1945: Power, Politics, and Provincialism (Toronto: University of Toronto Press, 1981), p. 57-101; C. David Naylor, Private Practice, Public Payment: Canadian Medicine and the Politics of Health Insurance, 1911-1966 (Kingston and Montreal: McGill-Queen's University Press, 1986), p. 95-175.

<sup>97</sup> Letter, H.A. Ansley, Assistant Director of Health Services, Department of National Health and Welfare, to K.S. Landauer, Director of Medical Care, NFIP, July 3, 1947, NAC, RG29, Vol. 210, file 311-P11-17, pt. 1.

specialist was engaged as a consultant since there was "no doctor in this province who specializes in bone treatment."<sup>98</sup>

In Quebec, 1,612 cases (44.4 case rate) and 115 deaths were reported in 1946, which was over half the national total for the year. Montreal was hardest hit with 625 cases and 25 deaths,<sup>99</sup> although the city had suffered more seriously in 1931. Other than a localized outbreak in 1942, since then Montreal, and Quebec generally, recorded low levels of polio incidence prior to 1946 (Tables 1 and 2).

Montreal was well prepared in 1946 with a revised "Programme of Action in the Fight Against Poliomyelitis" that was based on a plan developed in 1942.<sup>100</sup> Adopting a similar strategy as Manitoba in 1941, an 18-member "Committee on Poliomyelitis" was assembled, which was double in size from the first set up in 1942. The committee was made up by members of the Montreal Board of Health, representatives of local hospitals and the provincial epidemiologist. The city's approach to managing this epidemic included epidemiological investigations to establish the focus of the infection, and a strict approach to closing public parks, pools, baths and public gatherings.<sup>101</sup> As had been the case in 1942,<sup>102</sup> there was a serious shortage of nursing and hospital staff and in order to meet the crisis, the city's Health Department dispatched at least 100 nurses to needy hospitals, while the province loaned nursing staff to hospitals.<sup>103</sup> Public education through the media was of particular importance, and as established in 1942, the committee decided that all press information should originate from one source. The "Programme of Action" also stressed the importance of

Prince Edward Island Department of Health and Welfare, Annual Report, 1946-47 (Charlot-tetown: 1947); and Annual Report, 1947-1948 (Charlottetown, 1948), p. 133-34; Letter, A.W. Matheson, P.E.I. Minister of Health and Welfare, to T.J. Bentley, Saskatchewan Minister of Fublic Health, May 19, 1950, SA, R11, file 14-87.

<sup>&</sup>lt;sup>99</sup> Quebec Ministry of Health, Annual Report, 1944, 1945, 1946 (Quebec City, 1947), p. 249.

<sup>100</sup> Montreal Department of Health, Annual Report, 1942 (Montreal, 1943), p. 33-35; D. Parry and M. Flander, "Nursing Aspects of Poliomyelitis," Canadian Nurse, 38 (Oct. 1942): 767.

<sup>101</sup> Montreal Department of Health, Annual Report, 1946 (Montreal, 1947), p. 66, 77-9, 81,

<sup>102</sup> Editorial, "It Took Thirty-three Years," Canadian Nurse, 39 (Aug. 1943): 509.

<sup>103</sup> Montreal Department of Health, Annual Report, 1946, p. 70.

cooperation from the medical profession, nurses and voluntary social agencies, such as the Red Cross.<sup>104</sup> Inspired by the NFIP, the Canadian Legion was particularly active in organizing a special "March of Dimes" campaign. Money was collected which was given to "hospitals, institutions and societies treating or interested in handicapped children, [and] victims of poliomyelitis." This "March of Dimes" organization seemed to be "established on a solid basis with a permanent Committee,"<sup>105</sup> but, as will be discussed in the next chapter, it would not be until 1948 that a nationally based Canadian March of Dimes would be founded.

The policy of the Quebec government in 1942 and 1946 with respect to polio hospitalization differed from most provinces and was based on financial need. In Quebec, poor patients were cared for in hospitals under the Public Assistance Act, that is through general welfare based on a means test. For "middle class patients," local health departments made recommendations to the province to cover the hospital costs on a daily basis and for each treatment. For such cases the province paid its "usual... share of a hospital day," while the family paid the difference. Hospitals could petition the Minister for orthopedic appliances, with the assurance from his Deputy "that these would be favorably received."<sup>106</sup>

The 1946 epidemic brought with it a new urgency for federal action against polio. For example, the Laboratory of Hygiene in Ottawa became the focus of anxious questions from Montreal physicians about how to diagnose polio quickly. In particular they asked how they could determine if individuals were carriers of the poliovirus, and whether there were facilities in Ottawa for this. "Apparently we have not in Montreal." One doctor worried about getting his own children out of the city, "but obviously I cannot send them to visit families in healthy localities unless I can offer

<sup>104</sup> *Ibid.*, p. 80.

<sup>105</sup> *Ibid.*, p. 82.

<sup>106</sup> Montreal Department of Health, Annual Report, 1942, p. 35.

some proof that they are not taking the disease with them."<sup>107</sup> An official of the federal Laboratory offered little help. All he could suggest was if children were in "good health and have had no known contact with Poliomyelitis cases for the past two or three weeks my opinion is that they would not be carriers... However it is imposs-ible to say so definitely." The problem for the Laboratory in trying to test for the poliovirus was that the procedure was time consuming and very expensive, due mainly to the costs of imported monkeys, which were reactive only to certain strains of the virus.<sup>108</sup>

This issue was more explicitly addressed when the editor of the Canadian Medical Association Journal, Dr. H.E. MacDermot, wrote directly to the Laboratory of Hygiene's virologist Dr. James W. Fisher. He asked how the poliovirus was isolated and whether any new methods had been developed other than passing the virus through animals. He also wondered if Ottawa planned any epidemiological investigations of the Montreal epidemic.<sup>109</sup> Fisher had been closely involved with Connaught's initial polio studies that focused on isolating the poliovirus from the human gastrointestinal tract through the use of monkeys. Indeed, until 1947, Fisher was perhaps one of the very few trained virologists in Canada with any direct experience with the poliovirus. Methods of isolating the poliovirus had not changed much since the Flexner era, and held little practical value for polio patients or public health authorities beyond identifying the particular strain responsible for the illness or outbreak. Such methods were time consuming and very expensive, relying on the inoculation of monkeys with nasal washings or stool extracts thought to contain the poliovirus. The monkeys were then observed for typical paralytic symptoms of poliomyelitis and then sacrificed. A polio diagnosis was confirmed by an examina-

<sup>107</sup> Letter, Dr. E.N. Warner, Montreal, to Director, Laboratory of Hygiene, August 14, 1946, NAC, RG29, Accession 83-84/119, Vol. 30, file 355-P-4, part 3.

<sup>108</sup> Letter, J. Gibbard, Assistant Chief, Laboratory of Hygiene, to Warner, August 15, 1946, *Ibid*.

<sup>109</sup> Letter, H.E. MacDermot, Editor, CMAJ, Montreal, to J.W. Fisher, Virologist, Laboratory of Hygiene, September 5, 1946, *Ibirl.*.

tion of the spinal cord. Most problematic, however, was that some strains isolated from human stool extracts were nonparalytic to monk ys, requiring further passages in order to isolate paralytic types. This process was "for the most part a qualitative procedure rather than a quantitative one," and made working with the poliovirus extremely difficult; a situation exacerbated in Canada by a lack of proper laboratory facilities and trained personnel.<sup>110</sup>

The 1946 polio epidemic also struck in another significant and personal way for the federal government. Windsor, Ontario, had a polio outbreak that year and in August the disease struck the eight-year-old son of the soon-to-be Minister of the Department of National Health and Welfare, Paul Martin. He was the Secretary of State at the time and while attending a Cabinet meeting he received a phone call from his wife, Eleanor (Nell). She "was beside herself." "Come home, come home, our son has polio," she said. Mrs. Martin later recalled that she was "the one mother that washed every bit of fruit that came into this house, and our son of all the youngsters [he] played with, he's the one who got the polio!"<sup>111</sup> In 1907, Martin himself once suffered from an attack of what many, including himself, felt was polio, but at a time before polio was a notifiable disease there is some question about this diagnosis. When he got the phone call, "At that instant, I knew just how my parents must have felt when I was taken ill as a boy." Prime Minister St. Laurent would not let Martin stay for the rest of the meeting, and C.D. Howe "insisted that I go immediately and promised a government plane for the trip -a scarce and carefully husbanded resource in those days." Martin arrived in Windsor to find his son, Paul Jr., in an isolation ward, "paralyzed in the throat and unable to speak... Mercifully, the crisis passed fairly quickly and Paul began to mend, even though it took almost a year before he recovered fully."

<sup>110</sup> Letter, Fisher to MacDermot, September 6, 1946, Ibid..

<sup>&</sup>lt;sup>111</sup> Interview with Mrs Nell Martin, September 21, 1993 for CBC Prime Time News Documentary, "Conquering the Crippler," broadcast December 7, 1993.

This experience was significant personally to Martin and to the federal government's subsequent polio program. It forced him to consider how medical science had progressed since when he was struck, like his son, with paralysis; "but, as in my youth, I knew that advanced treatment was still not available to all, even though over forty years had elapsed since I had contracted spinal meningitis." Martin's polio experience "would dictate the goals" that he would strive for when he assumed his new responsibilities as Minister of National Health and Welfare on December 12, 1946. Echoing a key question asked by Ontario's Minister of Health after the 1937 epidemic, the idea that the "benefits of medical science should be made universally accessible," would remain a major goal for Martin during his eleven years as Minister of Health.<sup>112</sup> Martin's personal experience with polio thus helped bring new energy and sense of purpose to his Department in dealing with this disease, and acted as a catalyst towards attaining his larger goal of universal health insurance for all Canadians.

In the wake of the 1946 epidemic, and with a new Minister as well as a new Deputy Minister of Health, Dr. G.D.W. Cameron, who was promoted on July 24, 1946, the Department of National Health and Welfare focused on the polio challenge more comprehensively. In March 1947, Fisher prepared a detailed report on the diagnosis of polio, in which he outlined the two possible methods that were available, either through isolating the virus, or through analyzing blood serum.<sup>113</sup> Even though Fisher seemed confident that the Laboratory could develop these methods, the fact remained that he was "at present the only trained person in the Virus Section and only a few selected projects can be attempted under present conditions."<sup>114</sup>

<sup>H.J. Kirby, "How far does the responsibility of the Provincial Department of Health go in the Treatment of Disease?" Paper presented at Meeting, Dominion Council of Health, December 6-7, 1938, AO, RG10-106, file 119.8; Paul Martin, A Very Public Life: Volume I, Far From Home, (Ottawa: Deneau Publishers, 1983), p. 459-60; Martin, A Very Public Life, II, p. 27.</sup> 

J.W. Fisher, Report: "Diagnosis of Poliomyelitis," March 13, 1947, NAC, RG29, Accession 83-84/119, Vol. 30, file 355-P-4, part 3.

<sup>&</sup>lt;sup>114</sup> Memo, R.J. Gibbons, Chief, Laboratory of Hygiene, to Ansley, March 15, 1947, Ibid..
Ottawa's polio program was initially focused on preparing for the 1947 polio season, and involved the cooperation of the NFIP. During the severe U.S. epidemic of 1946, the NFIP supported the deployment of "Polio Emergency Volunteers" (P.E.Vs.), community groups recruited through local chapters of the NFIP and women's organizations. With an impending epidemic, these volunteers were trained to assist nurses and help with the home care of polio cases. Ottawa was informed of these "P.E.Vs." through a series of articles on polio in the Montreal Gazette in late May 1947. Based on the large package of material subsequently received from the NFIP,<sup>115</sup> it was clear to Martin's Department that 'we have nothing corresponding to the National Foundation for Polio, and the control of the disease and its sequela is largely a matter of provincial concern." The federal role was limited to providing vital statistics and public health information. Officials in the Department, however, recognized after the 1946 epidemics "how valuable some form of voluntary training could have been in assisting families in which polio occurred, as well as the local government." The NFIP package was then studied by a Departmental committee in order "to see how [the P.E.V. program] could be fitted into the Canadian scheme of things."<sup>116</sup>

There was considerable support for the P.E.Vs. idea, which could be coordinated, with some federal funding, with a variety of voluntary organizations, including the Red Cross, the Health League of Canada, St. John Ambulance Brigades, Crippled Children's Societies and various service clubs. The Department would have to deal directly with these voluntary organizations, rather than with local health authorities indirectly. However, experience had shown that cooperation between various volunteer organizations was difficult since each strove for major recognition. Thus,

<sup>See, Letters: H.C. Plummer, Montreal Gazette, to Manitoba Minister of Health, April 4, 1947, MA, G157, B43, H-4-9-2; Plummer to C.W. Gilchrist, Director, Information Services, Department of National Health and Welfare, June 30, 1947, NAC, RG29, Vol. 201, file 311-P11-17, part 1; E. Whitelaw, Director, Women's Activities, NFIP, New York, to Gilchrist, July 1, 1947, NAC, RG29, Vol. 202, file 311-P11-17, part 2; Landauer to Ansley, June 28, 1947; Ansley to Landauer, July 3, 1947, NAC, RG29, Vol. 201, file 311-211-17, part 1.</sup> 

<sup>116</sup> Letter, Ansley to Landauer, July 3, 1947, NAC, RG29, Vol. 20 file 311-P11-17, part 1.

"a strong guiding hand in such a cooperative plan should be the prerogative of this Department."<sup>117</sup> As Cameron stressed to Martin in a comprehensive memo on the federal polio program, "The Federal role at the moment would appear to be similar to our role in initiating the National Cancer Institute." Martin had played a leading role in its founding earlier in the year in close cooperation with the Canadian Medical Association and the Canadian Cancer Society. But it was obvious to Cameron that it was impossible for Gttawa to assume the role of the NFIP, which was .nade up of local chapters. This role could be filled by one of the larger voluntary organizations. The provinces would, nevertheless have to support such a program. Federal money would also be needed to support the voluntary agency that assumed the role of the NFIP.<sup>118</sup> This was a challenging issue in Canada, as became clear with the founding of just such a Canadian counterpart of the NFIP a year later.

Cameron's memo to Martin in July 1947 marked the beginning of an accelerated federal interest in the polic problem that would increase over the next decade. Martin closely watched how his Department dealt with polio and Cameron kept him well informed. He had recently inspected the Laboratory of Hygiene. and Cameron's memo was designed as a "draft proposal outlining work being proceeded with and work contemplated." Such work included the preparation of a popular pamphlet, entitled "Polio Facts." The Laboratory of Hygiene's Virus Section was anxious to commence a study of the poliovirus, but Cameron highlighted how limited they were

118 Memo, "Re: Polio Program of the Department of National Heaith and Welfare," Cameron to Martin, July 10, 1947, Ibid.. The National Cancer Institute of Canada was founded in early 1947 after Martin was directly approached by Dr. William Boyd, Professor of <sup>p</sup>athology at the University of Toronto, asking if Ottawa would lead a national campaign against cancer. Martin needed to develop a close relationship with the medical profession if his plans for national health insurance were to fly, and in association with the Canadian Medical Association and the Canadian Cancer Society, Martin was able to devote \$450,000 from the "King George V Silver Jubilee Cancer Fund of Canada." of which the Prime Minister, Leader of the Opposition and the Federal Chief Justice were the trustees. For Martin this was a major step in building political support withir. a fiscally conservative abinet for expanded federal involvement in health care. Polio was another; Martin, A Very Public Life, II, p. 36-38.

<sup>&</sup>lt;sup>117</sup> Memo, D.V. Hutton, Pediatric Specialist, Division of Child and Maternal Health, to Ansley, July 7, 1947, *Ibid.*.

in trained staff. An enlarged staff was necessary, but qualified people were difficult to find. The Laboratory had to turn to Connaught, or even American labs, to help with recruitment and specialized training. Under these conditions, "practically no field work" was possible by the Department by the fall of 1947, although Martin was in a position to state publicly that his Department "has laboratory work in progress..., it has people away training for polio work, and it is expanding the virus section of the Laboratory of Hygiene for this purpose."<sup>119</sup>

Thus, as the 1947 polio season began, Canadians found Ottawa far more prepared to deal with the ravages of this disease than it had been even two years earlier. This had been fuelled by the Kenny revolution, an expansion of provincial polio services, the high profile efforts of the NFIP, and a major epidc:nic in 1946. The foundation of a national polio policy had developed. Within a context of growing federal interest in health generally, as the provinces had began to feel two decades earlier, the capticious threat of epidemic polio now forced Ottawa to demonstrate that it too was willing to join the fight. In 1948, the emergence of the Canadian Foundation of Poliomyelitis reinforced and complicated the expanding efforts of the federal *p*<sub>-1</sub>d provincial governments against polio. How and why did the CFP generate both effects? The popular and political role of polio volunteers generally, and the CFP specifically, and its relationship to the phenomenally successful NFIP, is the focus of the next chapter.

<sup>119</sup> Memo, Cameron to Martin, July 10, 1947, NAC, RG29, Vol. 201, file 311-P11-17, part 1.

## CHAPTER 5:

Polio Volunteers and the State, 1945-1952: The Canadian Foundation for Poliomyelitis and the Politics of the "March of Dimes"

The emergence of the National Foundation for Infantile Paralysis in 1938 and its highly publicized "March of Dimes" campai<sub>e</sub>ns in the United States through the 1940s and early 1950s had a significant impact in Canada. The unprecedented fundraising success of the NFIP, its unrestricted financial assistance to polio victims, and its high level of polio research funding, all had important ramifications north of the border. The expanding involvement of provincial governments in providing hospitalization, treatment and medical services was reinforced by the remarkably high public and media profile of the NFIP and its aggressive efforts against this disease in the U.S. Ironically, such efforts effectively limited the development of significant American state or federal government polio patient support policies.

The NFIP piayed a major, though often controversial role, in inspiring Canadian individuals, communities, and especially local and national voluntary organizations to do something against the ravages of polio. This was most evident in 1948 when an independent Canadian counterpart to the NFIP was establisheen the Canadian Foundation for Poliomyelitis (CFP). The CFP tried to duplicate the NFIP's organizational structure and fundraising strategies, most notably the "March of Dimes" campaigns, that had proven so successful in the U.S. Before examining the CFP, however, the development of the NFIP must first be understood. What was its structure and its fundraising strategy, and why was this voluntary health organization far more successful than any other? The success of the NFIP had as much to do with the particular nature and broadly felt middle class threat of epidemic polio, as it did with Foundation's unique organizational structure and fundraising strategy.

Between 1948 and 1951 the CFP became the lightning rod of growing controversy from other Canadian voluntary health agencies, the medical profession, and

the federal and some provincial governments. To varying degrees, they questioned the basic need for a centralized national organization in Canada devoted to a single disease and wondered what its role would be in dealing with polio in light of existing government programs and substantial American research efforts. The CFP, with its high fundraising potential, was viewed by its competitors, somewhat jealously, as yet another voluntary health agency asking for money from the already depleted pocketbooks of the public.

Underlying such questions was a feeling among many in the medical profession that too much public attention was being given to polio relative to its actual importance as a public health threat and cause of death. Such concerns reflected a desire to downplay public fears of an unpredictable, deadly and debilitating disease over which doctors had little or no control. The medical profession also had little control over the CFP, which, following the NFIP model, was inspired and led by laymen. This was in sharp contrast to the establishment of most other such organizations, particularly another national voluntary organization dedicated to a single disease founded a decade earlier. The Canadian Society for the Control of Cancer originated through the efforts of the Canadian Medical Association and the federal government and was more closely modeled after the British Empire Cancer Fund than its American counterpart, founded in 1912 by a wealthy philanthropist.<sup>1</sup> By 1951, the

The Canadian Society for the Control of Cancer was initially financed by the "King George V Silver Jubilee Cancer Fund for Canada," which was established in 1935 by the Governor-General, Lord Bessborough. In 1937, after earlier attempts to organize against cancer failed for lack of funding, the CMA arranged with the Trustees of this fund, the Prime Minister and other government leaders, to give the interest from it to the CMA in order to set up a Department of Cancer Control, and organize the Canadian Cancer Society, which would be open to lay membership. See, for example, "Report of the Study Committee on Cancer, Canadian Medical Association," CMAJ, 37 (Sept. 1937, suppl.): 24-43; The Cancer Campaign, "Canadian Society for the Control of Cancer," CMAJ, 41 (July 1939): 82-3. See also Barbara Natalie Clow, "The Problem of Cancer: Negotiating Disease in Ontario, 1925-1945," Ph.D. Thesis, University of Toronto, 1994, p. 273-80.

On the American Society for the Control of Cancer (American Cancer Society), see James T. Patterson, *The Dread Disease: Cancer and Modern American Culture* (Cambridge, Mass.: Harvard University Press, 1987), p. 71-76; Richard Carter, *The Gentle Legions* (New York City: Doubleday & Co. Ltd., 1961), p. 139-72.

controversy surrounding the CFP sharply focused the broader apprehensions that had developed among Canadian governments and the medical profession about the proliferation of voluntary health groups and what precise role they should play in the management of health care in Canada.

Following a survey of the rise and success of the NFIP, this chapter briefly highlights the period before the establishment of the CFP. What was the role of voluntary health organizations with respect to polio? What was the relationship between such groups and the federal government, and what was the influence of the NFIP? How did the presence of the CFP change, and even threaten, this situation? In turn, how did the controversy change the structure of CFP, its relationship with Canadian governments, and the services they each provided to polio patients?

5.1) Polio Volunteers and the March of the NFIP, 1938-1948

The National Foundation for Infantile Paralysis (NFIP) "stood beyond all challenge as the most successful voluntary health organization on earth." Between 1938 and 1959 the NFIP raised a total of \$622 million and spent \$315 million on medical, hospital, nursing and rehabilitative care for some 325,000 polio sufferers in the United States. During that period it also spent \$55 million on polio research and \$33 million on fellowships, scholarships and other types of national educational assistance to medical students, physicians, researchers, physical therapists, nurses and medical social workers.<sup>2</sup> Ar authoritative American study of Voluntary Health Agencies in 1944-45, known as the "Gunn-Platt Report," called the "extraordinary growth of the March of Dimes... one of the wonders of American philanthropy."<sup>3</sup> In the subsequent decade such wonders grew considerably. How did this happen and how did the NFIP differ from other voluntary health agencies? Was this success based more on

<sup>2</sup> Carter, "The Polio Triumpu" chapter in his *The Gentle Legions*, p. 91, 95-96.

<sup>&</sup>lt;sup>3</sup> Selskar M. Gunn and Philip S. Platt, Voluntary Health Agencies: An Interpretive Study (New York City: The Ronald Press Co., 1945), p. 214.

the unique structure of the NFIP, or attributable more to the frightening image and widespread threat of polio? The dynamics between both factors were essential, as were the circumstances surrounding the Foundation's birth, its founders, and its initial organization.

The fundamental structure of the NFIP was corporate, with a strong central administration, coupled with 3,100 autonomous local chapters based in towns, cities and counties across America. Unlike most other national voluntary health organizations in the U.S., there were no federated state or regional divisions, and no middlemen. The national office in New York City was where all policy was decided, where close to half of all "March of Dimes" funds were kept for institutional, emergency and research support, and from where all research grants were assessed and disbursed. Of primary importance was a sharp division between the ongoing activities of a relatively small number of dedicated chapter volunteers devoted to local patient care services, and the large numbers of volunteers involved with organizing and conducting the annual March of Dimes fundraising campaigns that climaxed each January 30, President Roosevelt's birthday. Directing such an organization was NFIP President, Basil O'Connor, who was not afraid of the hard sell because "he knows it gets results and he regards results as a sacred duty."<sup>4</sup> O'Connor had an unbeatable combination based on the emotional appeal of the kid in the wheelchair, the sponsorship of FDR, the disease everyone was afraid of, and volunteers -- "those polio parents, Democrats, bleeding hearts, busy bodies, and do-gooders who swarmed over the country like locusts every time he ran a campaign."5

The extraordinary ability of the NFIP to attract and hold the interest of middle class and public-spirited volunteers was essential to its success. This was reinforced, particularly at the local chapter level, by a strict division between lay volunteers and

<sup>4</sup> Carter, The Gentle Leg. ns, p. 104.

<sup>5</sup> Ibid., p. 97. On the history and structure of the NFIP, the most substantial, albeit sociological, study is David L. Sills, The Volunteers: Means and Ends in a National Organization (Glencoe, Ill.: The Free Press, 1957).

the medical profession. The former were in control of, and responsible for, all aspects of the NFIP's local patient assistance and fundraising activities, while the latter served the Foundation in a strictly advisory capacity at the local and national levels. Indeed, physicians and public health officers were specifically barred from the position of chapter chairman and direct involvement in Foundation activities.<sup>6</sup> Despite the enormous financial support the NFIP devoted to polio research, for most of the volunteers who raised and spent the bulk of the "March of Dimes" money, and for the public who donated it, the *raison d'être* of the NFIP was to financially assist polio victims. The critical factor was that money raised locally was spent and controlled locally to assist polio patients in that community. This program was perceived by NFIP volunteers and the public not as a charity effort for the less fortunate, but a visible and pragmatic community service, with the "March of Dimes" offering "the chance to buy the cheapest paid-up insurance policy you can get -- only a dime."<sup>7</sup>

The tendency of polio to strike predominantly middle class families unpredictably and visibly was a powerful motivator for middle class parents to become active Foundation volunteers, and for the majority of the public, even children, to donate something, if only a dime, to the annual March of Dimes campaigns. This provided a gratifying opportunity for volunteers and the public alike to do something practical to protect their families, neighbours, and themselves, against the threat and effects of polio in a manner, the fruits of which were clearly visible in the community.<sup>8</sup> Thus, the particular structure and success of the NFIP was reinforced by the unique threat of polio and the chance the Foundation gave the American public to do something pragmatic about it.

The creation of the NFIP and the form it eventually took was by no means intentional. It was the product of key individuals, most notably FDR and O'Connor,

<sup>6</sup> Sills, *Ibid.*, p. 48-50.

<sup>&</sup>lt;sup>7</sup> *Ibid.*, p. 170.

<sup>8</sup> *Ibid.*, p. 165-73.

and grew out of an effort to endow the Georgia Warm Springs Foundation, which Roosevelt strongly felt helped himself and could help other polio patients. In August 1921, at age 39, while vacationing on an island between Maine and New Brunswick, Roosevelt suddenly fell victim to polio and was left paralyzed from the waist down. Warm Springs had criginally been a resort and possessed warm spring water that FDR heard seemed to help polio sufferers who swam in it. The buoyancy of warm waters allowed for long periods of  $e_{XP} = iA \frac{1}{2} \frac{1}{2}$ 

Newspaper accounts of FDR's initial stay at Warm Springs in October 1924 attracted a number of other polio patients. The poor repair of the facilities, however, made it unsuitable for growing numbers of unsolicited polio cases, whom FDR felt responsible for. Encouraged by his own real or imagined progress, in 1926 he decided to buy the resort and transform it into a polio treatment centre. Next to winning the Presidency Warm Springs became the second greatest commitment of his career.<sup>9</sup> However, this would not be enough to upgrade and maintain Warm Springs for very long. With the reluctant assistance of his law partner, Basil O'Connor, FDR set up the Georgia Warm Springs Foundation in 1927 using his own money and that of some friends. However, the Depression made large gifts increasingly difficult to secure and by 1932, the Foundation, like most of America, was bankrupt.<sup>10</sup>

Much as Americans had placed hopes in FDR to get the country out of the Depression when they elected him President in November 1932, hopes in Warm Springs

<sup>9</sup> Richard T. Goldberg, The Making of Franklin D. Roosevelt: Triumph Over Disability (Cambridge, Mass.: Abt Books, 1981), p. 73-91. On FDR's polio see also, for example: Hugh G. Gallagher, FDR's Splendid Deception (New York City: Dodd, Mead & Co., 1985); Jean Gould, A Good Fight: The Story of F.D.R.'s Conquest of Polio (New York City: Dodd, Mead & Co., 1960). Warm Springs was FDR's largest ever investment, over \$200,000, which consumed over a third of his personal fortune.

<sup>10</sup> Sills, The Volunteers, p. 42; Goldberg, Ibid., p. 133-42.

were also reborn with a shift to a mass fund-raising campaign in 1933. A Georgia campaign netted 60,000 gifts, from a dime to \$500, and this success prompted a national campaign to ensure the support of Warm Springs and give hope to polio victims nationally. Influenced by an oil tycoon friend and FDR's public relations man, the idea of dances was concocted to celebrate the President's birthday and raise money for Warm Springs. A specific, annual event was needed and on January 30, 1934, the first President's Birthday Ball was held amidst a wave of newspaper and radio publicity, asking Americans to "dance so that others may walk." To the amazement of O'Connor and FDR, \$1,016,444 was raised after all expenses were paid.<sup>11</sup>

A group of postmasters across the country, who had just been appointed by FDR after a decade of Republican rule, were instrumental in organizing the almost 6,000 separate local celebrations. The new postmasters represented a close link between polio fundraising and the Democratic party, although during the heyday of public support for FDR's Presideacy, many Republicans also joined the polio campaign.<sup>12</sup> As became the pattern for NFIP volunteers and chapter leaders, the postmasters brought with them the involvement of a broad range of businessmen, professionals and individuals associated more with *civic* than *social* prominence. These were the "functioning," "Main Street" and middle class segment of the community, as opposed to the socially prominent ranks. This set the NFIP apart from other health and welfare organizations.<sup>13</sup> Doctors, prominent upper class philanthropists, leading citizens and politicians characterized the leadership and organization of most voluntary health organizations in America and Canada. The establishment of the Canadian Society for the Control of Cancer, founded in 1938, largely through the top-

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<sup>11</sup> Carter, The Gentle Legions, p. 106-08; Sills, Ibid., p. 43.

<sup>12</sup> Carter, Ibid, p. 107; Sills, Ibid.

<sup>13</sup> Sills, *Ibid.* p. 47.

down efforts of the Canadian Medical Association, was the most recent and prominent example of such national health organizations in Canada.<sup>14</sup>

Between 1934 and 1937 these "Balls" raised a total of \$3,362,000. Local Birthday Ball Committees retained 70% of the proceeds, while the remaining 30%, or \$241,000, went to a research committee, much of which was directed towards the ill-fated Brodie and Kolmer polio vaccines. This overwhelming fundraising success led to the dilemma of what to do with the money. The local committees decided to use the money to assist rolio victims financially. This was a revolutionary program that emerged accidentally because of a "too successful" fund-raising idea.<sup>15</sup> There was also the question of how to ensure future funding in light of FDR's faltering political fortunes.

A new and broader direction emerged in the fall of 1937 with the creation of the National Foundation for Infantile Paraly is, which Roosevelt stressed was designed "to lead, direct, and unify the fight on every phase of this sickness." To many, the NFIP represented "a fairly large experiment in socialized medicine," which some feared as its entering wedge, since the Foundation paid doctor and hospital bills for a few with the money of millions. Others saw the foundation as a barrier to socialized medicine and a triumph of private initiative.<sup>16</sup> As Richard Carter stresses in his 1961 survey of American voluntary health organizations, "Ideological pino-pong of this kind" typified controversy about the foundation. Moreover, he argues,

The truth is that the National Foundation has no interest in socialized medicine but, nevertheless, is social dynamite with a shorter fuse than many had realized. It is unwaveringly "social" in substance and in form, existing for no purpose other than to provide the people of the United

<sup>14</sup> Ibid.; Carter, The Gentle Legions; Gunn and Platt, Voluntary Health Agencies, p. 17-26, 173-75; Richard H. Shryock, National Tuberculosis Association, 1904-1954: A Study of the Voluntary Health Movement in the United States (New York City: Arno Press, 1957) (Public Health in America series) (New York City: Arno Press, 1977); Health League of Canada, National Voluntary Health Associations in Canada (Toronto: Health League of Canada, 1956); Elizabeth S.L. Govan, Voluntary Health Organizations in Canada (Canada, Royal Commission on Health Services) (Ottawa: Queen's Printer, 1966).

<sup>15</sup> Saul Benison, "The History of Polio Research in the United States: Appraisal and Lessons," in G. Holton (ed.), The Twentieth Century Sciences: Studies in the Biography of Ideas (New York City: W.W. Norton & Co., Inc., 1970, 197\_), p. 321; Sills, The Volunteers, p. 44.

<sup>16</sup> Carter, The Gentle Legions, p. 110.

States with apparatus for frontal assault on medical problems that conservatives neglect to solve and radicals are unable to reach. Almost by definition, the foundation is at war with the past. To the degree that the foundation influence spreads, it becomes an increasing threat to sponsors of obsolescence both in and out of the health field.<sup>17</sup>

The NFIP began operations in O'Connor's law office in New York City in January 1938 and its first "March of Dimes" campaign, christened as such by celebrity Eddie Cantor, "was without precedent as a promotional raid on the mind, heart, and pocketbook of the United States." It set a pattern for even larger campaigns that were later imitated by a new crop of health agencies that sprang up all across North America. Instrumental were "advertising geniuses, public relations manipulators, and experts in the mysteries of every trade and profession." Hollywood movie stars went on the radio to appeal for dimes. Hundreds of thousands of dollars in donated advertising appeared in hundreds of magazines. Walt Disney and Warner Bros. each produced special cartcons. Matchbooks, billboards and campaign buttons pleaded the cause. Doctors were persuaded to talk about polio on the radio and in the popular press. This involvement of the medical profession with the NFIP and the media helped establish valuable medical credentials for the new foundation, which were lacking in the old birthday-ball organization. Special NFIP councils were set up to involve public health officers, orthopedic specialists, motion picture producers, trade and industry, radio stations, labour, women, hotels, sports writers, fraternities and educators. In the end the first campaign collected \$1,823,045.46.18

The initial plan was to keep all the money in the national office. By the end of 1938, however, pressure from local fundraising committees forced O'Connor to settle on a 50-50 split on receipts between the national office and local Chapters. These Chapters were initially set up by the Chairman of the Birthday Ball Committees and were assigned responsibility for the patient care program. The Committees themselves evolved into the separate March of Dimes organizations and fund-raising units of

<sup>&</sup>lt;sup>17</sup> *Ibid.*, p. 110-11.

<sup>18</sup> *Ibid.*, p. 111-12.

the NFIP. The structure and distinction between chapter and March of Dimes organizations was not planned, "but developed as unanticipated consequences of decisions made in order to solve pressing problems."<sup>19</sup> This structure also enabled the Foundation to build huge central reserves that could be immediately spent where needed during epidemic emergencies. The national office had firm control, and with such substantial sums of money available, was able to push forward all aspects of its polio program aggressively.<sup>20</sup>

While the spectacular success of the NFIP was based on polio's inherently noncontroversial nature and widespread public interest, nevertheless, controversy soon emerged from certain interests. Warm Springs became overwhelmed by hopeful polio victims looking for a cure. Orthopaedic surgeons and physicians were upset with all the hopeful publicity about a disease that was so hard for them to cope with.<sup>21</sup> Many could not forgive the NFIP for raising more money every year than went to fight the most widespread health problems such as cancer, heart disease or mental illness. As Carter argues, "The foundation's very success exposes its altruism to doubt. Its pre-eminent use of the common touch is condemned as dirty pool; its leaders are suspected of disfiguring scientific reality for fund-raising purposes."<sup>22</sup> The 1945 Gunn-Platt Report highlighted many of the concerns generated by these proliferating organizations, with the NFIP the target of particular worry. There was a serious imbalance between the amount being raised among a small number of agencies relative to the seriousness of the health threat. The polio threat was not worthy of all the money it generated, much of which accumulated and was left unspent by the Foundation. The report suggested that the fruits of the NFIP's, along

22 Ibid., p. 93.

<sup>19</sup> Sills, *The Volunteers*, p. 46.

<sup>20</sup> Carter, The Gentle Legions, p. 113.

<sup>21</sup> *Ibid.*, p. 108-09.

with other well-financed efforts, should be spread to other diseases.<sup>23</sup> North of the border, similar concerns emerged a few years later after the founding of the Canadian Foundation for Poliomyelitis.

From the Canadian perspective, and in light of the discussion of the previous chapters, the involvement of U.S. state or federal governments was notably absent from the American polio story and the evolution of the NFIP. While the symbol and prominence of President Roosevelt was fundamental to the origin and early evolution of the NFIP, this did little to stimulate American governments to provide special services to polio victims. The emergence and rapid growth of the NFIP effectively, and quite intentionally, precluded the substantial involvement of American governments in the polio problem. In Canada, the opposite happened.

As has been shown, polio services began in many provinces before the founding of the NFIP and their expansion was fuelled in part by the NFIP's high public profile across North America. Significant Canadian voluntary efforts were limited by the growing provincial programs, and only became prominent with the end of World War II, and coincided with the death of FDR in April 1945 and the tenth anniversary of the NFIP's founding in 1948. With varying degrees of success, each of these events inspired concerted efforts to establish national voluntary organizations to fight polio in Canada. In each case the success, or lack thereof, was largely determined by the attitude and actions of the provincial and federal governments.

<sup>&</sup>lt;sup>23</sup> Gunn and Platt, Voluntary Health Agencies, p. 214-20; Shryock, National Tuberculosis Association, 1904-1954: A Study of the Voluntary Health Movement in the United States, p. 269-72.

## 5.2) Polio and Canadian Voluntary Organizations to 1948

Before the founding of the NFIP, the involvement of Canadian voluntary health organizations with the polio problem was relatively limited and was spread among a number of agencies and local service clubs. They provided charitable help to poor families, particularly with braces, crutches and other appliances, wheelchairs and the costs of transportation, housekeeping and the services of rehabilitation hospitals. Organizations with a particular interest in helping polio cases, and crippled children generally, included the Rotary, Kiwanis, and Shriner's Clubs, which were based at the local level. In particular, Shriner's Hospitals treated many local and out-ofprovince polio cases.<sup>24</sup> Also involved were the Canadian Red Cross and Junior Red Cross agencies, which had Crippled Children's Funds and set up charity hospitals.<sup>25</sup> On the provincial level, the Ontario, as well as Quebec Societies for Crippled Children devoted considerable energies to assisting polio cases, the former making a major contribution to the management of the 1937 Ontario epidemic. Encouraged by this effort, the leadership of the OSCC established the Canadian Council for Crippled Children, which received a federal charter in 1938. It later became known as the Easter Seals Society.<sup>26</sup>

As helpful as these groups were, as one survivor of polio from 1928 succinctly put it, "To be assisted by them you had to consent to publicity of the tear jerking 'poor child' sort that was absolutely nauseating."<sup>27</sup> This was an element notably

George S. (1930, age 7, Dane, Ont.), May 1993; Jean D. S. (1937, age 6, Moncton, NB), May 1993; Patricia M.C. T. (1938, age 8, Restigouche County, NB), June 1993.

Frances M. D. (1927, age 2, Calgary, Alb.), October 1993. See also Jean Macnamara, "The Treatment of the Paralyses of Poliomyelitis: Part II, Some Organizations to Provide This Care," CPHJ, 23 (Nov. 1932): 536-43; Report, "Poliomyelitis in Canada: Presentation to the First International Poliomyelitis Conference, July 12-17,1948," NAC, RG29, Vol. 194, file 311-P11-3, part 1.

<sup>&</sup>lt;sup>26</sup> Memo, E. Couture, Directcr, Division of Child and Maternal Hygiene, Department of Pensions and National Health, to G.B. Chisholm, Deputy Minister of Health, Department of Pensions and National Health, April 27, 1945, NAC, RG29, Vol. 201, file 311-P11-11; Health League of Canada, National Voluntary Health Associations in Canada, p. 16-18.

<sup>27</sup> Margaret M. C. (1928, age 7, Niagara Falls, Ont.), May 1993.

missing from the NFIP's assistance strategy, as well as that of most provincial polio policies. Reflecting the broad middle class threat posed by epidemic polio, financial assistance offered by local chapters of the NFIP was broader and more flexible than that of state agencies, and had no established eligibility criteria. It also went beyond just paying medical bills. According to the NFIP's Chapter guide:

We are not dispensing charity in any sense of the word. While we expect a family to do what it reasonably can financially, we do not insist that it prove itself totally indigent to obtain needed care. If it is evident that the high cost of polio care would result in undue hardship, force a family to sell a car th  $\dot{t}$  it needs, mortgage its home or otherwise drastically lower its standard of living, the Chapter should offer to pay for all or that portion of the cost that cannot be reasonably met by the family.<sup>28</sup>

This was similar to the attitude increasingly taken by most provincial governments through the 1940s and early 1950s. How then did voluntary health organizations in Canada fit into this kind of policy?

A significant deterrent for most Canadian voluntary agencies against expanding into polio or other health services during the early 1940s was their involvement in the war effort. This was a particular problem for the Canadian Society for the Control of Cancer, particularly as it only began just before the start of the war.<sup>29</sup> By late 1944, however, as World War II wound down, the Kinsmen Clubs of Canada, especially in British Columbia, recognized that their "Milk for Britain Fund," which began while bombs were falling on Britain, was losing its broad appeal to the Canadian public and their national office should consider a successor appeal. It is significant to note that the voluntary spirit in British Columbia was especially strong, despite the war, as was demonstrated by the rapid rise and success of the B.C. Cancer Foundation between 1935 and 1941 and its leadership in setting up a Cancer Institute in Vancou-

<sup>28</sup> Sills, *The Volunteers*, p. 134. Local NFIP Chapters also paid for nursing care, physical therapy, appliances, surgery, transportation, foster home care, and psychiatric and psychological services.

<sup>29 &</sup>quot;Report of the Department of Cancer Control, Canadian Medical Association," CMAJ, 45 (Sept. 1941, suppl.): 7-9; Clow, "The Problem of Cancer: Negotiationg Disease in Ontario, 1925-1945," p. 273-74.

ver with little assistance from the provincial government.<sup>30</sup> The Kinsmen milk fund was such an "unqualified success" because its message touched every Canadian man, woman and child, and was "equally popular in large ard small clubs, from Prince Edward Island to British Columbia." The Vancouver Kinsmen felt that a "Prevention and Treatment of Poliomyelitis" project would generate a similarly strong national and "universal appeal throughout all classes in Canada," since there was "universal fright by all parents of the danger of this terrible disease." Medical science had made some progress, but, unfortunately, Canadians were not in a position to keep abreast for want of a national polio policy. According to the Kinsmen, there was, "At present, no adequate attempt to meet the enemy... anywhere in Canada."<sup>31</sup>

The Vancouver Kinsmen were inspired to select polio as their postwar project by the example of the NFIP, upon which Canadians looked "with envy."<sup>32</sup> In Canada the gap between polio knowledge and polio practice, which the NFIP worked to fill, was "tremendous," according to Dr. Alice McDonald, the Sister Kenny doctor at Vancouver General Hospital. There was an urgent need for an organization to push for further research work to prevent polio, "which at present is woefully lacking."<sup>33</sup> Another primary need was to train additional Kenny physiotherapists. Scholarships should be offered for both young men and women since, "An adult male polio patient, if rendered helpless by the disease, is almost beyond the strength of a young woman to handle."<sup>34</sup>

In late January 1945, a detailed "Brief on the Prevention and Treatment of Poliomyelitis" prepared by the Vancouver Kinsmen was sent to the Deputy Minister

<sup>&</sup>lt;sup>30</sup> The Cancer Campaign, "The British Columbia Cancer Institute," *CMAJ*, 42 (Jan. 1940): 87: "Report of the Department of Cancer Control, CMA," *CMAJ*, 45 (Sept. 1941, suppl.): 8.

<sup>31</sup> Kinsmen Club of Vancouver, "Brief on the 'Prevention and Treatment of Poliomyelitis:' Need for the Project Herein Suggested," January 19, 1945, p. 1-3, NAC, RG29, Vol. 201, file 311-P11-15.

<sup>32</sup> A.J. McDonald, "The Problem of Poliomyelitis," in *Ibid.*, p. 11.

<sup>&</sup>lt;sup>33</sup> "Brief on the Subject of Poliomyelitis," in *Ibid.*, p. 3.

<sup>34</sup> McDonald, "The Problem of Poliomyelitis," in Ibid., p. 10.

of National Health, Dr. Brock Chisholm, for his opinion.<sup>35</sup> By this time, the federal government had developed a draft Health Insurance Bill. After a long process of meetings, drafts and debates that began in 1942, the final version of this bill was ready in July 1944.<sup>36</sup> Chisholm stressed in his reply to the Kinsmen that the bill proposed to grant to the provinces \$500,000 a year "for the prevention and treatment of crippling conditions in children, which, if put into effect, will no doubt be very helpful in the prevention and treatment of poliomyelitis...." Otherwise, Chisholm was not overly enthusiastic about the Kinsmen's plans and pointed out that the Rotary Club had already assumed the responsibility of treating crippling conditions in children. There was an important need "to avoid a duplication," through cooperation with existing orgunizations, the provinces and the medical profession.<sup>37</sup>

The Deputy Minister hoped to divert the Kinsmen away from Ottawa, but their national office soon raised some broader and more difficult issues. These included specific questions about the amount of funds available for polio research in Canada as compared with cancer; comparable mortality statistics between polio and cancer in Canada in last 15-20 years; and what was being done by other organizations and governments in Canada about polio with respect to research, hospitalization and rehabilitation.<sup>38</sup> Chisholm reported that the organization with the most interest in the polio

<sup>35</sup> Letter, H.G. Wardell, Kinsmen Club of Vancouver, to Chisholm, January 29, 1945, Ibid..

<sup>36</sup> C. David maylor, Private Practice, Public Payment: Canadian Medicine and the Politics of Health Insurance, (Montreal and Kingston: McGill-Queen's University Press, 1986), p. 98-131. This draft Health Insurance Bill was supposed to have been debated at a Dominion-Provincial conference in the fall of 1944, but was delayed by Prime Minister King until after the election of 1945. By the time the conference was held in August 1945, this Bill had been absorbed into a larger package of a full-scale reconstruction program. As this plan, or "Green Book proposals" as it was known, required the provinces to accept it as a complete package, when Ontario and Quebec objected over the tax and constitutional issues involved, they refused to go along with the federal government and the entire program was stalled. The federal government, nevertheless, arranged to go ahead with some aspects of the program where it could, although the health insurance proposals had to wait. See Martin, A Very Public Life:, II, p. 30-33.

<sup>37</sup> Letter, Chisholm to Wardell, February 6, 1945, NAC, RG29, Vol. 201, file 311-P11-11.

<sup>38</sup> Letter, W.H. Poole, Chairman, National Postwar Problems Committee, Association of Kinsmen Clubs, Montreal, to Chisolm, April 19, 1945, *Ibid.*.

problem was the Canadian Council for Crippled Children (CCCC), which had provincial branches in Ontario and Quebec. This Council was under the direction of Reg Hopper and had grown out of the efforts of the Ontario Society for Crippled Children (OSCC). The CCCC acted as a "unifying national link," dependent upon other agencies, such as the Kinsmen, willing to contribute to the problem of crippled children. The CCCC traced all children who had suffered a physical disability because of polio, the parents of whom were financially unable to provide care. The Council supplied braces and other appliances, provided the services of orthopaedists, arranged transportation, and provided special equipment for schools.<sup>39</sup>

Chisholm seemed enthusiastic about the polio efforts of the CCCC and the provinces, but questions about Canadian polio research were more problematic. There were significant obstacles, although he seemed confident that the National Research Council could finance any Canadian research in this field for any qualified applicant.<sup>40</sup> Between 1939 and 1943, Connaught Laboratories and the School of Hygiene had been involved with polio research through the support of the NFIP, but as Chisholm confessed, "it would appear that the total available supply of the right kind of monkeys" was controlled by the NFIP and that any further research had to be done through them.<sup>41</sup> What Chisholm did not reveal was that Connaught's research efforts had to be discontinued because of problems obtaining monkeys from India, and the prohibitive price asked for them.<sup>42</sup>

The Vancouver Kinsmen were the first voluntary organization in Canada to adopt the polio problem as their major cause and then directly lobby the federal government for some action. Others would soon follow. For example, soon after the death of FDR on April 12, 1945, a private citizen. Robert F. Sherman, of Learnington, Ontario,

<sup>39</sup> Letter, Chisholm to Poole, April 28, 1945, Ibid..

<sup>40</sup> On the National Research Council see Richard A. Jarrell and Yves Gingras (eds), Building Canadian Science: The Role of the National Research Council, special issue, Scientia Canadens is, 15 (2) (1991).

<sup>&</sup>lt;sup>41</sup> Letter, Chisholm to Poole, April 28, 1945, NAC, RG29, Vol. 201, file 311-P11-11.

<sup>42</sup> Memo, Couture to Chisholm, April 27, 1945, *Ibid.*.

who had polio as a child, tried to establish a "Canadian Foundation for Infantile Paralysis" in June 1945. He had visited the offices of the NFIP in New York and discovered that they were supporting polio research in Canada. He first tried to set up a committee of physicians and researchers who had some contact with the NFIP. Sherman informed the Department of National Health and Welfare of his plans, but, like the Kinsmen, was directed to consult with the Canadian Council for Crippled Children. Nothing came of Sherman's efforts.<sup>43</sup>

Federal interest in the NFIP's efforts and their possible application in Canada accelerated in the wake of the 1946 Quebec polio epidemic and the use of trained volunteers to assist hospitals, nurses and doctors in Montreal.<sup>44</sup> The idea of adapting the NFIP's Polio Emergency Volunteer idea in Canada had been discussed within the Department of National Health and Welfare in July 1947. Deputy Minister Cameron then turned to various national health organizations for their views. In particular he approached the CCCC, the Health League of Canada, and the Canadian Red Cross Society.<sup>45</sup> There was general support, but the idea needed further study, and perhaps a special conference on polio in general.<sup>46</sup> In further consultations he also discovered strong professional apprehensions, particularly among Medical Officers of Health, "who in no way sponsor this polio volunteer movement," and also from hospitals, which "were adverse to giving any publicity to volunteers."<sup>47</sup> Cameron's inquiries also revealed significant tensions among the major voluntary groups over

<sup>43</sup> Letter, Robert F. Sherman, Learnington, Ontario, to Department of National Health and Welfare, June 11, 1945; Memo, Couture to Chisolm, June 19, 1945; Letter, Chisolm to Sherman, June 20, 1945, NAC, RG29, Vol. 192, file 311-P11-1, part 1.

<sup>44</sup> Memo, Cameron to Martin, "Re: Polio Emergency Volunteers during the Montreal Outbreak in 1946," July 17, 1947, NAC, RG29, Vol. 201, file 311-P11-17, part 1.

<sup>&</sup>lt;sup>45</sup> Letter, Cameron to R.W. Hopper, Executive Director, Canadian Council for Crippled Children. July 11, 1947, *Ibid.*.

<sup>46</sup> Letters: Hopper to Cameron, July 14, 1947; G. Bates, Director, Health League of Canada, to Cameron, July 14, 1947; F.W. Routley, National Commissioner, Canadian Red Cross, to Cameron, July 18, 1947; H.G. McArthur, National Director, Nursing Services, Canadian Red Cross, to Cameron, October 21, 1947, *Ibid.*.

<sup>47</sup> Letter, H.A. Ansley, Assistant Deputy Minister of National Health, to G.F. Amyou, Deputy Minister of Health, B.C., July 17, 1947, *Ibid.*.

their involvement in polio care, as it was clear that "no one society should take on the work alone."<sup>48</sup> Federal plans for implementing the PEV program in Canada ended in a stalemate with Ottawa unable to coordinate the various groups. These tensions, along with the broader questions associated with the NFIP, foreshadowed the controversy that surrounded the evolution of the Canadian Foundation for Poliomyelitis after 1948.

## 5.3) "Don't Panic Over Polio!"<sup>49</sup> The Canadian "March of Dimes" and the Politics of Polio, 1948-1952

The birth of the Canadian Foundation for Poliomyelitis (CFP) in 1948 was directly inspired by the success of the NFIP. Many Canadians felt a strong personal identification with Franklin Roosevelt's polio disability and his overwhelming desire to do something about the disease by establishing the NFIP. After FDR's death, one Canadian in particular, Horace Brown, who was not a wealthy politician or philathropist, but a writer stricken with polio as an infant, wanted to somehow honor FDR's memory and help polio victims in Canada at the same time. Brown's attempt to directly transplant the structure of the NFIP to Canada occurred in a political environment that grew increasingly hostile to his efforts. The NFIP had evolved and operated with little or no government interference. The CFP, however, quickly found itself subject to the political tensions of growing Canadian provincial and federal interest in health care, and in polio specifically, amidst a Canadian tradition of state control and a desire for order. Brown was also caught between competing voluntary interests in polio care, a significant desire among physicians to downplay the seriousness of this particular disease, and a highly polio-conscious public desperate for action.

The growing desire of the medical profession to downplay the relative seriousness of polio was particularly important during the late 1940s and posed a major chal-

<sup>48</sup> Memo, Ansley to Cameron, October 24, 1947, *Ibid.* 

<sup>49</sup> Charles Neville, "Don't Panic Over Polio," Maclean's Magazine, (Aug. 1, 1948).

lenge for Brown in Lis desire to gain professional and political legitimacy for the CFP. This conservative attitude emerged in the public and professional press and reflected the obvious inability of physicians to act against this disease. Statistics were frequently cited when popular articles, often written by, or with the cooperation of doctors, reassured parents that they need not panic over polio.

For example, reflecting a rise in adult cases, one article claimed that "Risk Drops to One Case In 100,000 Beyond Age 20," while another was less specific in stacing "One Chance in 1500 Of Developing Polio."<sup>50</sup> Many articles were more explicit in stressing to parents, "Don't Fanic Over Polio," and that "Polio Panic [was] Often Worse Than Disease."<sup>51</sup> These appeals for calm often became strident, as was the case during the Montreal epidemic of 1946 when hospitals were "Besieged By Telephone Calis From Anxious Parents."<sup>52</sup> Most of these articles rarely sounded very reassuring. Their advice was often confused and placed inordinate pressure on parents to protect their children from a broad range of possible poliovirus threats, recognize the vague early symptoms of the disease, and immediately call the doctor, but, nevertheless, not panic. But some doctors, particularly polio researchers, had to admit such "Facts [were] Small Comfort For Victims."<sup>53</sup> Other stories tried to minimize the potential severity of the disease and stressed the numbers of "recovered" cases, such as a 1950 *Maclean's Magazine* article with the bizarre title: "I'm Glad I Had Polio." This was about a young woman who had been "98% cured." Her article highlighted how 50%

 <sup>(</sup>Associated Press, Washington), "Risk Drops to One Case In 100,000 Beyond Age 20," London Free Press, (Aug. 17, 1946); "One Chance in 1500 Of Developing Polio," Vancouver Sun, (July 14, 1950).

<sup>51 &</sup>quot;London MOH Warns Against Panic Over Polio," London Free Press, (Aug. 18, 1946); Neville, "Don't Panic Over Polio;" A.L. Blakeslee, (Associated Press, New York), "Facts, Fiction: Polio Panic Often Worse Than Disease," Globe and Mail, (Aug. 21, 1949); "Don't Panic Over Polio, Doctors Say: One Chance in 1,000 Of Falling Victim To Disease," Winnipeg Free Press, (Aug. 1, 1953).

<sup>&</sup>lt;sup>52</sup> "Doctors Warn Against Panic As Polio Climbs: Hospitals Besieged By Telephone Calls From Anxious Parents," *Montreal Star*, (Aug. 16, 1946).

<sup>53 (</sup>Associated Press, Washington), "A Polio Expert Speaks: Research Head Admits Facts Small Comfort For Victims," *Montreal Star*, (Aug. 16, 1946).

of polio cases "recover completely; 5% are totally disabled, about 40% suffer only minor disability, and only 5% die."<sup>54</sup>

Such a conservative effort by physicians to promote a calm and reasoned approach to polio through the press, or in its own journals, was fed by an uncomfortable realization that they had nothing to offer children, or the growing numbers of adults, who were struck by the disease.<sup>55</sup> Exaggerated claims of medical efficacy against polio had been problematic and embarrassing during previous epidemics when such hopeful weapons as convalescent serum, nasal sprays, and the "miracles" of Sister Kenny, were widely publicized in Caanada, only to be then questioned, and/ or declared useless, or even dangerous.

Unaware of these professional anxieties, and even less aware of the politics surrounding polio in Canada, Horace Brown, a writer of radio scripts and mystery stories, set out with considerable energy to do something about polio. He was strongly interested in the work of the NFIP and anxious to honour FDR in the name of Canadians.<sup>56</sup> As noted earlier, other Canadians felt the same way and independently attempted, or initiated locally based "March of Dimes" fund drives. A Vancouver newspaper and the Quebec Legion had been the most successful, although they had not directly approached the NFIP.<sup>57</sup> Brown's original idea was to establish "The Franklin

<sup>54</sup> Georgina Bailey, "I'm Glad I Had Polio," *Maclean's Magazine*, (Oct. 1, 1950); "Doctor Says 3/4 Of Victims Fully Recover From Polio," *Winnipeg Free Press*, (Sept. 1, 1953).

Editorial, "Poliomyelitis and the Medical Officer of Health," CJPH, 38 (Aug. 1947): 399-400. This editorial stressed that "Without in any way encouraging or even condoning complacency, it is the duty of the health officer to allay unwarranted fear and apprehension rather than excite or add to it. It is only right that the people should be told the truth – and the truth is that, as is the case in the majority of infections, the presence of the causative agent of poliomyelitis, as witnessed by the occurrence of one or two cases in a community, does not necessarily mean widespread infection; that even widespread infection does not necessarily mean widespread disease; and, too, that disease does not necessarily mean paralysis. Even in times of high epidemic prevalence, though infection is widespread, only a few of the infected develop disease and of these, few suffer paralysis and of these few die;" p. 399.

<sup>56</sup> H. Brown, "Speech to the CBC Trans-Canada Network," January 7, 1950, NAC, RG29, Vol 1201, file 311-P11-21.

<sup>57</sup> Letter, H. Brown, Executive Director, Canadian Foundation for Poliomyelitis, to H.P.J. Gunn, Administrator, Children's Hospital, Vancouver, May 17, 1949, NAC, MG28, 167, Vol. 1, CFP Corr. 1948-49.

D. Roosevelt Canadian Memorial Foundation," which would finance a special hospital or hospital wing in Toronto dedicated to polio treatment.<sup>58</sup> Brown brought this plan to Basil O'Connor, who asked Brown to consider instead setting up a Canadian counterpart to the NFIP.<sup>59</sup> In late 1947, O'Connor was preparing to celebrate the NFIP's tenth anniversary with an International Polio Conference, planned for July 12-17, 1948 in New York City. Brown was invited to attend the conference, as was an official Canadian delegate from Ottawa to outline the Canadian polio situation.<sup>60</sup>

By the time of the NFIP conference, broader plans for a "Canadian Foundation for Infantile Paralysis" (CFIP) had been developed by Brown, along with a business friend, Leo V. Trottier, who saw the potential benefit of a larger effort. Trottier was a private promoter and publisher and had already secured a copyright to the "March of Dimes" slogan and the CFIP name. After the conference Trottier offered \$8,000 to finance the initial establishment of the CFIP. He hired Brown, who was then unemployed, to set up and manage the new Foundation.<sup>61</sup> Through the balance of 1948, they sought to consolidate support and formalize the Foundation by first seeking appointees for a Board of Trustees and President. In December 1948, Brown met once again with O'Connor in New York and conferred with NFIP staff.<sup>62</sup>

Brown hoped to duplicate the recent establishment of the National Cancer Institute of Canada by the close coordination of voluntary, medical and federal inter-

<sup>58</sup> Browi: "Speech to the CBC," January 7, 1950; H. Brown, "The Canadian Foundation for Infantile Paralysis: Brief Presented to Board of Trustees at the Inaugural Meeting of the Foundation," February 15, 1949, p. 34, NAC, RG29, Vol 1201, file 311-P11-21. See also R. Williams, "Polio Fund Has its Troubles," *Financial Post*, (Jan. 20, 1951): 1. Brown had originally approached three Toronto hospitals to arrange for them to be the beneficiary of the funds, but all three rejected the idea.

<sup>59</sup> Brown, "Speech to CBC," Ibid..

<sup>60</sup> *Ibid.*: Letter, Basil O'Connor, President, NFIP, to Department of National Health and Welfare, November 29, 1947, NAC, RG29, Vol. 201, file 311-P11-17, part 1; Report, "Poliomyelitis in Canada: Presentation to the First International Poliomyelitis Conference, July 12-17,1948," NAC, RG29, Vol. 194, file 311-P11-3, part 1.

<sup>61</sup> Brown, "Brief...," February 15, 1949, p. 34; "Polio Foundation Expenses Nearly Half Amount Collected by 'March of Dimes,'" Justice Weekly, (Jan. 20, 1951).

<sup>62</sup> Letter, O'Connor to Brown, December 10, 1948, NAC, MG28, I67, Vol. 1.

ests. Unlike the establishment of the NFIP, which despite President FDR's role was built ocally and privately, Brown desired the direct involvement and support of the federal government and the Department of National Health and Welfare. As noted earlier, the Minister of National Health and Welfare, Paul Martin, had been instrumental in the creation of the Cancer Institute and in December 1948, Brown focused on gaining his personal support. Brown believed the Minister of Health, particularly as someone with personal experience with polio, would make an ideal choice for President of the new polio foundation. Another goal of Brown's was for Martin to call a special national conference on polio.63 Martin seemed interested, but hesitated until the Foundation was better established and the provinces had been fully consulted. This was important in light of the new Federal Health Grants Program that had begun in May 1948, which, like the aborted Health Insurance Bill, included Crippled Children Grants to the provinces totalling \$500,000.64 Brown also needed a Medical Director, and sought Dr. Harold A. Ansley, Director of Federal Health Services and assistant to Cameron. In order to leave this job, however, Ansley demanded a \$15,000 salary.<sup>65</sup> This was too steep for the new Foundation, although Ansley remained an important supporter.<sup>66</sup>

Brown was frustrated in securing a commitment from Martin, which was typical of the troubles he increasingly encountered setting up the CFIP. This included some unexpected resistance from Reg Hopper of the Ontario Society for Crippled Children, as well as from the Canadian Medical Association's General Secretary, Dr. T.C. Routley. Both men were influential and questioned the need for a separate polio

Letters: Brown to Couture, December 18, 1948; Brown to Martin, December 18, 1948, NAC, RG29, Vol. 1201, file 311-P11-21; Brown to Martin, December 22, 1948, NAC, MG28, 167, Vol. 1. On the founding of the National Cancer Institute of Canada, see Martin, A Very Public Life, II, p. 36-41.

<sup>64</sup> Letters: Martin to Brown, January 8, 1949; Martin to J. Heise, CFP, October 7, 1949, NAC, RG29, Vol. 1201, file 311-P11-21; Department of National Health and Welfare, Annual Report, 1949 (to March 31, 1949), (Ottawa: 1949), p. 83-84.

<sup>65</sup> Letter, Couture to Brown, December 22, 1948, Ibid.

<sup>66</sup> Letter, Cameron to P.S. Campbell, Deputy Minister of Health, Nova Scotia. May 3, 1949, Ibid.

foundation in Canada. Routley's brother, Fred, was the Director of the Canadian Red Cross, which made it clear to Brown that "one Routley brother is concerned for the other's fund raising for the Red Cross."<sup>67</sup>

Further troubles emerged while Brown prepared a detailed "Brief" for the Foundation's inaugural meeting in Ottawa, set for February 15, 1949. He was desirous of a Federal Charter, and thus had to be certain of the reputations of all associated with the new Foundation.<sup>68</sup> In January, the focus of Brown's concern centred on Trottier after "certain questions arose in the minds of some persons regarding his past activities." These questions and persons were not specified. Trottier, meanwhile, wanted to divest himself of responsibility for the CFIP, and resigned in early February, leaving Brown as Executive Director. Brown had essentially taken control already and was looking for a way to keep it. Trottier wanted to leave, and also get his \$8,000 investment back. In order to pay him back, this was to be "considered as first liability and charge against any assets of the Foundation."<sup>69</sup> Moreover, to ensure that Trottier formally resigned, Brown had to agree in writing to pay 10% of his annual CFP salary to Trottier to cover the costs of office space they shared. This money was also to serve as a kind of agent's fee to Trottier. Brown agreed to all this but kept this personal arrangement secret from others in the CFIP. He then neglected to pay Trottier, despite the high salary he was drawing from the Foundation. Indeed, the issue of Brown's salary later became the focus of growing public criticism. By January 1951, the public and personal controversies Brown faced came to a head. Trottier

<sup>67</sup> Letters: Hopper to Couture, December 14, 1948; Brown to T.C. Routley, CMA, December 22, 1948; Brown to Martin, December 22, 1948, NAC, RG29, Vol. 1201, file 311-P11-21; Brown to Charles Clay, Editorial and Research Institute (and soon to be President of the CFP), Ott-awa, December 22, 1948, NAC, MG28, I67, Vol. 1.

<sup>68</sup> Brown applied for a Charter at the end of January 1949; Memo, W.P.J. O'Meara, Deputy Secretary of State, to Cameron, January 29, 1949, NAC, RG29, Vol. 1201, file 311-P11-21.

<sup>69</sup> Brown, "Brief...," February 15, 1949, p. 34.

drew Brown into a protracted lawsuit, just as Brown and the Foundation faced the broader public crisis that led to its reorganization.<sup>70</sup>

After Trottier's resignation and the CFIP's inaugural meeting in February 1949, questions emerged over the foundation's name. The name, "Canadian Foundation for Infantile Paralysis," gave the impression that it was little more than a subsidiary of the American NFIP. This fostered public uncertainty of whether or not it would spend the money it raised from Canadians in Canada. By March 1949, a new name was decided on, the Canadian Foundation for Poliomyelitis. that eased such questions. Furthermore, "Poliomyelitis was now a more applicable term than 'Infantile Paralysis.'" The NFIP had not objected to the original name, but insisted that any reference to the CFP being founded by Franklin Roosevelt had to be dropped from their letterhead.<sup>71</sup>

Despite the new name, the CFP was to be built on the NFIP model of a strong central office that coordinated the activities of autonomous locally-based chapters. However, unlike the 50-50 split of March of Dimes proceeds established between the NFIP's local Chapters and national office, the CFP's central office in Toronto would keep 75% of the funds. The difference was that few local chapters existed and Brown had to struggle to promote their creation at the county level. Until the chapters were up and running, Brown felt justified keeping 75% of the money in Toronto.<sup>72</sup> Brown gave little thought to establishing provincially-based chapters, nor did he recognize the problems he would face by bypassing the provinces and trying to directly trans-

<sup>\*</sup>Charity 'Workers' Grabbing Fat Salaries: Public Now Asking 'Charity For Whom?;' March of Dimes....???," Flash, (Mar. 20, 1950); Williams, "Polio Fund Has its Troubles," p. 1; ; "Polio Foundation Expenses...", and "Infantile Paralysis Assn. Director Being Sued For 10 Percent of Salary," Justice Weekly, (Jan. 20, 1951); Notes from telephone conversations between Horace Brown and Charles Clay, February 19, 1951; February 20, 1951, NAC, MG28, I67, Vol. 3; "Major Surgery Revives Polio Fund," Financial Post, (May 10, 1952): 12.

<sup>&</sup>lt;sup>71</sup> Memo, R.E. Curran, Legal Advisor, Department of National Health and Welfare, to Cameron, March 14, 1949, NAC, RG29, Vol. 1201, file 311-P11-21; H. Brown, Statement read at Executive Meeting, CFP, in response to *Financial Post* article (Jan. 20, 1951), January 25, 1951, NAC, MG28, I67, Vol. 2.

H. Brown, "Organizational Brief to the National Medical Advisory Committee, CFP," January 16, 1950, NAC, RG29, Vol. 1201, file 311-P11-21.

plant the NFIP's American local chapter model into Canada.<sup>73</sup> He had conducted a detailed survey of provincial polio policies and services, but feit that despite some advanced programs, they were not uniform. Brown was particularly disturbed by a serious lack of acute and rehabilitative care services, especially for long-term and adult cases of polio, such as himself.<sup>74</sup> He saw this as the CFP's greatest purpose.

Brown's most vexatious initial difficulty was the inability to establish a satisfactory medical advisory committee.<sup>75</sup> Without proper medical backing a federal charter was impossible to obtain. He did not technically need a charter to begin fundraising, but without it difficult questions would likely be asked about the CFP, its basic purpose, and what it planned to do with all the money it raised.<sup>76</sup> Nevertheless, Brown's determination to start raising money was urgent. By early May he was convinced that he had wide, if tentative, provincial and medical support.<sup>77</sup> Actually, this support proved somewhat soft.

Brown's original plans were for a modest 1949 fundraising campaign. By November, however, this had changed in order to attempt a large-scale "March of Dimes" fund drive in January 1950 to take advantage of the NFJP's annual campaign. Following on the wildly successful NFIP model, this involved hiring a professional fundraising company, an advertising agency and the spending of some \$36,000 the CFP did not yet have.<sup>78</sup> The campaign made extensive use of the media, especially radio, and both free and paid advertising through a close association with the Canadian Associ-

<sup>73</sup> Brown, "Brief...;" Feb. 15, 1949, p. 14-15, 17.

<sup>74</sup> Ibid., p. 8-11.

Letter, Clay to Brown, March 24, 1949; Memo, Clay to Brown, March 30, 1949, NAC, MG28, 167, Vol. 1; Memos: Cameron to Martin, April 11, 1949; Ansley to Brown, April 13, 1949, NAC, RG29, Vol. 1201, file 311-P11-21.

<sup>76</sup> Letters: P.S. Campbell, Deputy Minister of Health, Nova Scotia, to Cameron, April 30, 1949; Cameron to Campbell, May 3, 1949, NAC, RG29, Vol. 1201, file 311-P11-21; Minutes, Meeting of the Board of Directors, CFP, June 8, 1949, in H. Brown, "First Annual Report: Canadian Foundation for Poliomyelitis," April 20, 1950, Ontario March of Dimes Archives (hereafter OMD), Toronto.

<sup>77</sup> Letter, Brown to Ansley, May 10, 1949, NAC, KG29, Vol. 1201, file 311-P11-21.

<sup>78</sup> Minutes, Meeting of National Board of Directors, CFP, November 3, 1949, in Brown, Annual Report, CFP, April 20, 1950, OMD Archives.

ation of Broadcasters. It also involved an extensive and expensive national promotional tour by Brown himself.<sup>79</sup> Brown, however, was no Basil O'Connor, and neither was the CFP's somewhat reluctant President, Charles Clay, who was a writer and editor.<sup>80</sup> Fortunately, by the time the campaign began a Medical Advisory Committee had been finally established,<sup>81</sup> albeit amidst further controversy that it was missing a number of key members.

Most prominent among the missing was Dr. Robert D. Defries, Director of Connaught Laboratories, where a substantial polio research program was underway. Defries carried considerable weight among provincial and federal health authorities and questioned the need for a Canadian polio foundation, especially as it threatened to complicate Connaught's delicate funding relationship with the NFIP. He recommended that the status of the CFP be discussed by the Dominion Council of Health. Ontario's Deputy Minister of Health was also very much opposed to the Foundation.<sup>82</sup> The DCH had discussed the CFP issue in October 1949, concluding that most provinces were already devoting significant funds to polio. Moreover, there were already enough voluntary health groups responding to the dramatic appeal of polio.<sup>83</sup> In fact, beneath this explanation, many Deputy Ministers of Health had serious problems with Brown. According to Ansley, some of whom were quite hostile towards his

<sup>&</sup>lt;sup>79</sup> Brown, Annual Report, CFP, April 20, 1950, p. 1-8; H. Brown, "Bread Upon the Waters: The Story of Canadian Radio and the 1950 Campaign of the Canadian March of Dimes," Presented to the Canadian Association of Broadcaters Annual Convention, April 27-30, 1950, OMD Archives.

<sup>&</sup>lt;sup>80</sup> Carter stresses that O'Connor's "baronial insist ince on travelling deluxe is calculated. That he likes to be comfortable is somewhat beside the point: his press clippings have taught him that when he roars into town and sweeps into the royal suite, all observers immediately recall that the National Foundation is something special;" Carter, *The Gentle Legions*, p. 104.

<sup>81</sup> H. Brown, "Organizational Brief to the National Medical Advisory Committee, CFP," January 16, 1950, NAC, RG29, Vol. 1201, file 311-P11-21. M.B., "Samaritan," Saturday Night, (Feb. 7, 1950): 21.

<sup>82</sup> Memo, Cumeron to Martin, January 23, 1950, NAC, RG29, Vol. 1201, file 311-P11-21; Letters: R.D. Defries, Director, Connaught Laboratories, to S. Smith, President, University of Toronto, December 17, 1949, UTA, A68-0007, Box 064, file 06; J.T. Phair, Ontario Deputy Minister of Health, to Brown, December 8, 1949, NAC, MG28, 167, Vol.1.

<sup>&</sup>lt;sup>83</sup> Minutes, Meeting, Dominion Council of Health, October 19-21, 1949, AO, RG10-05, file 13.

efforts. Ansley actually had to step in to defend the CFP so that its larger value was not discouraged.<sup>84</sup>

Resistance to the CFP also developed on a number of other fronts, especially in response to the growing perception among voluntary organizations that it was a duplication and drain on their fund raising efforts.<sup>85</sup> By April 1950, the situation in Ontario among various voluntary health agencies towards the CFP, particularly with the Rotary Club, had grown to open animosity and "almost-internecine warfare." According to Brown, there was the belief that "they have a monopoly in the field of disease."86 The CFP and the OSCC managed to patch things up somewhat when Brown offered Hopper \$10,000 after the 1950 campaign. Hopper later rejoined the CFP Board of Trustees after he had quit earlier.<sup>87</sup> By the fall of 1950, Brown attempted to improve the standing of the CFP with the other health organizations, and the medical profession. This was especially needed in Ontario and Manitoba, where physicians complained through the press that polio was already getting too much public attention, and money from the already depleted pocketbooks of the public.<sup>88</sup> Compounding the problem was the charge that "Charity 'Workers' [were] Grabbing Fat Salaries: Public Now Asking, 'Charity For Whom?'" This charge was aimed primarily at Brown's "substantial" salary, which was later revealed publicly to be \$160 a week, or \$6,250 a year. The Red Cross was the "notable exception," paying its top executive only \$5,400 annually. Basil O'Connor did not receive a salary at all from the NFIP --

<sup>84</sup> Notes of telephone conversation between Clay and Ansley, March 21, 1951, NAC, MG28, I67, Vol. 4.

<sup>85</sup> Memo, Ansley to Cameron, September 13, 1949, NAC, RG29, Vol. 1201, file 311-P11-21; Minutes, Meeting of Executive Committee, Ontario Society for Crippled Children, December 16, 1949, February 14, 1950, OSCC Archives.

<sup>86</sup> Brown, Annual Report, CFP, April 20, 1950, p. 12-18, OMD Archives.

<sup>87</sup> Minutes, Annual General Meeting, OSCC, June 23, 1950; Minutes, Meeting, Board of Directors, OSCC, September 22, 1950, December 8, 1950, OSCC Archives.

<sup>88</sup> R. Williams, "Is Charity Campaigning Getting Out Of Hand? Financial Post, (Aug. 5, 1950).

he did not need or want one.<sup>89</sup> To help appease the situation Brown decided to broaden the CFP base beyond polio by offering to help "other crippling conditions where requested."<sup>90</sup>

The most serious controversy the CFP faced emerged in provinces where comprehensive polio policies had been established, such as in Ontario, Manitoba and Alberta. A weakened CFP that could assist with other less prominent and problematic diseases would be less financially and politically threatening. In provinces with less polio-active governments, such as British Columbia, where the Kinsmen Clubs developed a strong voluntary interest in polio. thoughts of helping other diseases were quickly rejected. The Kinsmen hoped to benefit by the CFP's national focus on polio, which needed more attention and money in B.C. Any official effort to share the wealth should wait until the complex problems surrounding this disease were under control.<sup>91</sup> Despite this issue, Brown depended financially upon the B.C. Kinsmen, with whom he otherwise had good relations. He also received good support from the Quebec Command of the Canadian Legion. These groups acted as the CFP's only official provincial chapters until 1951.

Politically, Brown received a warm government welcome only in Nova Scotia, where the Deputy Minister of Health's son had recently been stricken with polio. Elsewhere, Brown encountered varying degrees of interest, and often outright hostility to the CFP's organizing efforts. Alberta was particularly "hostile" since the government felt that under the Polio Act it was already doing all that could possibly be done for polio cases.<sup>92</sup> Misunderstandings, or perceived conflicts with existing

<sup>\*</sup>Charity 'Workers' Grabbing Fat Salaries... March of Dimes...?????" Flash, (Mar. 28, 1950);
\*Half 'March of Dimes' Funds Spent on Expenses," Justice Weekly, (Jan. 20, 1951); Carter, The Gentle Legions, p. 103-06.

<sup>&</sup>lt;sup>90</sup> Telegram, Brown to P. White, CFP, Vancouver, November 11, 1950, NAC, MG23, I67, Vol. 2.

Letters: C.R. Hallman, Provincial Committee, CFP, Vancouver, to Brown, November 14, 1950;
 Brown to W.T. Mustard, Chairman Medical Advisory Committee, CFP, November 15, 1950;
 T.J. Allard, General Manager, CFP, to Brown, November 17, 1950, NAC, MG28, I67, Vol. 2.

<sup>92</sup> Brown, Annual Report, CFP, April 20, 1950, p. 12-18, OMD Archives; Memo, Ansley to Cameron, February 27, 1950, NAC, RG29, Vol. 1201, file 311-P11-21; Minutes, Meeting concer-

crippled children councils, accounted for some official resistance to Brown's aggressive efforts during and after the 1950 campaign. This was most serious in Saskatchewan, and later in Manitoba. This first March of Dimes campaign, despite all the controversy, was able to raise close to  $$300,000.^{93}$ 

Brown wanted a fully national March of Dimes campaign for 1951, but he ran into serious political opposition in Manitoba. The CFP's President, Charles Clay, had a friendship with the Manitoba Minister of Health, Ivan Schultz, which Brown hoped to exploit. Clay also knew the Manager of the Winnipeg Better Business Bureau, who it was hoped would organize a local chapter. Success on both fronts would help consolidate official support upon which the CFP could grow.<sup>94</sup> Such friendships, however, only added to the sensitivity that grew in Manitoba over the larger issues surrounding the CFP. Paramount was the strong perception of the CFP as yet another central Canadian (*ie.* Ontario) organization that would draw substantial amounts of money out of the province and over which Manitobans had little control, and even less representation.<sup>95</sup> There was also minimal support for establishing county-based CFP chapters in Manitoba. Encouraged by the successful provincial chapters in B.C. and Quebec, Brown hoped to develop provincial chapters in the other provinces for an expanded 1951 campaign.<sup>96</sup>

Brown focused first on setting up a Manitoba chapter, but the difficulties he ran into in Ottawa and elsewhere put the Manitoba government on the defensive by the time it was approached.<sup>97</sup> A meeting with Schultz had been arranged for May

ning establishing CFP chapter in Edmonton, October 18, 1949, attached to Letter, Clay to Brown, October 28, 1949, NAC, MG28, I67, Vol. 1.

<sup>93</sup> Brown, Annual Report, *Ibid.*; Letter, F.D. Mott, Acting Deputy Minister of Public Health, Saskatchewan, to Cameron, January 9, 1950, NAC, RG29, Vol. 1201, file 311-P11-21.

<sup>94</sup> Brown, Annual Report, Ibid., p. 14; Memo, Ansley to Cameron, February 27, 1950, NAC, RG29, Vol. 1201, file 311-P11-21.

<sup>95</sup> Memo, Ansley to Cameron, NAC, RG29, Vol. 1201, file 311-P11-21.

<sup>96</sup> Brown, Annual Report, CFP, April 20, 1950, p. 13, 16-18, OMD Archives.

<sup>97</sup> Letter, Clay to I. Schultz, Minister of Health and Welfare, Manitoba, March 23, 1950, MA, G157, B64, file H-4-9-2; Letter, Clay to Brown, June 7, 1950, NAC, MG28, I67, Vol 1. Clay was close friends with the Director of the Canadian Welfare Council, R.E.G. Davis, who hon-

1950, but the major flood that hit Winnipeg at that time forced a delay.<sup>98</sup> In the meantime, Schultz decided to bring together the various Manitoba voluntary groups interested in polio to meet with Brown. Schultz had decided to follow the Saskatchewan government's lead with its recent establishment of the Saskatchewan Council for Crippled Children. The Saskatchewan government was also uncomfortable with the CFP's unauthorized activities in the province. In early January 1950, it had unceremoniously forced their radio spots off the air.<sup>99</sup> But there followed a sudden turn-around when the Government Hospital Group offered to help in the CFP campaign. Prompted by this support, but determined to exercise some control over the multiplicity of volunteer groups, and also protect its substantial polio program, the province sponsored the establishment of the Council for Crippled Children. The CFP was to give the money raised in the province directly to the Council.<sup>100</sup> Schultz, with the efforts of Dr. Bruce Chown of Winnipeg Children's Hospital, also established a Society for Crippled Children of Manitoba for similar reasons.<sup>101</sup> Chown, however, was dead set against the CFP from the beginning, while Schultz wanted to set up a Manitoba chapter.<sup>102</sup>

In the fall of 1950, Brown and Clay finally met with Schultz and the various Manitoba groups interested in crippling conditions. A special executive committee was then set up to investigate the CFP's plans for a Manitoba Chapter in more detail.

estly gave Clay a "frank opinion" about the CFP and how "we are being terrible criticized," especially over high salaries, especially Brown's, executive overstaffing, and high costs in fund raising.

<sup>98</sup> Letter, C.R. Donovan, Acting Deputy Minister of Health, Manitoba, to Cameron, December 19, 1950, NAC, RG29, Accession 85-86/248, Vol. 34, file 311-P11-21.

<sup>99</sup> Letter, F.D. Mott, Deputy Minister of Public Health, Saskatchewan, to Cameron, January 9, 1950, NAC, RG29, Vol. 1201, file 311-P11-21.

<sup>100</sup> Memo, Ansley to Cameron, February 27, 1950, Ibid.; Brown, Annual Report, CFP, April 20, 1950, p. 14, OMD archives; Letter, Mustard to Brown, November 18, 1950, NAC, MG28, I67, Vol. 2.

<sup>&</sup>lt;sup>101</sup> Letter, Schultz to T.J. Bentley, Minister of Public Health, Sackatchewan, August 10, 1950, SA, R11, file 14-87.

<sup>102</sup> Letter, J.M. George, Provincial Chief Justice, Manitoba, to Clay, December 29, 1950, NAC, MG28, I67, Vol. 2.

This committee was not impressed with the CFP's basic purpose, organizational and executive structure, provincial representation, or how it would distribute the money it hoped to raise in the province. In October this committee then took part in the executive meeting of the CFP in Toronto, where an intense debate ensued over these and other issues. Chown, and Judge J.M. George, a Manitoba Chief Justice, who was the chairman of the committee, essentially took over the Toronto meeting. They were no more impressed than before. Indeed, Chown strongly recommended that Manitoba

have nothing to do with this organization as it is presently set up. I further recommend that we make every effort through newspaper publicity to prevent it forming a chapter in Manitoba, and that we enlist the support of the media of publicity in preventing it from carrying on an active campaign in Manitoba.

He felt that, rather than just a polio foundation, Manitoba needed to establish a broader "Council for Cripples and Crippling Diseases." This would deal with "all aspects of crippling, prevention, cure, care, rehabilitation and research as to cause may be coordinated in the Province, so far as that is possible."<sup>103</sup>

Chown's recommendations were thought unworkable by others on the committee. Such a plan would damage other volunteer efforts and not prevent the CFP's larger campaign. Neither would it stop Brown from seeking out someone else in the province who might be only too glad to form a local chapter.<sup>104</sup> Judge George was more conciliatory and suggested to Schultz that, rather than fighting so hard against the CFP, "we should try to control it." A provincial chapter should be formed, George argued, with the cooperation of existing groups and the government, and it should retain the right to be consulted in the preparation of a Federal Charter. This would preserve provincial autonomy so that as many provinces as possible could be "organized on a similar basis to avoid control by a central group in Ontario." It was clear to George that the CFP was going to go ahead regardless and raise a lot of money. He

<sup>103</sup> B. Chown, Minutes, Executive Committe Meeting, CFP, October 24, 1950, "To the Committee in Reference to the Canadian Foundation for Poliomyelitis," MA, G157, B64, file H-4-9-2.

<sup>104</sup> Meeting Report, Donovan to File, attached to Memo, Donovan to Schultz, November 21, 1950, MA, G157, B64, file H-4-9-2.

compared this situation with the attitude governments took towards Communism: "namely not to ban it but try and control it."<sup>105</sup> This argument was appealing to Schultz,<sup>106</sup> but in order to satisfy Chown and others who were less politically pragmatic, Manitoba's committee decided to give the CFP a chance to respond to their concerns before pushing the issue more drastically.<sup>107</sup>

Underlying the controversy over the CFP was the perception among provincial governments, as well as in Ottawa, that the need for an organization specifically oriented towards polio "does not exist." This feeling was reinforced in light of the CFP's plans to try and raise up to \$3.75 million annually from a public that many felt was already well served by extensive provincial polio programs and existing voluntary groups interested in the general problem of crippled children. As its political and medical critics argued, it was the CFP's "responsibility to prove the need before asking such sums of the public."<sup>108</sup> The debate over the CFP was closely followed in Ottawa, where the CFP's Charter was still being considered closely.<sup>109</sup> Manitoba's Acting Deputy Minister of Health, Dr. C.R. Donovan, kept his federal counterpart notified, through whom the other Provincial Deputy Ministers were kept confidentially informed.<sup>110</sup>

An important result of this controversy was a new recognition of the need for more state support of rehabilitative facilities and care for those affected by all crippling disorders, including adults. But there was a strong desire within Canadian

<sup>105</sup> Letter, J.M. George to Schultz, November 23, 1950, Ibid.

<sup>106</sup> Letter, Schultz to W. Palmer, Secretary, Civic Charities Endorsement Bureau, Winnipeg, January 22, 1951, Ibid..

<sup>107</sup> Report, "Questions for Discussion Re National Foundation for Poliomyelitis," attached to Letter, Chown to Clay, November 29, 1950; Letter, Schultz to Brown, December 4, 1950, MA, G157, B64, file H-4-9-2a.

<sup>108</sup> Report, "Questions for Discussion," Ibid..

<sup>109</sup> Memo, Cameron to Martin, October 1950, NAC, RG29, Acession 85-86/248, Vol. 34, file 311-P11-21.

<sup>110</sup> Letter, Donovan to Cameron, December 19, 1950; Telegrams: Cameron to Donovan, January 2, 1951; Donovan to Cameron, January 2, 1951; Letter, Cameron to All Provincial Deputy Ministers of Health, January 4, 1951, Ibid.

governments to establish, if not impose, order among all the existing groups interested in this problem. The CFP seemed to symbolize and embody the existing chaotic situation.<sup>111</sup> Federally, the controversy over the CFP and its long-denied Charter, "crystallized" a reconsideration of how to properly license the growing number of applications from overly enthusiastic voluntary groups.<sup>112</sup> Manitoba's efforts to seek order in the CFP reinforced a positive federal attitude towards trying to coordinate and integrate "the present wasted effort" of all these various groups. Order was necessary despite the organizational challenge of "reconciling conflicting, opposing, or in some cases ruffled feelings."<sup>113</sup>

More than a few ruffled feelings resulted when the CFP controversy grew into a major public crisis on the eve of the January 1951 March of Dimes campaign. This crisis was prompted primarily by direct criticism from a number of "Medical Men," who brought all of the questions about the CFP into sharp focus.<sup>114</sup> The CFP represented "Unnecessary Duplication," and a "Public Body [was] Needed To Scan Pleas For Funds" since "Half 'March of Dimes' Funds Spent On Expenses."<sup>115</sup>

The main criticism originated from Dr. Gordon Bates of the Health League of Canada, Dr. Alan Brown, physician in chief at the Hospital for Sick Children in Toronto, and Dr. Arthur Kelly, secretary of the Ontario Medical Association. They argued that there was no need for such a high profile and inordinately expensive national campaign against polio. Bates was particularly critical of the CFP's activities. Echoing earlier American criticisms of the NFIP, Bates stressed the apparent imbalance

203

Letters: Donovan to Cameron, *Ibid*; Cameron to Donovan, December 27, 1950, *Ibid*.

<sup>&</sup>lt;sup>112</sup> Memo, Cameron to Martin, October 1950, *Ibid.*.

<sup>&</sup>lt;sup>113</sup> Memo, R.E. Curran, Legal Advisor, Department of National Health and Welfare, to Cameron, December 29, 1950, *Ibid.*.

<sup>&</sup>lt;sup>114</sup> "Medical Men Criticize March Of Dimes Here On Eve Of Campaign," Globe and Mail, (Jan. 10, 1951); R. Williams, "Polio Fund Has Its Troubles: Controversy Mounts as More Facts Emerge," Financial Post, (Jan. 20, 1951).

Editorial, "Unnecessary Duplication," Globe and Mail, (Jan. 12, 1951); Ken W. MacTaggart,
 "Hold Public Body Needed To Scan Pleas For Funds," Globe and Mail, (Jan. 11, 1951); "Half
 'March Of Dimes' Funds Spent On Expenses," Justice Weekly, (Jan. 20, 1951).
between the amount of money being raised by the CFP and the NFIP for polio work, and the unimportance of polio as a health threat relative to such diseases as cancer and whooping cough. Polio was a "relatively minor item on the list of diseases about which we should be concerned," he argued, and the public's emotions should not be swayed by such groups as the CFP, especially in light of its obvious failings.<sup>116</sup>

The CFP's supporters came to the defense of their cause and pointed out that, unlike whooping cough and diphtheria, polio had no preventive. It was also unfair to be comparing diseases, all of which were bad.<sup>117</sup> Despite the bad press, the CFP responded by declaring the "March of Dimes Drive Was Still On" since "We Have The Truth On Our Side."<sup>118</sup> The crisis escalated when the political and legal controversies surrounding the CFP each intensified. The most dangerous and immediate problem the CFP faced was the apparently scandalous Trottier-Brown lawsuit.<sup>119</sup>

The press storm surrounding the CFP forced Brown and Clay to resign from the executive in late January. Brown was able to stay on temporarily as Office Secretary Clay voluntarily resigned the Presidency. However, despite his failing health, Clay had honestly tried to steer the CFP through the controversies using his substantial political connections. The remaining members then asked for a federal investigation of the Foundation and also planned "a complete re-organization of their affairs." High on the agenda was the appointment of a new Board of Directors with full provincial representation.<sup>120</sup> George and Chown were appointed as Manitoba's represen-

<sup>116</sup> Williams, "Polio Fund Has its Troubles," p. 1, 3, which included Gordon Bates "Health League Editorial."

<sup>&</sup>lt;sup>117</sup> Press Statement by CFP to *Globe and Mail*, January 9, 1951, NAC, MG28, 167. Vol. 2.

<sup>&</sup>lt;sup>118</sup> "Donation Despite Criticism: March of Dimes Drive Still On," *Toronto Telegram*, (jan. 11, 1951).

<sup>119</sup> Williams, "Polio Fund Has Its Troubles:" Statements, "Infantile Paralysis Assn. Director Being Sued For 10 Percent Of Salary," Justice Weekly, (Jan. 20, 1951); "Sansom Heads Reorganized Polio Foundation," Globe and Mail, (June 18, 1951).

<sup>120</sup> Letters: George to Clay, December 29, 1950: Clay to George, January 9, 1951; George to Brown, January 9, 1951; George to Clay, January 19, 1951, *Ibid.*.

tatives,<sup>121</sup> and under their influence, the newly organized executive recommended that the funds collected in the 1951 drive "should be used for all crippling conditions of children and not limited to poliomyelitis."<sup>122</sup>

The formal reorganization of the CFP occurred in Toronto in late March 1951. The new Executive Committee of the National Board of Directors met with provincial representatives from B.C., Alberta, Saskatchewan, Manitoba, New Brunswick and Nova Scotia. In sharp contrast to the original CFP and the NFIP, the new CFP was completely transformed into a federated body of recognized and provincial associations. It was left with a weak national office, responsible for overall coordination, information exchange and publicity, and strong and autonomous provincial chapters, each with their own medical advisory committees. The bulk of the money raised in each province would remain there, with only a small grant designed to support the national office's greatly reduced operation.<sup>123</sup> Dr. William T. Mustard, surgeon at the Hospital for Sick Children, and who had hitherto served as the CFP's Chair of the National Medical Advisory Committee, was nominated Acting President.<sup>124</sup>

The nomination of Mustard was significant for the future of the CFP as an organization primarily interested in polio. Mustard was a noted surgeon with an interest in polio; he later originated the internationally acclaimed "Mustard procedure" in 1952, which was a muscle transfer operation that gave polio patients better hip stability.<sup>125</sup> Controversy continued to dog the CFP through 1951, particularly from some voluntary groups, such as the Health League and OSCC. Mustard risked his

<sup>121</sup> Minutes, Meeting of Manitoba Committee to Consider CFP, January 27, 1951, MA, G157, B64, file H-4-9-2a.

<sup>122</sup> Letter, Schultz to Palmer, February 1, 1951, Ibid.

<sup>123 &</sup>quot;Statement of Resolutions Passed at a Joint Meeting of the Executive Committee of the National Board of Directors of the CFP and Representatives from the Provincial Chapters," March 24, 1951, MA, G157, B64, file H-4-9-2.

<sup>124</sup> Minutes, Meeting of Executive Committee of National Board of Directors, CFP, March 25, 1951, *Ibid.*.

<sup>125</sup> Marilyn Dunlop, Bill Mustard: Surgical Pioneer, (Toronto: Dundurn Press/ Hannah Institute for the History of Medicine, 1989), p. 25-31.

job at HSC in order to see the Foundation through this turbulent period.<sup>126</sup> By remaining he ensured that the new CFP, and the newly established Ontario Chapter, would stay committed to supporting polio research and treatment, at least until the introduction of the Salk vaccine. The Ontario Chapter of the CFP, later known as the Ontario March of Dimes, was built directly out of the remains of the original CFP's head office, which was radically scaled down.<sup>127</sup> Over the next year it was generally felt that Mustard put the national office of the CFP "on a sound and economical basis and [it] appears to be making considerable headway in spite of the previous adverse publicity."<sup>128</sup> A symbol of this progress was the much delayed granting of the CFP's federal charter in December 1952.<sup>129</sup>

In 1952 the Ontario Chapter managed to raise \$25,000, but was able to effectively double the total funds collected in its March of Dimes campaigns each subsequent year through 1956 and raise more than \$500,000 a year through 1960. By 1956 a total of \$1,290,000 was raised nationally by all the provincial March of Dimes Chapters. Reflecting a strong voluntary tradition in the province, British Columbia had the most fundraising success on a per capita basis (22.4¢), while Quebec had the lowest (2.7 ¢). The national average was 9.74¢ per capita. Between 1958 and 1960 a total of

<sup>Letters: Allard to George, April 5, 1951; George to Allard, April 18, 1951; Allard to George, April 23, 1951; Notes of telephone conversation between Clay and Ansley, March 21, 1951, NAC, MG28, 167, Vol. 4; "Major Surgery Revives Polio Fund,"</sup> *Financial Post*, (May 10, 1952), p. 12.

<sup>127</sup> Letter, Mustard to His Honour Judge T.H. Barton, Toronto, April 16, 1951, AO, RG4, C-3, 1951/434; "Report of the Public Trustee: Canadian Foundation for Poliom/elitis (not incorporated), October 1, 1952, AO, RG4, Series 4-02, file 66.3. See also, Minutes, Meeting, Ontario Chapter, CFP, August 13, 1951; Minutes, Board of Directors Meeting, Ontario Chapter, CFP, June 4, 1952, OMD archives. On the broader history of the Ontario March of Dimes see Hon. Justice George Ferguson, "Ontario March of Dimes: 40 Years of Caring," Abilities, #10 (Winter 1992): 22-25.

<sup>128</sup> Memo, T.J. Bentley, to T.C. Douglas, Minister of Public Health, Saskatchewan, July 29, 1952, SA, R11, file 14-78.

<sup>129</sup> Memos: Curran to Ansley, June 6, 1952; Curran to T.J. Giles, Secretary, Dominion Council of Health, December 8, 1952; Letter, Roth to Cameron, December 11, 1952, NAC, RG29, Accession 85-86/248, Vol. 34, file 311-P11-21.

some \$1,400,000 was raised each year by the Canadian March of Dimes.<sup>130</sup> This money was directed largely towards adult polio patient care, although beginning in 1957 the March of Dimes mandate broadened to include rehabilitation for a variety of crippling conditons. In 1959 March of Dimes funds were spent in such areas as: prevention publicity (11.2%), medical and rehabilitation (54%), equipment (3.8%), grants in aid (14.5%), professional training (4.1%), recreation (1.4%), research (7.8%), administration (10%), and campaign expenses (9.6%). Such services, however, varied among provincial chapters.<sup>131</sup>

The evolution of the Canadian Foundation for Poliomyelitis between 1948 and 1951 demonstrated the powerful influence of the NFIP, and how the strong desire it inspired for individuals and governments to do something about polio was ultimately ordered and adapted into a politically acceptable Canadian form. During these years, the CFP stood at the centre of a sharp four-way clash that existed between rising public fears over polio, the determination of many physicians to downplay such fears, while provincial governments and other voluntary health agencies struggled to balance a changing relationship. The CFP upset this dynamic and raised the political stakes, creating jealousy and conflict, both open and underhanded. Like the earlier handling of convalescent serum, the nasal spray and Sister Kenny, the CFP's struggles for legitimacy further illustrates how American methods, ideas, organizations and publicity were transplanted and transformed by a different political

<sup>130</sup> Ontario Chapter, Canadian Foundation for Poliomyelitis, Annual Report, 1956, OA, RG10-6-524, Box 49; The (Ontario) Rehabilitation Foundation for Poliomyelitis and the Orthopaedically Disabled (March of Dimes), Directors' Handbook, May 26, 1957, 1957 Minute Book, OMD Archives; "Canadian Foundation for Poliomyelitis and Rehabiltation, 1958 Composite Financial Analysis of Chapter Activities," attached to Letter, A.C. Solomon, National Executive Secretary, to K.C. Charron, Director of Health Services, Department of National Health and Welfare, August 5, 1959; Minutes, Annual Meeting, Canadian Foundation for Poliomyelitis and Rehabilitation - The March of Dimes, June 17-19, 1960, Grand Tracadie, P.E.I., NAC, RG29, Accession 85-86/248, Vol. 34, file 311-P11-21.

<sup>131</sup> In 1958 the national breakdown was somewhat differently defined: patient care and rehabilitation (13%), orthopaedic appliances (6%), economic assistance (8%), transportation (5.7%), follow up services (2.7%), research bursaries and public education (4.4%), equipment and grants (16%), preventive program (7.7%), extended program (7%), adminstration (13%) and campaign expenses (9.5%).

environment north of the border, and how this process influenced the way the problem of polio was approached and managed in Canada. This process continued during the fourth wave of Canadian polio epidemics that began in 1947 and climaxed with unprecedented provincial epidemics in 1952, which were followed by a national polio crisis in 1953. As the next chapter stresses, these American and Canadian differences were evident in the continuing expansion of provincial polio policies, and sharpened with the federal management of a new polio prophylactic, gamma globulin, in 1952-53, and then the Salk vaccine in 1954-55.

## <u>CHAPTER 6:</u>

## The Fourth Wave, 1947-1953: Summers of Fear, Desperate Hopes and the Federal Politics of Polio

The fourth wave of major polio epidemics in Canada was the most severe the country ever faced. It began in 1947 with a number of major provincial epidemics,<sup>1</sup> followed by others between 1949 and 1951. and especially in 1952 and 1953. These years were also punctuated by a series of severe and unusual outbreaks in isolated regions of the country during the fall and winter. The most extraordinary of these involved a community of Eskimos during the winter of 1948-49, necessitating the largest quarantine in Arctic history. During this period there were alarming numbers of adult cases and many who required iron lungs. The fourth polio wave climaxed with severe epidemic situations in many provinces in 1952, followed in 1953 with a unprecedented polio cricies in most parts of the country in which the national case rate doubled that of 1952 (see Figure 1 and Tables 1,2,3 and 4). The western provinces felt the brunt of the 1952 and 1953 epidemics. Manitoba was hit the hardest in 1953, to a degree rarely matched in the history of this disease. Through this period, on many levels, scientific, social and political, epidemic polio became one of the most urgent national health issues in Canada.

After 1947, polio became a growing concern of the federal government. It was under pressure from the provinces to investigate worsening epidemics and to prepare for the eventuality of testing a polio vaccine. Ottawa's direct involvement in polio grew significantly in the wake of the 1952 epidemics, which had coincided with American enthusiasm for another immune serum, gamma globulin (GG). This serum was made from a highly concentrated blood fraction that promised a degree of passive protection against polio for case contacts. Echoing the provincial response to

In 1946 a national case notification rate of 20.6 was reported, while in 1947 it was 18.3. In 1946 most cases were focused in Quebec (at a 44.4 case rate), and other than P.E.I, no other province reported rates above 20. In 1947 B.C., Saskatchewan and Manitoba each reported case rates up to and over 30 per 100,000, with Manitoba reaching 79.4.

convalescent serum during the first epidemic wave, the dramatic American publicity surrounding GG, and the NFIP's massive field trials in 1952, generated intense pressure for its use in Canada. Ottawa was the focus of provincial pressure as there was no blood fractionation capacity in Canada and only the federal government, through Connaught Laboratories, could expedite one in time for the 1953 polio season.

The increasingly severe and unpredictable polio epidemics of the fourth wave were highly problematic and dramatically challenged provincial and local health care infrastructures. Beyond dealing repeatedly with intense epidemic situations generally, provincial governments increasingly faced dangerous shortages in hospital space, special equipment, such as iron lungs, and trained nursing staff, upon whom, in the wake of the Kenny revolution, the burden of acute and long-term treatment was greatest. In response, most provinces were forced to establish or expand polio hospitalization and treatment policies. Such policies depended on the cooperation of the medical profession, city hospitals and municipal governments. Conflict often flared over insufficient financing, improper hospital accommodation, and the question of who controlled and paid for medical treatment.

The severity of the 1953 polio experience in Canada had significant national implications. Gamma globulin finally offered some hope of a specific preventive agent against polio. It seemed that something could finally be done, and in 1953, the federal government took ultimate responsibility for doing it. This was a new federal initiative since the distribution of such public health biologicals was traditionally an exclusive provincial responsibility, although it was financed jointly through the Federal Health Grants program. More significantly, as the GG supply was very limited, this federal role ensured a tightly controlled and centralized national reserve. This supply, produced by Connaught, was distributed freely according to strict standards set by a National Advisory Committee on Gamma Globulin to those provinces and

individuals most threatened by the disease. This pattern was expanded further with the introduction of the Salk vaccine.

## 6.1) Worsening Epidemics and Post-War Federalism, 1947-1951

Between 1947 and 1951 polio epidemics in Canada struck provinces seriously, but, as noted in the previous chapter, coincided with an effort by many in the medical community and the popular press to downplay polio's relative seriousness and the chances of an individual child being stricken by it. This conservatism was undermined on many levels after 1947, and especially after 1949, because of changes in the demographics of whom polio struck, how it struck, where it struck, and what could be done about it.

Paralytic polio was no longer perceived strictly as a childhood disease. Growing numbers of adolescents and adults were being stricken, most alarmingly by the severe and deadly effects of bulbar polio, requiring intensive nursing and technological support from iron lungs and other specialized equipment. The challenge of bulbar polio and bulbar-spinal polio was "perhaps more complex than in any other type of bedside nursing,"<sup>2</sup> and clearly "one of the most arduous nursing jobs" nurses could face.<sup>3</sup> By threatening more than just children, adult polio cases raised new problems as polio could suddenly destroy the financial security of middle class individuals and families. Within the context of a rapidly expanding post-war economy and a dramatic rise in the numbers of young middle class families, this alarming shift in polio incidence further compounded the emotional and political impact of this disease.

B. Montizambert, "Nursing Care of a Patient in a Respirator," Canadian Nurse, 50 (June 1954): 463. See also A.J.W. Alcock, "Respiratory Involvement in Acute Poliomyelitis," University of Manitoba Medical Journal, 25 (Dec.-Jan. 1953-54): 35.

<sup>&</sup>lt;sup>3</sup> Chandler, "Small in Number, A 'Fighting' Few Stand Polio Siege," *Winnipeg Free Press*, (Sept. 5, 1953). See also J.H. Maxwell, "The Iron Lung: Halfway Technology or Halfway Step?" *Milbank Quarterly*, 64 (1986): 3-29.

Moreover, the severe and unexpected polio outbreaks during the winter and in isolated communities that did not follow the familiar summer "polio season" pattern, most notably among Arctic Eskimos, challenged conventional wisdom about polio. They contributed to a growing perception that the real odds of getting polio in Canada were actually much worse than previously believed.

Symbolic of this dramatic shift in incidence were frightening reports of pregnant mothers being stricken by bulbar polio and giving birth while in an iron lung.<sup>4</sup> For one young Toronto family in August 1951 the headlines rapidly went from hopeful: "Mother Stricken By Polio, Baby Born In Iron Lung: Report Condition Good;" to tragic: "Born To Mother In Iron Lung, Baby Girl Dies 5 Hours Later;" to devastating: "Iron Lung Mother Dies of Polio."<sup>5</sup> The experience of a Winnipeg woman was particularly harrowing, though less tragic. She was eight months pregnant when struck by polio in 1953. Total paralysis quickly ensued and she was placed in an iron lung. Fifteen hours later she gave birth to a healthy baby boy while still inside the respirator, where she remained for the next six months.<sup>6</sup> There were a number of other polio survivors who were pregnant at the onset of polio. Some miscarried soon after onset, others gave birth prematurely, and many bore full term healthy babies during their early polio recovery period.<sup>7</sup>

These changing circumstances had a number of important effects during major provincial polio epidemics and created serious challenges for provincial governments and for Ottawa. The continuing and growing problem of polio epidemics, and

<sup>&</sup>lt;sup>4</sup> One of the first Canadian reports of this occurred in Toronto in August 1949; (Canadian Press), "Woman Gives Birth to Child During Worst Stage of Polio," London Free Press, (Aug. 26, 1949). In this case the child was born healthy. Occasionally, the unborn child contracted polio before birth; (Associated Press, Milwaulkee), "Find Polio Virus in Unborn Child," Ottawa Journal, (May 12, 1953).

<sup>&</sup>lt;sup>5</sup> "Mother Stricken By Polio, Baby Born in Iron Lung," *Globe and Mail*, (Aug. 10, 1951); "Born To Mother In Iron Lung, Baby Girl Dies 5 Hours Later," *Globe and Mail*, (Aug. 11, 1951); "Iron Lung Mother Dies Of Polio," *Globe and Mail*, (Aug. 13, 1951).

<sup>6</sup> Yvonne H. (1953, age 25, Winnipeg, Man.), July 1993.

Marie H. (1947, age 26, Surrey, BC), August 1993; Hattie J. S. (1949, age 23, Niagara Falls, Ont.), June 1993; Yvette M. M. (1951, age 28, St. Catherines, Ont.), June 1993; Beatrice E. T. (1951, age 26, Truro, NS), May 1993: Jean E. K. (1953, age 34, Barrie, Ont.), June 1993.

other mysterious virus disease outbreaks, placed mounting pressure on the federal government to assist with their management, investigation and control. The Manitoba polio epidemic of 1947 was complicated by an outbreak of another undetermined virus infection that was difficult to differentiate from mild polio. These outbreaks highlighted medical helplessness against virus diseases, which had become "the most important medical problem of our day." Protection against them was "no better than that against smallpox in the days of Sydenham." Manitoba, in particular, seemed to be "a proven hotbed of virus infection," and a modern laboratory for virus identification was clearly needed in the province, as well as in Ottawa.<sup>8</sup>

By 1947 there was a sympathetic ear in Ottawa with the Minister of National Health and Welfare, Paul Martin, who, with officials in his Department, responded as energetically as possible. Martin planned to develop modern laboratory facilities to track virus diseases, and prepared for the eventuality of a polio vaccine, since Ottawa would be responsible for its testing.<sup>9</sup> Yet, in the summer of 1947, Ottawa's Laboratory of Hygiene was severely lacking in space, equipment and staff trained in virology. A one million dollar federal laboratory building was proposed but delays and "overcrowded conditions" forced a move to temporary quarters. Martin also followed the advice of the Rockefeller Foundation and recreated the Division of Epidemiology, which had been disbanded in 1937, to facilitate virus field work.<sup>10</sup> A telegraph reporting

Manitoba Department of Health and Public Welfare, Annual Report, 1947 (Winnipeg: 1948),
p. 107; J.D. Adamson and R.H. McFarlane, "Virus Epidemic - 1947," Manitoba Medical Review, 27 (Oct. 1947): 570-73.

Thomas Sydenham (1624-1689) was known as the "English Hippocrates." His significance stemmed from his clinical observation and reasonable degree of treatment. In his management of epidemic diseases, such as "the fevers," he focused on mainly on observing and classifying them according to species and origin; Erwin H. Ackerknecht, A Short History of Medicine (Revised Edition) (Baltimore: Johns Hopkins University Press, 1982), p. 122-23.

<sup>9</sup> Memo, D.G.W. Cameron, Deputy Minister of National Health and Welfare, to Paul Martin, Minister, July 16, 1947, NAC, RG29, Vol. 192, file 311-P11-1, part 1; "Poliomyelitis in Canada," Presentation to First International Poliomyelitis Conference, New York City, July 12-17, 1948, NAC, RG29, Vol. 194, file 311-P11-3, part 1.

<sup>10</sup> Memo, Cameron to Martin, July 16, 1947, NAC, RG29, Vol. 192, file 311-P11-1, part 1. This Rockefeller Report was written by Dr. D.F. Milam and entitled "A Survey of the Epidemiological Services in Canada: 1947," and recommended that the reborn Epidemiology Division

service was also established so each province could regularly report polio incidence directly to Ottawa.<sup>11</sup> With a personal interest in the effects of polio and a clear goal to bring in federal health insurance, Martin was determined to exploit every opportunity to expand his department's involvement in the study and management of this disease. Martin's first opportunity came from British Columbia.

When it appeared that British Columbia was headed for a significant outbreak in 1947, the B.C. Deputy Minister of Health, Dr. G.F. Amyot, wasted little time in informing his counterpart in Ottawa, G.D.W. Cameron, of the situation. This was the worst outbreak since 1927 and involved a total of 312 cases and 12 deaths that were focused mainly in Vancouver.<sup>12</sup> To help deal with the situation, complicated by isolated outbreaks across the province's rugged geography, a special "polio team" provided nursing and general assistance with the disease in outlying areas of the province.<sup>13</sup> As was the case in the other western provinces, Amyot encountered a shortage of special medical and nursing personnel in the province and he turned to Ottawa for assistance.<sup>14</sup> He also requested space in federal Veteran's Hospitals for polio cases, and extra hospital equipment. Ottawa assured Amyot that it would help in any way it could.<sup>15</sup>

British Columbia's request for federal assistance was necessitated, in part, by the recent establishment of a comprehensive provincial Department of Health and

provide "investigative, control and information services," Department of National Health and Welfare, Annual Report, 1948-49 (Ottawa: 1949), p. 31-2.

<sup>&</sup>lt;sup>11</sup> Memo, Cameron to Martin, July 10, 1947, NAC, RG29, Vol. 201, file 311-P11-17, part 1.

British Columbia Department of Health and Welfare, Annual Report, 1947 (Victoria: 1948), p. 19; Report, "Poliomyelitis in the Province of British Columbia, 1947," attached to Letter, J.A. Taylor, Director, Local Health Services, B.C. Department of Health and Welfare, to A.F.W. Peart, Chief, Division of Epidemiology, Department of National Health and Welfare, July 29, 1948, NAC, RG29, Vol. 193, file 311-P11-2, part 1.

<sup>13</sup> Letter, G.F. Amyot, to all B.C. Medical Officers of Health, July 17, 1947, Ibid..

<sup>&</sup>lt;sup>14</sup> Letter, Dr. J.S. Cull, Deputy Provincial Health Officer, B.C., to Dr. H.A. Ansley, Assistant Director, Public Health Services, Department of National Health and Welfare, July 29, 1947, NAC, RG29, Vol. 201, file 311-P11-16.

<sup>15</sup> Letters: Amyot to Cameron, July 19, 1947; Ansley (for Cameron) to Amyot, July 22, 1947, *Ibid.*.

Welfare in 1946. Until then, B.C.'s management of public health was based on the simpler advisory structure of a Provincial Board of Health and decentralized local services. Such Boards generally set provincial public health regulations, but left their implementation to regional or local authorities. The provincial government had thus grown more dependent than other provinces upon community groups and voluntary health organizations.<sup>16</sup> These agencies were responsible for procuring any special equipment, such as iron lungs. Most were cld "Nuffield" models supplied by the B.C. Red Cross, although two respirators were sent from the Quebec Command of the Canadian Legion. The Kinsmen Club of Vancouver played a major role, providing large quantities of equipment, paying for additional hospital personnel, and providing financial assistance to many patients. The government also turned to the NFIP for literature, advice and the loan of some equipment.<sup>17</sup>

This B.C. epidemic presented a chance for Martin's Department and the Laboratory of Hygiene to demonstrate Ottawa's new interest in studying polio.<sup>18</sup> An ambitious survey of the poliovirus was planned based on "pathological samples" taken from acute, convalescent and recovered polio cases in the Vancouver area, as well as those not affected. These samples were supposed to be tested in the Laboratory of Hygiene by its virologist, Dr. J.W. Fisher,<sup>19</sup> but plans soon changed. Connaught Laboratories was asked to do the actual laboratory tests through monkey inoculations, but required that Ottawa pay for the twelve monkeys that were needed at a cost of \$65 each. The total figure of \$780 came as a shock to the Chief of the Laboratory of Hygiene, James Gibbard, and to Cameron, leading them to conclude that "the value of the

<sup>16</sup> G.F. Amyot and R.D. Defries, "The British Columbia Department of Health Services and Hospital Insurance," in Defries (ed.), The Federal and Provincial Health Services in Canada, (Toronto: Canadian Public Health Association, 1956), p. 130-33.

<sup>17</sup> Report, "Poliomyelitis in the Province of British Columbia, 1947," NAC, RG29, Vol. 193, file 311-P11-2, part 1.

<sup>18</sup> Letter, D.V. Hutton, Paediatric Specialist, Division of Child and Maternal Health, Department of National Health and Welfare, to E. Couture, Director, Division of Child and Maternal Health, September 30, 1947, NAC, RG29, Vol. 204, file 311-P11-28, part 1.

<sup>19</sup> Press Release, Department of National Health and Welfare, "Polio Studies in B.C.," September 2, 1947, NAC, RG29, Vol. 201, file 311-P11-16.

information secured would not justify the cost of securing it."<sup>20</sup> This naturally upset the B.C. participants.<sup>21</sup> The project was an embarrassment for Ottawa, reflecting the minimal federal resources devoted to health in 1947 (\$8,000,000, or 0.36% of the total federal budget)<sup>22</sup> and indicated limited appreciation for the complexities and expense involved in polio research. Further federal polio studies of this nature were limited for the next few years and largely dependent upon the assistance of Connaught.<sup>23</sup>

For most provinces continuing epidemics stretched and redefined existing polio policies. Hospitals or clinics specially designated by provincial polio policies, and equipped to manage polio cases, became increasingly limited and often overwhelmed as epidemics worsened. A major problem for many provincial governments was severe shortages of nurses and other medical and support staff.

Saskatchewan's 1947 epidemic<sup>24</sup> placed considerable pressure on the province's Polio Clinic in Saskatoon, established in 1943, and the two added in Regina and Moose Jaw during the 1947 epidemic. Financed by the province under North America's first tax-supported system of comprehensive hospital insurance, that began in January 1947,<sup>25</sup> these Polio Clinics offered unlimited free hospital, nursing and medical services. The bulk of the work fell to public health nurses who applied the Kenny treatment methods under the general direction of a physician-consultant. Under the strain of the epidemic an acute shortage of Kenny-trained nurses and staff soon

<sup>20</sup> Letters: James Gibbard, Chief, Laboratory of Hygiene, to Defries, February 18, 1948; Defries to Gibbard, February 20, 1948; Gibbard to Defries, February 25, 1948, Connaught Archives (CA), 83-015-05, file 5/7.

Letter, Hutton to Couture, September 30, 1947, NAC, RG29, Vol. 204, file 311-P11-28 part 1.

<sup>&</sup>lt;sup>22</sup> F.H. Leacy, M.C. Urquart and K.A.H. Buckly (eds.), *Historical Statistics of Canada* (Second Edition) (Ottawa: Statistics Canada, 1983), Table H19-34, Federal government budgetary expenditute, classified by function, 1867-1975.

Letter, Gibbard te all Provincial Laboratories, July 9, 1948, NAC, RG29, Accession 83-84/119, Vol. 30, file 355-P-4, part 3.

<sup>24</sup> There were 277 cases and 12 deaths, with a case notification rate of 33.1 per 100,000; Saskatchewan Department of Public Health, Annual Report, 1947 (Regina: 1948), p. 22; D.M. Hopkins, "Poliomyelitis Clinics in Saskatchewan," Canadian Nurse, 44 (Aug. 1948): 633-35.

<sup>25</sup> C. David Naylor, Private Practice, Public Payment: Canadian Medicine and the Politics of Health Insurance, 1911-1966 (Montreal: McGill-Queen's University Press, 1986), p. 141-42.

developed. To meet the crisis the provincial government attempted to limit the numbers of cases referred to the clinics by local MOHs. They were asked to keep suspected cases under the care of their physicians until definite paralytic signs appeared.<sup>26</sup> Despite this hope of lessening the number of patients, there was a strong attraction to these clinics and their comprehensive free polio care.

A nursing shortage also became a serious challenge for Manitoba in managing its 1947 epidemic,<sup>27</sup> compounded by rising numbers of bulbar cases who required 24hour nursing care. The Minister of Health, as in 1941, reestablished a Poliomyelitis Advisory Committee, along with a Nursing Committee to focus on this issue.<sup>28</sup> It was decided to turn to the press to recruit both trained and untrained volunteer nurses.<sup>29</sup> The province's polio policy of 1941 remained in force. It provided three weeks of free post-acute hospitalization, but medical fees and special nursing costs were not covered. It was the patient, or their local municipality's responsibility, to "carry the burden" of further treatment.<sup>30</sup>

Provincial polio policies made a considerable difference for everyone involved. Most were "very pleased" with the help they received, which many polio survivors recall covered everything automatically, even if they had such hospital insurance as Blue Cross.<sup>31</sup> But the financial burden forced on many polio patients under

<sup>26</sup> Memo, LS. Rosenfeld, Director, Division of Regional Health Services, Saskatchewan Department of Public Health, to All Regional MOHs, July 28, 1947, Saskatchewan Archives Board (SA), R194, file 31p.

<sup>27</sup> The epidemic involved 587 cases and 7 deaths, at a case rate of 79.4; Manitoba Department of Health and Public Welfare, Annual Report, 1947 (Winnipeg: 1948), p. 107. See also Harry Medovy, A Vision Fulfilled: The Story of The Children's Hospital of Winnipeg, 1909-1973 (Winnipeg: Peguis Publishers Ltd., 1979), p. 58-62.

<sup>28</sup> F.W. Jackson, "Report of Special Committee on Poliomyelitis," attached to Memo, Jackson to Schultz, August 16, 1947, MA, G157, Box 43, file H-4-9-2.

<sup>&</sup>lt;sup>29</sup> Manitoba Department of Health and Public Welfare, Annual Report, 1947, p. 108-09.

<sup>30</sup> Ibid., p. 108; Letters: I. Schultz, Minister of Health and Public Welfare, Manitoba, to (a citizen), Belmont, Manitoba, April 5, 1948; Schultz to M.R. Sutherland, M.L.A., Griswold, Manitoba, July 28, 1948, MA, G157, Box 43, file H-4-9-2.

<sup>31</sup> Joseph E. W. (1944, age 24, St. Catherines, Ont.), May 1993; Margaret M. (1951, age 25, Toronto, Ont.), May 1993; Yvette M. M. (1951, age 28, St. Catherines, Ont.); Betty F. (1952, age 22, Calgary, Alb.), May 1993; Margaret L (1952, age 6, Toronto, Ont.), June 1993.

limited provincial programs, and particularly after such policies expired, was often "devastating."<sup>32</sup> For example, in 1951, the parents of an 11-year-old Toronto girl went "thousands of dollars into debt... over \$10,000, which at that time was a lot of money, particularly for a family with five children."<sup>33</sup> The impact was not always financial. When a 17-year-old surveyor in northern Quebec was stricken by polio, the immediate costs to his family were quite minimal, "but the long term cost[s], I believe were immense." He was unable to return to school and went from being an honour student to a drop-out because "There was no help available to get me back in the stream."<sup>34</sup> For those stricken in the absence of an epidemic, or in isolated regions, government polio programs seemed less accessible.<sup>35</sup> There were also puzzling cases which apparently did not receive government benefits for reasons unclear.<sup>36</sup> One woman had just paid the premium for B.C.'s Hospital Insurance Plan the day before she was stricken with polio. She recalled that this "saved us from financial ruin. Undergoing such a major illness, the freedom from worry which such insurance gave us had a major impact on my recovery."<sup>37</sup>

In some provinces, the government's polio policy, while generous to patients, could generate controversy among physicians and hospital administrators. Sometimes policy changes were demanded, backed up by threats of refusing to accept or treat polio cases. Just such a dangerous situation developed in Ontario in 1947 after two years of high polio incidence.<sup>38</sup> Western Ontario was particularly hard hit, placing considerable stress on London's Victoria Hospital (LVH), one of Ontario's eight

- 12

Zosia E. (1946, age 6 months, Drummondville, Que.), May 1993; Mary G. (1953, age 33, Mission, BC), September 1993.

<sup>33</sup> Barbara D. W. (1951, age 11, Toronto, Ont.), September 1993.

<sup>&</sup>lt;sup>34</sup> Jacques d'A. (1951, age 17, Montreal, Que.), May 1993.

<sup>35</sup> Charles L. B. (1942, age 9, Windsor, Ont.), May 1993; Anne B. (1951, age 2, Chipman, NB), May 1993.

<sup>36</sup> Barbara D. W. (1951, age 11, Toronto, Ont.).

<sup>37</sup> Betty K. (1951, age 25, Fruitvale, E.), August 1993. See also Mary G. (1953, age 33, Mission, BC), September 1993.

<sup>38</sup> Ontario Department of Health, Annual Report, 1947 (Toronto: 1948), p. 13-20.

designated polio treatment hospitals.<sup>39</sup> With this program, Deputy Minister of Health, J.T. Phair, was confident that Ontario had gone "farther than any other provincial government, or any other type of government, in the provision of care for those suffering from polio."<sup>40</sup> The province essentially offered free hospital, nursing and medical treatment to all polio cases for as long as considered necessary. Polio Committees in each designated hospital were collectively responsible for providing and directing all necessary treatment, with the province paying a standard per diem rate fc.r each case. However, the London Polio Committee disliked the fact that the policy prevented them from billing individual patients or their insurance companies for medical services; even if some patients or their families could easily afford to pay. The policy also precluded cases from being treated by their family physician.<sup>41</sup>

Polio Committees were also responsible for securing a properly trained nursing staff and deciding on the type of treatment practiced in each of the designated hospitals. On the latter question a "sharp division" developed within the London Polio Committee. There was an obvious clash between a majority "more or less wedded" to the orthodox methods used in 1937, and a minority who favoured the widely accepted, though modified Kenny methods. This conflict spread and became public, sparked by a sharply critical newspaper editorial that originated in Stratford. The editorial highlighted the overcrowded conditions at LVH for polio patients, threatening the care of other patients there. The overall treatment of polio cases sent to London was thought to be poor and it was up to the hospital's management to remedy such "deplorable" conditions. The editorial also criticized the government for requi-

Report and maps, "Poliomyelitis, 1947 - Western Ontario Area," November 14, 1947, Archives of Ontario (AO), RG10-106, file 250.8; Letter, D.S. Puffer, Assistant Chief MOH, Ontario, to all MOHs in Ontario, June 27, 1947, AO, RG10-106, file 250.22. These designated hospitals were Hamilton General Hospital, Kingston General Hospital, Victoria Hospital in London, Ottawa Civic Hospital, Toronto General Hospital, Hospital for Sick Children in Toronto, Riverdale Isolation Hospital in Toronto, and Fred Adams Memorial Hospital in Windsor.

<sup>&</sup>lt;sup>40</sup> Letter, J.T. Phair, Deputy Minister of Health, Ontario, to W.M. Abraham, Kent County Clerk, June 23, 1948, AO, RG10-106, file 250.22.

<sup>41</sup> Editorial, "The Treatment of Polio," Stratford Beacon-Herald, (Nov. 11, 1947), reprinted in the London Free Press, (Nov. 14, 1947).

ring the Committee doctors to serve without extra pay despite the "unusually heavy burden" they carried in treating polio cases, especially during an epidemic.<sup>42</sup>

Victoria Hospital's administration and a number of members of its Polio Committee were understandably upset by the editorial's charges, calling them unjust and "app:oaching libel."<sup>43</sup> After failing to gain the support of Reg Hopper of the Ontario Society for Crippled Children,<sup>44</sup> but with the support of the Ontario Medical Association and the London Academy of Medicine,<sup>45</sup> the LVH group pressured the government to modify its polio policy. Of primary concern was the need for increased funding from the province that better reflected the real costs of polio treatment.<sup>46</sup> The LVH administration demanded changes in the polio policy or else the hospital would refuse to admit any more polio patients. With no changes made by the spring of 1948, the hospital made good on its threat.<sup>47</sup>

This conflict was of major concern to many in Western Ontario. Should a polio epidemic strike, all cases in the region could only be treated at LVH since no other hospitals were capable of isolating acute polio cases. The small local governments of the region were also unable or unwilling to cover the potentially high costs of polio care.<sup>48</sup> Similar problems were also evident in other designated hospitals in the province, particularly with the widening gap between the actual costs of treating polio cases and the amount the province paid.<sup>49</sup> The government held its ground.<sup>50</sup> No

<sup>42</sup> Ibid..

<sup>&</sup>lt;sup>43</sup> Letter, L.J. Crozier, Superintendent, Victoria Hospital, London, to R.W. Hopper, Executive Director, OSCC, November 14, 1947, AO, RG10-106, file 250.8.

<sup>44</sup> Letters: G.A. Ramsay, LVH Polio Committee, to Hopper, November 14, 1947; Hooper to Crozier, November 18, 1947, *Ibid.*.

<sup>45</sup> Letter, Ramsay to Hopper, November 14, 1947, *Ibid.*.

<sup>&</sup>lt;sup>46</sup> Meeting Agenda, Victoria Hospital Medical Advisory Board and Polio Committee with J.T. Phair, Deputy Minister of Health, November 24, 1947, *Ibid.*.

<sup>47</sup> Editorial, "New Deal on Polio is Urgently Needed," Stratford Beacon-Herald, (May 7, 1948).

<sup>&</sup>lt;sup>48</sup> Letters: Abraham to Phair, June 16, 1948; Phair to Abraham, June 23, 1948, AO, RG10-106, file 250.22.

<sup>49</sup> Letter, Dr. J.B. Neilson, Superintendent, Hamilton General Hospital, to Phair, January 21, 1948, *Ibid.* 

<sup>&</sup>lt;sup>50</sup> Letter, Phair to Neilson, January 29, 1948, Ibid.

agreement to change the policy was made before the start of the 1948 polio season; the province managed to convince LVH to keep its doors open to polio patients, but only for another few years. In an effort to conserve often inadequate hospital accommodations, the province decided to "restrict such space as is available to those in which the diagnosis is obvious."<sup>51</sup>

In Ottawa, Deputy Minister Cameron closely followed the controversy over Ontario's policy. He understood that the policy cost the government at least \$100,000 a year, and that it deserved credit for such an "ambitious scheme." Nevertheless, Cameron felt that the criticism of the policy contained "a good deal of truth." Moreover, Ontario's problems reflected the larger problem of properly managing chronic and convalescent cases in need of lengthy hospitalization and specialized nursing care. Cameron recommended to Martin, "we should not support a proposal to establish special hospitals for polionyelitis."52 Specialized polio treatment belonged in general hospitals, or more preferably, "in special institutions for the care of chronic and convalescent cases of all kinds." This was a general problem that was under consideration as part of the so-called "Green Book Proposals" for national health insurance that were tabled in 1945-46.53 The Ontario controversy over polio hospitalization added further weight to Martin's plans for health insurance and reinforced the need for more immediate federal support for provincial health care facilities, such as hospitals. These circumstances and worsening polio epidemics were important catalysts in Martin's spring 1948 decision to separate an extensive program of Federal Health Grants to the provinces from the larger and politically problematic "Green Book" proposals.

<sup>51</sup> Letters: Phair to all MOHs in Ontario, July 3, 1948, *Ibid.*; Phair to all Ontario physicians, August 3, 1948, NAC, RG29, Vol. 194, file 311-P11-3, part 1; Phair to all Ontario physicians, August 2, 1949, NAC, RG29, Vol. 192, file 311-P11-1. part 2.

<sup>52</sup> Memo, Cameron to Martin, February 21, 1948, NAC, RG29, Vol. 192, file 311-P11-1, part 2.

<sup>53</sup> Ibid.; See also Naylor, Private Practice, Public Payment, p. 152-53; Paul Martin, A Very Public Life, Vol. II: So Many Worlds (Toronto: Deneau, 1985), p. 36-49.

The \$30 million annual Federal Health Grants program was formally announced on May 18, 1948, more than doubling the federal health budget. It involved a variety of provincial grants for general public health development, including public health research, hospital construction, mental health, tuberculosis, venereal disease and cancer control, as well as for crippled children.<sup>54</sup> Crippled Children Grants for 1948-49 totalled \$500,000 and were particularly relevant for provincial polio programs. With matching provincial funds, these grants helped pay for personnel training, and finance specialized equipment, hospital expansions for orthopaedic treatment and the extension of specific polio policies. The grants were also important for the management of other, less dramatic crippling conditions, such as cerebral palsy. The money was distributed in the form of a basic \$4,000 grant to each province, with the rest distributed on a provincial per capita basis. However, these grants, and most provincial polio policies, were designed primarily around the needs of children crippled by polio, while the more complex issues of adult and bulbar polio were rarely mentioned.<sup>55</sup>

<sup>54</sup> Naylor, Ibid.; Martin, Ibid.; D.G.W. Cameron, "The Department of National Health and Welfare," in Defries (ed.), The Federal and Provincial Health Services in Canada (Toronto: Canadian Public Health Association, 1956), p. 10. The federal government defined a crippled child as "a person under 21 years of age who. because of disease, accident or defect, is restricted in his normal muscular movements." The federal health budget jumped from \$8,000,000 in 1947, to \$19,000,000 in 1948, to \$30,000,000 in 1949; Leacy, Urquart and Buckly (eds.): Historical Statistics of Canada, table H19-34.

<sup>55</sup> Saskatchewan, in particular, took a leading role in the process of reviewing their already extensive polio treatment policy and canvassed the other provinces in early 1950 to find out about how they dealt with polio; Memo, S.C. Best, Director, Division of Communicable Diseases, Saskatchewan Department of Public Health, to T.J. Bentley, Minister of Public Health, December 19, 1949, SA, R11, file 14-3; Letter, Bentley to all Provincial Ministers of Health, April 22, 1950, SA, R11, file 14-87.

Newfoundland had an outbreak in 1949 and handled acute polio like other communicable disease and flew cases to the provincial isolation hospital in St. John's for free treatment, and if necessary to the St. John's General Hospital for free after-treatment. For ordinary accommodation and treatment, no means test was applied; Letter, J.R. Chalker, Minister of Health, Newfoundland, to Bentley, May 16, 1950, SA, R11, file 14-87.

In Quebec, all patients or their families were responsible for their own hospitalization and medical costs, and if they could not pay they became subject to the Quebec Public Charities Act, which did administer a means test; Letter, J. Grêgoire, Deputy Minister of Health, Quebec, to Bentley, April 27, 1950, SA, R11, file 14-87. See also P.A. Linteau (*et al.*), *Quebec Since 1930* (Toronto: James Lorimer and Co., 1991), p. 235.

Alberta was quick to apply for a Crippled Children's Grant after its worst polio epidemic to date in 1948. The money was earmarked to extend free hospital treatment services to those affected by paralytic polio prior to the enactment of the province's Poliomyelitis Sufferer's Act of 1938, to whom the original Act did not apply.<sup>56</sup> To meet a polio crisis in 1949, Nova Scotia also turned to Ottawa and received a Crippled Children's Grant. Out of 85 cases, 20 were bulbar cases, with most of these involving adults. Half of the bulbar cases died.<sup>57</sup> This serious situation taxed the very limited facilities of the Halifax Polio Clinic, highlighting the need for new equipment, especially iron lungs. The grant helped buy two new respirators, a resuscitator and an oxygen tent for the Polio Clinic.<sup>58</sup> This new equipment was welcome, but was not

In 1949 B.C. established a premium based provincial hospital insurance program which provided standard ward care for \$1.00 per day charged to the patient. Otherwise, the province had no established polio treatment policy or specialized facilities for acute or longterm polio care other than by voluntary agencies, in particular the recently established Western Society for Physical Rehabilitation: Letter Amyot to Bentley, May 2, 1950, SA, R11, file 14-87. See also G.F. Amyot and R.D. Defries, "The British Columbia Dep.rtment of Health Services and Hospital Insurance," in Defries (ed.), *The Federal and Provincial Health Services in Canada* (Toronto: Canadian Public Health Association, 1956), p. 140-41.

New Brunswick's policy paid a standard, all-inclusive per diem hospitalization grant for each duly reported polio case admitted to the Fredericton Polio Clinic, but it did not cover transportation, diagnosis or physician's fees; New Brunswick Department of Health, Annual Report, 1953 (to March 31, 1953), (Fredericton: 1953), p. 59. No letter from New Brunswick was found in the Saskatchewan Archives in response to Bentley's inquiry.

In Nova Scotia, the province owned and operated the polio clinic at Victoria General Hospital in Halifax and charged the patient, or municipality, a per diem rate of between \$6.00 and \$7.00; Letters: A.H. McKinnon, Minister of Public Health, Nova Scotia, to Bentley, May 3, 1950, SA, R11, file 14-87; J.S. Robertson, Deputy Minister of Health, Nova Scotia, to Phair, March 5, 1953, AO, RG10-106, file 249.2.

P.E.I had no specific polio policy after May 1949 when it shut down the special Treatment Centre for Crippled Children in the Provincial Tuberculosis Sanatorium in Charlottetown. An orthopaedic consultant was retained from Halifax and the province gave a special grant of \$5,000 to the provincial Red Cross to help with their handling of polio treatment; Letter, A.W. Matheson, Minister of Health and Welfare, P.E.I., to Bentley, May 19, 1950, SA. R11, file 14-8; P.E.I. Department of Health and Welfare, Annual Report, 1950 (to March 31, 1950), (Charlottetown, 1950), p. 161.

56 Department of National Health and Welfare, Annual Report, 1949 (to March 31, 1949), (Ottawa: 1949), p. 83-84; Alberta Department of Public Health, Annual Report, 1948, (Edmonton: 1949), p. 17-18, 31. Alberta had a total of 380 cases and 28 deaths in 1948.

- 57 Nova Scotia Department of Public Health, Annual Report, 1949 (Halifax: 1950), p. 37, 242-45.
- 58 Department of National Health and Welfare, Annual Report, 1951 (to March 31, 1951) (Ottawa: 1951), p. 30-31; Nova Scotia Department of Public Health, Annual Report, 1951 (to March 31, 1951) (Halifax: 1951), p. 244.

enough to manage the 428 cases and 24 deaths across the province in 1951, forcing the opening of new polio wards "almost overnight" and the hiring of extra nurses. The epidemic also placed enormous pressure on the Halifax Infectious Diseases Hospital, as well as the Polio Clinic since "Local hospitals are for the most part loath to handle these patients."<sup>59</sup>

By the late 1940s and early 1950s the poliovirus was more readily brought to widely dispersed areas of the country. This was facilitated by rapid post-war economic development, particularly in the Canadian North, expanded military and resource exploration activity, and increased levels of rapid intercontinental and international air travel. Many isolated areas had rarely been exposed to the poliovirus, and then likely only to one of the three distinct types. Such communities were thus vulnerable to outbreaks of the disease that affected a broader age group than in the more settled areas of the country. Also particularly vulnerable were the "better areas" of rapidly growing suburban centres like Winnipeg and Edmonton, among many others across Canada.<sup>60</sup> Another contributing factor was an accelerating decline in breast feeding, particularly among young urban and suburban mothers and a resulting decline in the transmission of maternal antibodies, including polio antibodies.<sup>61</sup>

Underlying this situation, and the major epidemics of 1952 and 1953, was the emergence of the "baby boom" generation and the growing polio hazard of a large population of newborn infants and toddlers with unusually young parents.<sup>62</sup> Once exposed, the poliovirus rapidly multiplied in the gastrointestinal tract of such children, and masked as a mild or "flu-like" illness, quickly spread within families and

<sup>&</sup>lt;sup>59</sup> Nova Scotia Department of Public Health, Annual Report, 1952 (to March 31, 1952), (Halifax: 1952), p. 14, 165, 223-25.

<sup>&</sup>lt;sup>60</sup> "Polio Incidence Highest in City's 'Better Areas,' Elliott Tells Meeting," Winnipeg Free Press, (July 7, 1953).

<sup>&</sup>lt;sup>61</sup> Rima D. Apple, Mothers and Medicine: A Social History of Infant Feeding, 1890-1950 (Madison: University of Wisconsin Press, 1987), p. 150-83.

<sup>62</sup> Veronica Strong-Boag, "Home Dreams: Women and the Suburban Experiment in Canada,1945-1960," Canadian Historical Review, 72 (1991): 471-504; Robert Bothwell, Ian Drummond and John Englisn, Canada Since 1945: Power, Politics and Provincialism (Toronto: University of Toronto Press, 1981), p. 26-33.

communities. This was most often through changing diapers and the resultant soiling of towels and other household articles. Many polio survivors recall such youngsters were sick around the time of their polio onset, but a direct connection was not often recognized unless these children went on to develop polio along with their sibling(s) and/or parent(s).<sup>63</sup> Instead, adult polio case survivors frequently attributed their illness to being "run down" and in a "weak and vulnerable condition."<sup>64</sup>

A dramatic signal of this turning point in polio's distribution and its public perception in Canada, and elsewhere, was the Arctic polio epidemic in the winter of 1948-49 that principally struck adult Eskimos. There had been rare reports of winter outbreaks of polio,<sup>65</sup> as well as small outbreaks affecting Eskimos,<sup>66</sup> but nothing on the scale of the epidemic which struck the Chesterfield Inlet region of the North West Territories, 150 miles north of Churchill, Manitoba, on the western shore of Hudson's Bay. This was an "explosive" outbreak involving a total of 57 paralytic cases and 14 deaths in the Chesterfield area between February 14 and March 7, out of a total population of 275. This represented an extremely high case rate of 185 per 1,000 (or 18,500 per 100,000) and an unprecedented death rate for this disease. Most cases involved adolescents and adults, with the epidemic most severe among adults over 40.<sup>67</sup> By mid-March, the emergency forced the largest quarantine ever imposed

<sup>&</sup>lt;sup>63</sup> Zosia E. (1946, age 6 months, Drummondville, Que.); Betty K. (1951, age 25, Fruitvale, BC); Barbara D. W. (1951, age 11, Toronto, Ont.); Jean E. K. (1953, age 34, Barrie, Ont.); Gisele G. (1956, age 9 months, Winnipeg, Man.), August 1993.

Marie H. (1947, age 26, Surrey, BC), August 1993; Jean H. C. (1952, age 33, Leask, Sask.).
June 1993; Shirley S. (1953, age 18, Calgary), July 1993; Jean E. K. (1953, age 34, Barrie, Ont.); Yvonne H. (1953, age 25, Winnipeg, Man.).

<sup>65</sup> A.C. McGugan, "An Outbreak of Acute Anterior Poliomyelitis in Alberta During the Winter Season," *CPHJ*, 30 (Oct. 1939): 495-99; A.C. Duncan, "Correspondence: Poliomyelitis in the Far North," (December 16, 1944, Dawson, Yukon Territory), *CMAJ*, 52 (Feb. 1945): 206.

<sup>A.F.W. Peart, "An Outbreak of Poliomyelitis in Canadian Eskimos in Wintertime: Epidemiological Features," CJPH, 40 (Oct. 1949): 405-06, notes that 30 Arctic polio outbreaks reportedly ocurred prior to 1914, while more recently outbreaks in Greenland in 1925 and 1935 that affected Eskimos See also J.D. Adamson, J.P. Moody, A.F.W. Peart, R.A. Smillie, J.C. Wilt and W.J. Wood, "Poliomyelitis in the Arctic," CMAJ, 61 (Oct. 1949): 339; A.J. Rhodes, E.M. Clark, A. Goodfellow and W.L. Donahue, "An Outbreak of Poliomyelitis in Canadian Eskimos in Wintertime: Laboratory Investigations," CJPH, 40 (Oct. 1949): 418-19.</sup> 

<sup>67</sup> Peart, Ibid., p. 409-13; Paul, History of Poliomyelitis, p. 360.

in the Arctic, enforced by the Army through radio broadcasts, syllabic signs and written material that the Eskimos could understand.<sup>68</sup> Indeed, it was "the largest regional quarantine in medical history," affecting close to 50,000 square miles, and lasting more than nine months.<sup>69</sup>

The highly unusual nature of this deadly epidemic sent shock waves throughout Canada, and particularly the polio research community, demonstrating that just about everything hitherto understood about polio was now suspect. Its scientific importance to clarifying the epidemiology and immunology of polio is discussed in the next chapter. More generally, this outbreak simultaneously underscored the fallacy of a "polio season," the vulnerability of adults, and the high socio-economic costs of polio in terms of rehabilitation, not only for the Eskimos involved, but also to the federal government, which was responsible for their welfare. This epidemic also gave Martin's Department another major opportunity to investigate a polio epidemic, but it was once again embarrassed by the limitations of the Laboratory of Hygiene, and after stalling for a year, rather reluctantly allowed Connaught to conduct an intensive study of Eskimo polio.

On a broader level, the Eskimo epidemic also meant that no region of Canada was safe from polio. Indeed, from the polio season of 1949 and during the years leading up to the nation's worst epidemic of 1953, other unusual polio outbreaks captured the imagination of the nation and apparently made the odds of anyone getting polio much greater. Ontario's 1949 polio experience, for example, involved 1,138 cases and 82 deaths. It was not a widespread epidemic, but like the Arctic outbreak, occurred in areas of the province that had been free of the disease for up to thirteen years. It

<sup>68</sup> Phone Message, J.P. Moody, MOH, Chesterfield Inlet, NWT, to Dr. Falconer, "Re. Medical Team recommendations," March 16, 1949, attached to Draft of message "To Be Transmitted to Esk-imos North of Chesterfield;" NAC, RG29, Vol. 23, file 311-P11-22, part 2. See also: Donald Jack, Rouges, Rebels and Geniuses: The Story of Canadian Medicine (Toronto: Doubleday, 1981), p. 515-27; J.P. Moody and W.G. Embden, "How We Fought Polio in the Arctic," Maclean's, (Jan. 1, 1954): 12-13, 34-37

<sup>&</sup>lt;sup>69</sup> Moody and Embden, "How We Fought Polio in the Arctic," p. 36-7.

was severe, with more than 200 cases showing bulbar involvement. Some 30% of the reported cases and almost half of the deaths were spread relatively evenly among individuals 15 years of age and older.<sup>70</sup>

A series of unusually severe polio outbreaks occurred elsewhere in localized areas of eastern Canada. The isolated fishing village of St. Augustine, Quebec (population 400), near the Labrador border, was hit by an intense polio outbreak in February 1950. A total of 55 cases occurred, 2 of whom were children who died before an emergency Air Force rescue team arrived to transport cases back to a Montreal hospital.<sup>71</sup> During the fall and early winter of 1950-51, Prince Edward Island reported 79 cases and 7 deaths, prompting the reopening of a Polio Centre in the Provincial Sanatorium in March 1951.<sup>72</sup> In March 1952, an "explosive" polio outbreak struck in the small village of Tatamagouche, Nova Scotia (population 628) on the north coast of the province. It generated public hysteria locally and prompted federal assistance and an epidemiological investigation.<sup>73</sup>

The seriousness of the 1951 Ontario epidemic revived the debate on the province's polio policy.<sup>74</sup> London's Polio Committee took their earlier demands one step

<sup>&</sup>lt;sup>70</sup> Ontario Department of Health, Annual Report, 1949 (Toronto: 1950), p. 19-24.

<sup>71 &</sup>quot;2 Children Flown From Polio Area: Montreal Scientists Leave in Attempt to Trace Cause of Outbreak," Montreal Gazette, (Feb. 2, 1950); "Epidemic's Cause Remains Mystery: Doctors Report Far North Polio Survey Revealed 15 New Cases," Montreal Gazette, (Feb. 15, 1950); V. Pavilanis and A. Frappier, "A Winter Epidemic of Poliomyelitis in Saint-Augustine, Que.: III, Laboratorie Studies," CMAJ, 79 (July 1, 1958): 11-14.

P.E.I. Department of Health and Welfare, Annual Report, 1951 (to March 31, 1951), (Charlottetown: 1951), p. 10-11, 160-61; Department of National Health and Welfare, Annual Report, 1951 (to March 31, 1951), p. 18. The provincial government aggreed to pay half the cost each of special nurses needed and hospitalization in the new Polio Centre. P.E.I.'s implementation of this policy, in part, can be traced to the Premier's personal experience with this disease in 1949, when his granddaughter was struck, and to the Minister of Health, whose son had polio; Report, J.H. Daniell-Jenkins, Canadian Foundation for Poliomyelitis, Director of Chapter Organization, "Prince Edward Island," August 5, 1949, NAC, MG28, 167, Vol. 1, Canadian Foundation for Poliomyelitis, Correspondence, 1948-49.

<sup>73</sup> A.F.W. Peart, H. Lavers and F.P. Nagler, "A Winter Outbreak of Poliomyelitis in Tatamagouche, Nova Scotia, 1952," CJPH, 44 (Nov. 1953): 400-06; "Outline of Poliomyelitis Investigation at Tatamagouche, N.S., April 1952," NAC, RG29, Vol. 203, file 311-P11-23, part 1.

A total of 1,701 cases and 101 deaths were reported in the province, 104 of whom were treated in iron lungs. Ontario Department of Health, Annual Report, 1951 (Toronto: 1952), p. 13-14. On this epidemic, see also Christopher J. Rutty, "'Helpless:' The 1951 Ontario

further, and officially disbanded on March 1, 1952, once again leaving Western Ontario without polio hospital services. The principal issue in London, and elsewhere in the province,<sup>75</sup> was that polio committee physicians were not paid for their medical services to non-indigent polio patients.<sup>76</sup> When government received the threat of dissolution from London in January, in addition to criticisms from other centres, it had little choice but to seriously reconsider the policy.<sup>77</sup> This time the province was forced to relent. The new policy would come into effect after the end of the first two weeks of the illness. By this time paralytic symptoms were clear and all costs of treatment thereafter could be covered by the province as before, including all nursing costs of iron lung cases, but at a higher per diem rate. This change also worked to limit hospital admissions.<sup>78</sup>

This redefinition of Ontario's polio policy demonstrated the challenge of balancing the free provision of broad health services to polio victims, while somehow managing their sharply rising costs to provincial governments. Under the pressure of significantly worse epidemics in 1952 and especially in 1953, striking this balance, while being forced to expand services further, grew even more difficult in Canada.

Poliomyelitis Outbreak: The Neil Young Case," *The Mirror* (University of Western Ontario Student History Journal), 9 (1989): 82-109: also published in Alan Jenkins (ed.), *Neil Young and Broken Arrow: On a Journey Through the Past* (Mid Glamorgan, Wales: Neil Young Appreciation Society, 1994), p. 95-112.

<sup>&</sup>lt;sup>75</sup> Memo, D.S. Puffer, Assistant Chief MOH, Ontario, to File, May 18, 1951, re. Minutes, Meeting of Superintendents of Designated Polio Hospitals with Deputy Minister Phair, May 7, 1951, AO, RG10-106, file 249.1.

<sup>&</sup>lt;sup>76</sup> Letters: Dr. B.C. Brown, Chairman of Poliomyelitis Committee, Victoria Hospital, London, to Dr. Mackinnon Phillips, Ontario Minister of Health and Welfare, December 14, 1951; Brown to Phillips, January 31, 1952; W. Loveday, Chairman, Victoria Hospital Board of Trustees, to Phillips, March 24, 1952, AO, RG10-106, file 250.8.

<sup>&</sup>lt;sup>77</sup> Memo, Phair to Phillips, January 4, 1952, Ibid.

Letter, Phair to all Superintendents of Designated Polio Hospitals, July 31, 1952, AO, RG10-106, file 249.2. See also E.C. Janes, "Poliomyelitis," *Ontario Medical Review*, 20 (Mar. 1953): 158-59.

6.2) Politics, Policies and the High Costs of Polio, 1952-53

Managing polio epidemics was often like fighting and treating the casualties of war. During the early 1950s this military metaphor took on a much more immediate and practical meaning. Impossible to ignore were the frequent newspaper reports of iron lungs being flown in to epidemic areas by the Royal Canadian Air Force from all over Canada, as well as the U.S.,<sup>79</sup> and dramatic stories of military air ambulances transporting patients, many in iron lungs, from remote areas to designated polio hospitals.<sup>80</sup> This situation placed extraordinary pressure on provincial governments, but it also provoked an unusual federal response. The conjunction of the 1952 epidemics with intense American publicity surrounding the potential protective value of the gamma globulin blood fraction forced Ottawa to expedite a Canadian supply before the 1953 polio season began.

In 1952 record polio epidemics hit Western Canada and the Maritimes, especially in British Columbia, Alberta, Saskatchewan, Manitoba, P.E.I. and New Brunswick. The 1953 polio crisis proved considerably worse in most of the country. In both years provincial governments across Canada struggled with overwhelmed hospitals, iron lung shortages and the significant economic impact polio epidemics posed to provincial, municipal and personal finances.

Saskatchewan was the epicenter of the 1952 polio epidemic, which began in an isolated Mennonite community north of Saskatoon, among a group that had visited Texas.<sup>81</sup> The state, along with most of the U.S., was suffering its worst polio year ever

<sup>&</sup>lt;sup>79</sup> "Polio-Fighting Iron Lung Arrives To Bolster Supply," Winnipeg Free Press, (Sept. 17, 1952); "Iron Lungs Flown Here From Quebec: Number Of Polio Cases Taxing Hospital Staff," Winnipeg Free Press, (Oct. 23, 1952); "Iron Lungs Flown In From U.S.: 4 Respirators Arrive 24 Hours Ahead of Schedule," Winnipeg Free Press, (Aug. 24, 1953); "R.C.A.F. Flies Iron Lungs To Winnipeg," Winnipeg Free Press, (Aug. 27, 1953).

Jean H. C. (1952, age 33, Leask, Sask); Jim McLeish, (1953, age 26, Neepawa, Man.), from Steve Whysall, "The 20 Who Can't Forget the 1953 Polio Epidemic," Winnipeg Tribune, (Nov. 21, 1978).

<sup>81</sup> P. Barsky, "The Management of Poliomyelitis," CMAJ, 70 (May 1954): 517.

with almost 58,000 cases reported,<sup>82</sup> and with "more children dying of polio than any other infectious disease."<sup>83</sup> Polio cases soon developed after this group returned in June, while contact with Saskatoon, and with other Mennonite communities in Manitoba and Alberta, helped spark outbreaks across the prairies.<sup>84</sup> The resulting epidemic was particularly severe, involving a large percentage of bulbar cases, and a high rate of family and contact incidence.<sup>85</sup>

In total, Saskatchewan reported 1,205 cases and 90 deaths, with a case notification rate of 142.9 per 100,000, the highest provincial rate yet seen in Canada. The epidemic spread slowly, allowing the province time to mobilize physicians and nurses, prepare hospitals, check respirators and place the government's new air ambulance service on alert.<sup>86</sup> Nevertheless, the provincial polio clinics were soon unable to handle the large influx of cases, forcing other hospitals to accept acute cases. As in 1947, the province pressured private physicians to keep patients at home wherever possible if mild symptoms were evident.<sup>87</sup> In the media this was justified by stressing polio's newly appreciated sub-clinical features, while health authorities criticized the "excessive publicity" about the outbreak and the "undue alarm" it was generating.<sup>88</sup>

<sup>82</sup> This translated into a national case rate in the U.S. of 36.2 per 100,000, which broke the previous high rate of 28.2 set in 1949. Canadian case rates in the peak years of 1937 (35.4) and 1952 (32.9) were similar, but during the 1953 epidemic the case rate approached 60 per 100,000. See: R. Kohn, "Some Figures on Poliomyelitis in Canada," CJPH, 45 (June 1954): 225-35; M.-J. Freyche and J. Nielsen, "Incidence of Poliomyelitis since 1920," in Poliomyelitis (Geneva: World Health Organization, 1955), p. 76-77.

<sup>83</sup> K.H. Arsenault, "The Summer Nightmare: Poliomyelitis in Florida," Journal of the Florida Medical Association, 75 (Aug. 1988): 528. See also J.S. Smith, Patenting the Sun: Polio and the Salk Vaccine (New York City: William Morrow and Co., 1990), p. 160-61, 170-71.

Saskatchewan Department of Public Health, Annual Report, 1952 (Regina: 1953), p. 39;
Manitoba Department of Health and Public Welfare, Annual Report, 1952 (Winnipeg: 1953),
p. 73; Alberta Department of Public Health, Annual Report, 1952 (Edmonton: 1953), p. 33.

<sup>85</sup> Barsky, "The Management of Poliomyelitis," p. 517.

<sup>86</sup> Saskatchewan Department of Public Health, Annual Report, 1952, p. 32-33.

<sup>87</sup> Letters: G. Kinneard, Acting Deputy Minister of Public Health, Saskatchewan, to all Saskatchewan Physicians, August 8, 1952; M.G. Israels, Chief of Medicine, Regina General Hospital, to all Saskatchwan Physicians, August 11, 1952, SA, R11, file 14-87.

<sup>88 &</sup>quot;Undue Alarm About Polio Hinders Doctors: Excessive Publicity Causes too Big Furore," Saskatoon Star-Phoenix, (Aug. 15, 1952).

This emphasis on local care had a number of serious implications for polio patients, their family physicians and local hospitals, who were often unfamiliar with and unprepared for handling acute cases. For example, a nurse stricken with complete paralysis while working on a Saskatchewan Indian reserve in 1952, was left with strong feelings about how her case was initially handled at a nearby hospital.

The management in Prince Albert was verging on criminal. In an epidemic year, they couldn't recognize polio right under their noses, and didn't have sense enough to do the obvious diagnostic test until pressured by my husband [who was an Indian Agent]. They almost let me die, before getting me to a polio centre. They were calling it everything from multiple sclerosis to hysterical paralysis. What a bunch of idiots!<sup>89</sup>

In a case in New Brunswick that same year, an 18 year-old rural farm woman, who became almost totally paralyzed, was told by her family doctor that the Fredericton polio clinic was full and to stay in bed for a few days. The doctor never actually called the clinic, nor was it actually full. As she recalled, "The medical profession did nothing for me when it was at the crucial time."<sup>90</sup>

The potential financial impact of the Saskatchewan epidemic was of greatest concern to the government due to a too generous policy that covered all costs for all cases admitted to the polio clinics. What about the many cases treated at home or at other hospitals because of the clinic's bed shortage? There was a public and medical expectation that the province would also pay all individual physician's fees.<sup>91</sup> Thus, as Ontario had been forced to do in 1951 to try and minimize financial pressures on

91 Memos: T.J. Bentley, Minister of Public Health, to T.C. Douglas, Premier, August 13, 1952; F.B. Roth, Deputy Minister of Public Health, to Bentley, September 18, 1952; Roth to Bentley, October 7, 1952; Bentley to Douglas, August 13, 1952, SA, R11, file 14-87. This policy had its origins in the 1943 epidemic and a January 1944 special Order in Council, which authorized "the Department of Public Health [to] take all the necessary steps for the control, prevention and treatment of anterior poliomyelitis... and supply medical aid, accommodation and medicine and such other articles or things as may be deemed necessary for mitigating an epidemic of anterior poliomyelitis either in clinics established or which may be established for the care and treatment of patients suffering from anterior poliomyelitis;" Saskatchewan Order in Council, O.C. 109/44, January 31, 1944, attached to Memo, Bentley to Douglas, August 13, 1952, SA, R11, file 14-87.

<sup>&</sup>lt;sup>89</sup> Jean H. C. (1952, age 22, Leask, Sask.).

<sup>90</sup> Jennie-Grace M. (1952, age 18, Oakland Car County, NB), June 1993.

the government, the treatment of acute polio was redefined as the responsibility of the patient's own physician.<sup>92</sup>

There was also the question of coverage when polio patients approached the government, as many did, feeling that it was "responsible for all treatment where the diagnosis was polio, even though there were no residual effects."<sup>93</sup> Despite notice of the new regulations, was the government still legally responsible?<sup>94</sup> A far narrower guideline was eventually approved, which specified "that the responsibility for care for the mild case of polio or for the severe case during the first 21 days should rest with the patient. Only when the case becomes an economic burden should the government step in to cover the fees of a physician.<sup>95</sup> After the epidemic there was also an expansion of provincial rehabilitation facilities, despite the "very significant increase in expenditures" this required. A new Division of Physical Restoration was established in 1953 which consolidated and improved rehabilitation services to polio and cerebral palsy patients and promoted the training of needed personnel. During 1953-54, 965 polio, and 217 cerebral palsy cases were cared for at the Saskatoon and Regina polio clinics.<sup>96</sup>

The 1952 Manitoba epidemic generated a similar redefinition of the government's polio policy. This was driven primarily by the impact of mounting and longterm hospitalization costs, especially for the 72 cases for which iron lung treatment was required.<sup>97</sup> Unlike Saskatchewan, Manitoba did not have a system of public

<sup>92</sup> Memo, Roth to Bentley, October 6, 1952, Ibid..

<sup>93</sup> See for example, Letters: Dr. S. Wolfe, Smeaton, Saskatchewan, to Bentley, March 13, 1953; Bentley to Wolfe, March 21, 1953, Ibid..

<sup>&</sup>lt;sup>94</sup> Memos: Roth to J.L. Salterio, Deputy Attorney General, March 26, 1953; Salterio to Roth, April 8, 1953; Bentley to all Cabinet Ministers, April 16, 1953, *Ibid*.

<sup>95</sup> Memo, Roth to Douglas, May 11, 1953, SA, R331, file 571 (14-25); Saskatchewan Order in Council, O.C. 1285/53, June 8, 1953. SA, R1346, file 2-35.

<sup>96</sup> Memo, Roth to Bentley, October 6, 1952, SA, R11, file 14-87; Saskatchewan Department of Public Health, Annual Report, 1953-54 (Regina: 1954), p. 98.

<sup>97</sup> A total of 839 cases and 25 deaths occured throughout the province's rural districts, at a case notification rate of 105.1 per 100,000; Letter, F.C. Bell, Minister of Health and Public Welfare, Manitoba, to A.C. Solomin, National Executive Secretary, Canadian Foundation for Poliomyelitis, February 5, 1953, MA, G157, B64, file H-4-9-2a.

hospital insurance and the government came under increasing political pressure for more direct hospital support as polio incidence escalated and continued into early 1953.<sup>98</sup> The Minister of Health appointed a Technical Advisory Committee to monitor the epidemic, particularly the iron lung supply.<sup>99</sup> As the need for respirators arose they were borrowed from Ontario, or through the Canadian Foundation for Poliomyelitis' national office in Montreal, and sent by train or by the Royal Canadian Air Force.<sup>100</sup> Federal Health Grants helped buy nine new iron lungs that were set up at Winnipeg's King George Hospital where all bulbar cases were centralized.<sup>101</sup>

The size and severity of the epidemic created a financial crisis between the province and the hospitals that accepted acute cases, especially the Winnipeg Children's Hospital and the Winnipeg Municipal Hospitals, which included the King George Hospital. It was soon obvious that many patients would have to remain beyond the three weeks of free treatment offered by the province, and either be billed, or "written off as a free service by the hospital thus increasing its deficit."<sup>102</sup> This problem was most serious for iron lung patients. The limited government and voluntary funds that were available could end up being spent rapidly, just by the iron lung cases alone. The Committee suggested making every effort to reduce unnecessary hospitalization, in part by conducting physiotherapy treatment in patient's homes.<sup>103</sup>

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Report on 1952 Epidemic and Policy Statement, March 27, 1953, MA, G157, B64, file H-4-9-2a; Manitoba Department of Health and Public Welfare, Annual Report, 1952, (Winnipeg: 1953), p. 72-75.

<sup>&</sup>lt;sup>99</sup> "Schultz Combats Polio," *Winnipeg Tribune*, (July 18, 1952); Minutes, Meeting of the Advisory Committee on Poliomyelitis, July 21, 1952, MA, G157, B64, file H-4-9-2a.

<sup>100 &</sup>quot;Schultz Combats Polio," Ibid.; "Polio-Fighting Iron Lung Arrives to Bolster Supply," Winnipeg Free Press, (Sept. 17, 1952); "Iron Lungs Flown Here From Quebec: Number of Polio Cases Taxing Hospital Staff," Winnipeg Free Press, (Oct. 23, 1952); Minutes, Meeting of the Poliomyelitis Advisory Committee, October 20, 1952, MA, G157, file H-4-9-2a.

<sup>&</sup>lt;sup>101</sup> Manitoba Department of Health and Public Welfare, Annual Report, 1952, p. 75.

<sup>102</sup> Letter, F.H. Silversides, Superintendent, Winnipeg Children's Hospital, July 19, 1952, MA, G157, B64, file H-4-9-2. See also Harry Medovy, A Vision Fulfilled: The Story of The Children's Hospital of Winnipeg, 1909-1973 (Winnipeg: Pegius Publishers Ltd., 1979).

<sup>103</sup> Memo, J. Adamson, "Informal Meeting Re Treatment of Poliomyelitis," September 26, 1952," Ibid..

Iron lung treatment quickly became a major financial problem, particularly because as the epidemic was worst in the rural parts of the province, only a third of all bulbar patients were Winnipeg residents. The Winnipeg Hospital Commission was "gravely concerned" about providing necessary services to polio patients, and its responsibility needed to be more clearly defined. The costs of care for an iron lung patient were far greater than had ever been faced before, particularly for "a large and varied selection of drugs" and intravenous feedings. Such costs threatened the financial position of the municipal hospitals, especially in Winnipeg.<sup>104</sup> The financial crisis was reinforced politically by other local governments and the CCF members of the Manitoba Legislature.<sup>105</sup> This led to a series of substantial provincial grants totaling \$120,000, paid to the Winnipeg Hospitals and to individuals who had paid for private nursing care. The province also expanded its general polio policy. with some consultation with Alberta and Ontario to investigate how they dealt with the issue.<sup>106</sup>

The new Manitoba policy offered to "assume full liability for the care of polio patients who require treatment in iron lungs." Also covered was hospitalization beyond three months, although patients were responsible for costs incurred from the 21st to the 90th day. If the patient had private or pre-paid hospital coverage the government policy did not take effect until these benefits were exhausted.<sup>107</sup> The costs of appliances were now to be assumed by the Crippled Children's Society of

<sup>104</sup> Letter, City of Winnipeg Hospital Commission, to Schultz, October 14, 1952, *Ibid.*. On the management of iron lung cases and other life threatening aspects of polio see H.C.A. Lassen (ed.), *Management of Life-Threatening Poliomyelitis, Copenhagen, 1952-1956* (Edinburgh and London, 1956).

<sup>105</sup> Letters: J.E. Trottier, Secretary-Treasurer, Fort Gary, Manitoba, to D.L. Campbell, Manitoba Premier, December 11, 1952; D. Swailes, Provincial Secretary, Co-operative Commonwealth Federation (CCF), Manitoba Provincial Council, to Campbell, December 23, 1952; Campbell to Swailes, December 29, 1952; E. Prefontaine, Municipal Commissioner, Manitoba, to Bell, January 12, 1953; Bell to H.L. Trager, The Pas, Manitoba, January 19, 1953, MA, G157, B64, file H-4-9-2a.

<sup>106</sup> Memo, M.R. Elliott, Deputy Minister of Health, Manitoba, to Bell, February 13, 1953, Ibid.

 <sup>107 &</sup>quot;2 Hospitals Get \$95,000 Special Aid: Sweeping Provincial Grants Revealed in Legislature," Winnipeg Free Press, (Mar. 3, 1953); F.C. Bell, Transcript Draft of Legislature speech, March 2, 1953; F.C. Bell, polio policy speech, March 27, 1953, MA, G157, B64, H-4-9-2.

Manitoba.<sup>108</sup> This announcement was warmly received,<sup>109</sup> but few suspected that such an extraordinary financial effort on behalf of polio victims by the provincial government would have to be repeated and expanded in 1953.<sup>110</sup>

Polio's impact was politically significant elsewhere in Canada in 1952. A major New Brunswick epidemic<sup>111</sup> struck in the middle of a provincial election, during which the poor conditions of the Fredericton Polio Clinic became a decisive issue. The Conservative leader "sent the rocket up' with a dynamic attack on the conditions of the polio clinic," using the support of prominent physicians interested in polio, and friends in the media. He called it a "rat infested... disreputable old shack" that was a "fire trap." The governing Liberals could offer little defence, and on election day, which coincided with the day schools opened after delays caused by the epidemic, suffered a crushing defeat. The first bill proposed by the new Conservative government fulfilled an election promise for a new Polio Clinic and Health centre which opened in 1955.<sup>112</sup>

America's unprecedented polio epidemic of 1952 intensified public attention on the equally extraordinary NFIP field trials of gamma globulin (GG) that were taking place in Texas and Iowa. Gamma globulin is the protein fraction of blood that is rich in antibodies. Renewed interest in its protective possibilities emerged when

111 The epidemic involved 427 cases and 11 deaths at a case rate of 81.2 per 100,000, which was slightly less than the record of 91.6 set in 1941; New Brunswick Department of Health, *Annual Report, 1953* (to March 31, 1953), (Fredericton: 1953), p. 19-20, 58-59.

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<sup>108</sup> S.C. Sparling, "Brief on Plan for Co-ordination of Assistance for Polio Patients of All Ages Between Provincial Government and Society for Crippled Children," February 23, 1953, attached to Memo, Elliott to Bell, February 26, 1953; Memo, Elliott to Bell, March 3, 1953, MA, G157, B64, file H-3-18-1.

<sup>109</sup> F. Johnson, "Aid for Polio Victims: Legislature in Session," Winnipeg Tribune, (Mar. 3, 1953); J.M.C., "Under the Dome," Winnipeg Free Press, (Mar. 3, 1953).

<sup>110</sup> D. Pollard, "Polio Costs Staggering: Where Will Money Come From?" Winnipeg Free Press, (Dec. 6, 1952); D. Pollard, "Where Polio Costs Hit: City Taxpayers To Bear Brunt," Winnipeg Free Press, (Dec. 8, 1952); D. Pollard, "Polio Bills Mount Fast: Outbreak May Cost Half Million," Winnipeg Free Press, (Dec. 9, 1952).

<sup>112</sup> Gillian Liebenberg, "Death Disease and Disability: Poliomyelitis and Social Change in New Brunswick, 1940-1965," paper presented to Annual Meeting of the Canadian Society for the History of Medicine, Ottawa, June 4, 1993. Thanks to Gillian for a copy of her manuscript.

more sophisticated blood fractionation techniques were developed during World War II. This allowed the preparation of an immune serum 30-times more concentrated than convalescent serum. The discovery in 1951 that the poliovirus was present in the bloodstream before paralysis appeared further accelerated growing interest in its use as a source of passive immunity agianst polio.<sup>113</sup> There were high public expectations placed in GG,<sup>114</sup> but like convalescent serum twenty years earlier, there was mixed medical opinion over its actual value.<sup>115</sup>

A commercial supply of GG existed in the U.S., but most of it was bought up by the NFIP for its community-based mass trials. Normally, little of this was available in Canada, largely due to its expense, while none could be prepared for lack of domestic blood fractionation facilities. Alberta managed to obtain a small supply from the U.S. to try,<sup>116</sup> but other provinces, especially Manitoba, watched the American trials closely, hoping some could be spared for a Manitoba trial.<sup>117</sup> After this failed, Connaught was approached, but they were not equipped to supply any.<sup>118</sup>

In mid-October the gamma globulin issue was first raised at the Dominion Council of Health's bi-annual meeting. Connaught's Director, Dr. Robert D. Defries, suggested that a considerable supply of dried blood plasma left over from the war could be fractionated into GG if better methods were developed. A secondary benefit from such a project would be a significant stimulation of the public collection of

<sup>&</sup>lt;sup>113</sup> Paul, History of Poliomyelitis, p. 387-94.

<sup>(</sup>Associated Press, Houston), "16 Dead, 376 Ill At Houston: Anti-Polio Injection Tried Out," Winnipeg Free Press, (July 7, 1952); W. Martin. (Associated Press, Houston), "Swamp Doctors When Drug Tried As Paralysis Curb," Globe and Mail, (July 10, 1952); J.L. Melnick, "A New Era in Polio Research." Scientific American, 187 (Nov. 1952): 26-9; W. McD. Hammon, "Gamma Globulin in Polio," Scientific American, 189 (July 1953): 25-29.

<sup>115</sup> Dr. Peart of the Division of Epidemiology in Ottawa, for example, was "still from Missouri" on the gamma globulin issue, as was the Chief of the Laboratory of Hygiene; Memo, Peart to Gibbard, October 30, 1952, NAC, RG29, Accession 83-84/119, Vol. 30, file 355-P-4, part 4. See also A.J. Rhodes, (Editorial), "Recent Advances in the Diagnosis and Prevention of Poliomyelitis," CJPH, 44 (Mar. 1953): 102-05.

<sup>116</sup> Alberta Department of Public Health, Annual Report, 1952, p. 33.

<sup>&</sup>lt;sup>117</sup> Minutes, Advisory Committee on Poliomyelitis, July 21, 1952, MA, G157, B64, H-4-9-2a.

<sup>&</sup>lt;sup>118</sup> Minutes, Technical Advisory Committee on Poliomyelitis, August 6, 1952, *Ibid.* 

blood from which other blood products could also be fractionated.<sup>119</sup> This plan was hastened by a Public Health Research Grant to Connaught for \$67,000.<sup>120</sup>

Publicity from the American GG trials magnified public demand for GG in Canada considerably, creating a complex political problem for Canadian governments. Based on the initial dried serum supply, the most GG Defries could prepared was 11,000 doses by the end of the summer. There was also very little chance of any American commercial GG being available for 1953 either. Such a limited program led Manitoba's Technical Advisory Committee on Poliomyelitis to suggest that a second fractionation plant be set up in the west that would process blood plasma from postpolio patients and contacts.<sup>121</sup> This idea was put to Martin with the warning that, since polio

makes a tremendous emotional impression on the public mind and because of that the public reaction to the existence of an inadequate supply of the immunizing agent might be directed against the government and might be out of all proportion to that warranted by the incidence of the disease[,]<sup>122</sup>

meeting public demand for polio protection would thus "be an asset of no little value to Mr. Martin." Moreover, since 11,000 doses was clearly going to be inadequate in case of an epidemic, Ottawa was advised to "go all out for a far greater production," as "a really brave attempt to meet the situation would meet with strong public approval."<sup>123</sup> This political pressure on Martin to do something led to a meeting in January of leading authorities on the issue, including representatives from Connaught, and the Federal, Ontario and Quebec health departments. In the wake of the western epidemics of 1952, the latter provinces were concerned about major central Canadian

<sup>&</sup>lt;sup>119</sup> Minutes, Meeting, Dominion Council of Health, October 15-17, 1952, AO, RG10-05-15.

<sup>120</sup> Letter, R.D. Defries, Director, Connaught Medical Research Laboratories, to J.T. Phair, Deputy Minister of Health, Ontario, November 27, 1952; R.D. Defries, Application for Public Health Research Grant, "Facilities and Equipment for Gamma Globulin," November 27, 1952, CA, 83-005-06, Box 7, file 1/7.

<sup>121</sup> Minutes, Technical Advisory Committee, December 2, 1952, MA, G157, B64, H-4-9-2a.

<sup>122</sup> Letter, D.W.W. Revie. (unidentified, but likely a personal or political friend of Martin's since he calls the Minister "Paul") to Martin, December 8, 1952, attached to "Brief" by B. Chown or. gamma globulin, *ibid..* 

<sup>123</sup> Chown, "Brief," attached to Letter, Revie to Martin, December 8, 1952, Ibid..

outbreaks in 1953. Defries pressed for more equipment, which would help accelerate production, but not increase the supply for the 1953 polio season.<sup>124</sup> Still, any opportunity to increase the supply was seized and Defries was given a supplementary Health Grant to cover the costs of accelerated GG production.<sup>125</sup>

Defries planned to produce 5,000 doses by July 1, and then 500-1,000 doses a week, up to a revised maximum of 30,000 doses. Such a limited supply led to the establishment of a National Technical Advisory Committee, which was the only way the rationed use of GG could be justified to the public.<sup>126</sup> This Committee was to "provide independent and authoritative guidance" to the Federal government in the distribution and use of gamma globulin in Canada.<sup>127</sup> This represented a significant extension of federal responsibility in health care since the procurement and distribution of biological public health products was an exclusive provincial responsibility.

The supply was to be held by the Committee for distribution to the provinces reporting the greatest polio attack rate. The serum was to be used only for "house-hold contacts" of paralytic polio cases between 6 months to 11 years of age, in 5 c.c. or 10 c.c. doses, depending upon body weight. The supply was to be distributed through provincial health departments, preferably by a public health team. The Committee also looked ahead to 1954 when demand for GG would likely be even greater and "there would be less excuse for not having it." Moreover, there was a "real need for facilities to do blood fractionation in Canada for securing other blood fractions and to meet other needs."<sup>128</sup>

<sup>&</sup>lt;sup>124</sup> Minutes, Meeting to Discuss Production and Distribution of Gamma Globulin, January 5, 1953, NAC, RG29, Vol. 199, file 311-P11-10, part 2.

<sup>125</sup> Letter, Defries to Dr. W.C. Brown, National Health Grants Administration, Ontario Department of Health, January 10, 1953; R.D. Defries, Application for a Public Health Research Grant, "Facilities and Equipment for Gamma Globulin (supplementary application), January 10, 1953, CA, 83-005-06, B8, file 1/6.

<sup>&</sup>lt;sup>126</sup> Minutes, Meeting of the Dominion Council of Health, March 16-18, 1953, AO, RG10-05-15.

<sup>&</sup>lt;sup>127</sup> This was Federal Order-in-Council P.C. 1953-18/424, March 23, 1953.

<sup>128</sup> Minutes, First Meeting, Gamma Globulin Advisory Committee, April 25, 1953, NAC, RG29, Vol. 204, file 311-P11--25, part 1.

The first supplies of gamma globulin were sent, with much appreciation, to an unexpected destination in early June. An unusual polio epidemic had broken out in the Yukon Territory involving a total of 142 cases and 9 deaths among a population of about 9,000 civilians, Indians and Air Force and Army personnel. Adults were the primary victims, many of whom required iron lungs.<sup>129</sup> The Territory had never experienced a major polio outbreak and concerns quickly developed over the financial impact of the disease on individuals who had limited means.<sup>130</sup> This situation was also complicated by jurisdictional complexities between the Federal Departments of Health and Welfare, and Resources and Development, and the Yukon government's limited facilities for long-term polio treatment.<sup>131</sup> Federal assistance was clearly necessary to cover the estimated \$90,000 to treat the fifty civilian paralytic cases that were likely, in addition to the emergency costs of the epidemic.<sup>132</sup> A Yukon polio policy was developed based largely on the Alberta model, and financed by Ottawa, which provided hospital care and medical rehabilitation for all civilian paralytic cases requiring it.<sup>133</sup> Before the policy was implemented, concerns emerged that "Unless the public announcement is quite clear, it is possible that those who do not qualify for free treatment will become rather upset."<sup>134</sup> The Yukon epidemic sound-

<sup>129</sup> List, "Details of Distribution of Gamma Globulin," (January 20, 1954), NAC, RG29, Vol. 200. file 311-P11-10, part 4; J.D. Adamson, M. R. Bow and E.H. Lossing, "Poliomyelitis in the Yukon," CJPH, 45 (Aug. 1954): 337-44.

<sup>130</sup> Letter, W.G. Brown, Commissioner, Department of Resources and Development, to M.R. Bow, Chief MOH, Yukon, May 6, 1953, Alberta Provincial Archives (AA), 77-87, Box 1, file 6.

<sup>131</sup> Letter, H.A. Young, Deputy Minister of Resources and Development, Ottawa, to Cameron, June 10, 1953, NAC, RG29, Vol. 199, file 311-P11-10, part 2.

<sup>&</sup>lt;sup>132</sup> Memo, Peart to Cameron, June 12, 1953, NAC, RG29, Vol. 194, file 311-P11-2, part 2.

<sup>133</sup> R.H. Winters, Minister of Resources and Development, to F.G. Smith, Administrator, Yukon, June 17, 1953, NAC, RG29, Vol. 199, file 311-P11-10, part 2; Memo, J.W. Willard, Director, Research Division, Department of National Health and Welfare, to Peart, June 19, 1953, NAC, RG29, Vol. 196, file 311-P11-4, part 1; List of Provincial Poliomyelitis Policies, attached to Memo, E.H. Lossing, Epidemiology Division, Department of National Health and Welfare, to Bow, June 30, 1953, AA, 77-87, Box 1, file 6; Memo, Willard to Peart, July 8, 1953, NAC, RG29, Vol. 192, file 311-P11-1. part 3.

<sup>&</sup>lt;sup>134</sup> "Plan Providing for Hospitalization and Treatment, including Physio-Therapy, Rehabilitation, of Poliomyelitis Patients," attached to Letter, Bow to Smith, July 17, 1953, AA, 77-87,
ed a warning about the potential for another serious polio year in western Canada, and it was not long after the northern epidemic had ended when cases in the south started being reported at an alarming rate.

## 6.3) "The Summer of Fear:"<sup>135</sup> The National Polio Crisis of 1953

In 1953 epidemic polio was felt in Canada from coast to coast to coast. It began in the Yukon in May and continued through the winter into 1954, particularly in northern Alberta and even the North West Territories, where a small, but serious outbreak occurred.<sup>136</sup> The Maritimes had relatively low levels of polio in 1953, but Newfoundland was hit by its worst epidemic, at least since joining Confederation, involving 233 cases and causing 11 deaths.<sup>137</sup> Quebec had seemed almost immune to major polio epidemics since 1946, and in 1953 recorded only a relatively small rise in reported cases.<sup>138</sup> In 1953, Ontario experienced its worst polio epidemic since 1937, with a total of 2,239 cases and 124 deaths reported.<sup>139</sup> From Manitoba west every province felt the full effects of epidemic polio at record or near record levels (see Figure 1 and Tables 1, 2, 3 and 4). While the experience of each of the western provinces with epidemic polio was dramatic and devastating, it was Manitoba that faced

Box 1, file 6; Letter, Peart to G.G. Sivertz, Administrative Officer, Department of Resources and Development, June 17, 1953, NAC, RG29, Vol. 196, file 311-P11-4, part 1.

<sup>135</sup> Peter Carlyle-Gordge, "Summer of Fear," Winnipeg Magazine, (June 1983).

H.V. Johnsen, W.J. Wood, "An Outbreak of Poliomyelitis at Maguse River, N.W.T.," CJPH, 45 (Jan. 1954): 16-17; Peart. "An Outbreak of Poliomyelitis in Canadian Eskimos in Winter-time: Epidemiological Features;" E.S. Orford Smith and B.E. Cole, "A Winter Epidemic of Poliomyelitis in Northern Alberta," CJPH, 45 (Dec. 1954): 495-501.

<sup>137</sup> A.O.D. McDermott, "Poliomyelitis in the Province of Newfoundland, 1953," *CJPH*, 45 (July 1954): 286.

<sup>138</sup> Quebec would not experience another major epidemic until 1959, although significant localized outbreaks occurred in 1954; G. Côte, "Poliomyelitis in the Saguenay District, Quebec in 1954," *CJPH*, 47 (June 1956): 257-59; D. Kubryk, "Paralytic Poliomyelitis in Canada, 1959," *CJPH*, 51 (Oct. 1960): 389-99.

<sup>139</sup> Ontario Department of Health, Annual Report, 1953 (Toronto: 1954), 12-16, and Annual Report, 1954 (Toronto: 1955), 13-14.

the worst crisis in the country, if not in the history of this disease,  $^{140}$  and will thus form the main focus of the following discussion.

The emergence of another polio epidemic in Manitoba after such a large one in 1952 was unexpected since this had not happened after earlier major epidemics. The 1952 epidemic actually continued into the middle of March 1953. The first cases of what became the 1953 epidemic emerged in May and grew steadily until late June. Incidence then escalated alarmingly, reaching a peak of 244 cases per week by mid August, staying above 160 cases per week for the next three weeks, and then slowly declining. Cases were still reported through December and up to the end of February 1954.<sup>141</sup> The seriousness of the situation forced the reactivation and expansion of the province's Technical Advisory Committee on Poliomyelitis by the new Minister of Health and Public Welfare, F.C. Bell. It grew to include Armed Forces and Nursing representatives, and special sub-committees to advise on respirators, nursing and general preventive measures.

With another epidemic developing so soon, a difficult problem was how to handle the press. The press was a frequent target of doctors and health authorities for its excessive publicity about polio and "overplaying" its threat. For example, an article in the *Winnipeg Free Press* was titled, "Doctor Hits Polio Epidemic Panic" and stressed that "Statistics Show Accidents Greatest Killer," but no one was getting "panicky" about accidents. The term "epidemic" was objected to by the doctor, who wanted to place the polio danger in its proper perspective. He suggested a comparative "daily score" of polio and preventable accident deaths be run side by side in the newspapers. This and similar medical appeals in the press missed the point on two main iss-

<sup>140</sup> R.G. Cadham, "The Poliomyelitis Epidemic in Winnipeg, 1953," CJPH, 45 (May 1954): 185.

<sup>141</sup> Manitoba Department of Health and Public Welfare, Annual Report, 1953, p. 69-70 and Annual Report, 1954 (Winnipeg: 1955), p. 72. See also Cadham, Ibid..

ues: polio was not preventable and being killed by it was not what most worried the public.<sup>142</sup>

The Committee decided to release statistical reports to the press, with the Deputy Minister responsible for any statements of policy.<sup>143</sup> It was important that "efforts... be made to keep polio statistics off the front page of the newspapers and everything possible be done to prevent undue panic or alarm from the general population."<sup>144</sup> With this policy in mind, a request by CBC Radio "to do an actuality broadcast" on the gamma globulin situation was denied since it would serve no useful purpose "and would undoubtedly increase the demand for the unwarranted use of this material."<sup>145</sup>

The publicity issue surrounding gamma globulin (GG) was a complex matter for all governments. In Ottawa, carefully worded press releases were needed "to anticipate a growing demand which can't be met and to minimize as best we may public hysteria in regard to this means of counteracting the effects of polio." An abortive attempt at such a press release was made in mid-July, but there were concerns that it should not be in Paul Martin's name, which might only amplify public demands. Such hesitation prevented a federal press release on GG until early August.<sup>146</sup> For Manitoba, the worsening polio situation by early July forced the first request to Ottawa for a supply of 500 vials; of GG, each with a 5 c.c. dose. In total, Manitoba received just over 11,000 vials, which was well over a third of the national supply. Newfoundland received 850 vials, Ontario received 1,400, Saskatchewan only

<sup>&</sup>lt;sup>142</sup> "Doctor Hits Polio Epidemic Panic," Winnipeg Free Press, (July 22, 1953); "Health Deputy Hits Press For 'Overplaying' Polio," Winnipeg Free Press, (Mar. 15, 1954).

<sup>&</sup>lt;sup>143</sup> Minutes, Meeting of Special Advisory Committee on Poliomyelitis, July 3, 1953, MA, G157, B64, file H-4-9-2a.

<sup>&</sup>lt;sup>144</sup> Minutes, Meeting of Special Advisory Committee on Poliomyelitis, July 27, 1953, *Ibid.*.

<sup>&</sup>lt;sup>145</sup> Minutes, Meeting of Special Advisory Committee on Poliomyelitis, July 15, 1953, Ibid..

<sup>&</sup>lt;sup>146</sup> Memo and Statement Draft, D.M. Herron, Information Services, Department of National Health and Welfare, July 17, 1953, attached to Memo, B.D.B. Layton, Principal Medical Officer, Research Development, to C.F. Davidson, Deputy Minister of Welfare, July 15, 1953, NAC, RG29, Vol. 199, file 311-P11-10, part 2.

asked for 200, but Alberta received 11,000, while British Columbia requested 1,260 vials of gamma globulin. In Manitoba, the GG issue soon became complicated by a small commercial supply in the province which a few physicians had given to some case contacts, "but the number of these is negligible."<sup>147</sup>

The issue of commercial GG being sold "under the table" blew up into a major controversy in Manitoba and Ottawa. There was a public perception that the federal government had strict control over all supplies to ensure equitable distribution. Thus, when the story broke of GG being given by some private doctors at \$25 a dose, many wondered what was going on.<sup>148</sup> A more serious problem involved reports of someone taking advantage of the epidemic hysteria and selling GG, bearing a Connaught label, for \$10 per c.c. The small commercial supply was perfectly legal, but the health officials were at a loss to explain how a non-physician obtained a supply of Connaught gamma globulin to sell on the black market as none had been reported stolen.<sup>149</sup> The CCF opposition leader, Lloyd Stinson, found this situation alarming. and he pressured Bell to explain the situation to the press.<sup>150</sup>

The issue would not go away. By September, the Manitoba government put pressure on Ottawa to buy up and strictly control all of the American commercial GG that had appeared to prevent the further development of a black market.<sup>151</sup> Earlier, Washington had assured Ottawa's Gamma Globulin Advisory Committee that there would not be enough commercial GG to supplement the Canadian supply.<sup>152</sup> Cameron

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<sup>147</sup> Letter, M.R. Elliott, Deputy Minister of Health, Manitoba, to Layton, July 3, 1953, *Ibid*; "Shipments of Immune Serum Globulin (Human) Authorized by The Gamma Globulin Advisory Committee," to January 18, 1954, attached to Letter, M.H. Brown, Chairman, Gamma Globulin Advisory Committee, to B.D.B. Layton, Secretary, January 22, 1954, NAC, RG29, Vol. 200, file 311-P11-10, part 4.

<sup>&</sup>lt;sup>148</sup> "Polio Serum Available - At A Price," Winnipeg Free Press, (Aug. 1, 1953).

<sup>&</sup>lt;sup>149</sup> "City Warned Against Polio Serum Pedlars," Winnipeg Free Press, (Aug. 10, 1953).

<sup>150</sup> Letter, L. Stinson, MLA, Winnipeg South, to F.C. Bell, Manitoba Minister of Health, August 21, 1953; Bell to Stinson, August 24, 1953, MA, G157, B64, file H-4-9-2a; "Bell Defends Polio Policy in Manitoba," (Aug. 25, 1953).

Minutes, Technical Advisory Committee on Poliomyelitis, September 3, 1953, MA, G157, B64, H-4-9-2a.

<sup>152</sup> Cameron, Press Report, August 7, 1953, Ibid..

and Martin, however, were reluctant to intervene and further upset normal commercial or provincial biologicals practices. The "acceptance of gamma globulin as a useful element in polio control necessitated very prompt, and you might almost say emergency action" on the part of the federal government. This federal intervention to procure a GG supply was expensive and politically risky, and upset the traditional policy of provincial control over the distribution of biologicals.<sup>153</sup> To ask Ottawa to intervene again for the sake of a small amount of commercial GG, which proved to be valuable for some provinces, was asking too much. Martin felt that Ottawa should "now withdraw from what is generally viewed as a field in which the primary responsibility rests with the provinces."<sup>154</sup> This effectively ended the issue in Manitoba,<sup>155</sup> although it is unclear why the province did not simply buy up the commercial supply itself, as Martin noted was being done in other provinces.

The mounting epidemic also put pressure on Ottawa to reconsider the strict limits placed on who should be given gamma globulin. The policy of the Gamma Globulin Advisory Committee restricted its use to direct case contacts under eleven years of age, "except under special circumstances."<sup>156</sup> A chronic shortage of nurses in Manitoba, despite all efforts at trying to recruit volunteers, and the growing prevalence of polio among adults, generated fears among nurses and medical staff of catching polio, or transmitting the virus to their families. Working around polio cases posed a serious "occupational hazard." Reinforcing such anxiety, there were a number of reports of nurses and doctors developing polio, notably in Saskatchewan,<sup>157</sup>

<sup>153</sup> Letter, Cameron to Elliott, September 2, 1953, NAC, RG29, Vol. 200, file 311-P11-10, part 3.

<sup>154</sup> Letter, Martin to Bell, September 9, 1953, Ibid..

<sup>&</sup>lt;sup>155</sup> Minutes, Technical Advisory Committee on Poliomyelitis, September 10, 1953, MA, G157, B64, file H-4-9-2a.

<sup>156</sup> Cameron, Press Report, August 7, 1953, Ibid..

<sup>157</sup> Letter, G. Kinneard, Director, Regional Health Services, Saskatchewan, to Peart, August 19, 1953, NAC, RG29, Vol. 199, file 311-P11-10, part 2; F.L. Campion, "Fear Factors in Polio-myelitis," *Canadian Nurse*, 50 (June 1954): 475-76.

and in Manitoba.<sup>158</sup> Although such reports were downplayed,<sup>159</sup> the emergence of gamma globulin offered at least some hope of protection. Under the strict federal rules, however, it could not be used for nurses. Prompted by provincial pressure, special permission was given to Manitoba to give GG to case contacts up to age 30, but as far as allowing it for volunteer nurses and their families, Ottawa stalled.<sup>160</sup> Approval to give GG to nurses was not granted until officials from the Epidemiology Division flew from Ottawa to review the entire Manitoba situation in mid-August.<sup>161</sup> Subsequently, the existing supply came under pressure from hospitals requesting GG for their nurses.<sup>162</sup>

The special arrangements made with Manitoba created confusion in other provinces. Pressure built for Ottawa to clarify the situation and the criteria for the distribution of GG. British Columbia was facing a major epidemic too and also wanted to be able to give GG to polio nurses.<sup>163</sup> Cameron, however, assured his B.C. counterpart that when the danger of an overwhelming epidemic in a number of major centres diminishes, B.C. should then be able to obtain an emergency supply.<sup>164</sup> Camer-

164 Letter, Layton to Amyot, August 24, 1953, Ibid.

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<sup>158</sup> Carlyle-Gordge, "Summer of Fear," p. 19; L. Chandler, "Small in Number, A 'Fighting' Few Stand Polio Siege," Winnipeg Free Press, (Sept. 5, 1953); Interview with Dr. John Alcock, September 13, 1993, Winnipeg, prepared for CBC Prime Time News Documentary, "Conquering the Crippler," broadcast December 7, 1993. At least two King George Hospital staff members developed polio during the 1953 Manitoba epidemic.

<sup>159</sup> S. Stanbury, "Gamma Globulin," *Canadian Nurse*, 50 (June 1954): 471. Dr. Beverley Hannah, Medical Superintendent of Toronto's Riverdale Isolation Hospital, assured the readers of this nursing journal that, in his 30 year experience at that hospital and HSC, "he has never encountered a case of infection of a nurse or attendant caring for polio patients."

<sup>160</sup> Letter, Elliott to Layton, July 30, 1953, NAC, RG29, Vol. 199, file 311-P11-10, part 2; Minutes, Special Meeting of Medical Members of Technical Advisory Committee on Poliomyelitis, August 11, 1953, MA, G157, B 64, file H-4-9-2a.

<sup>&</sup>lt;sup>161</sup> "Epidemic Specialists Fly to City," Winnipeg Free Press, (Aug. 14, 1953); Memo, Peart to D. Wallace, Director, Information Services, Department of National Health and Welfare, November 18, 1953, NAC, RG29, Accession 85-86/248, Vol. 33, file 311-P11-1.

<sup>162</sup> Minutes, Meeting of Preventive Services Sub-Committee of Technical Advisory Committee on Poliomyelitis, August 19, 1953, MA, G157, B64, file H-4-9-2a; Letter, Elliott to Layton, August 20, 1953, NAC, RG29, Vol. 199, file 311-P11-10, part 2.

<sup>&</sup>lt;sup>163</sup> Letter, Amyot to Cameron, August 21, 1953, NAC, RG29, Vol. 199, file 311-P11-10, part 2.

on's policy was based on the assumption that the peak of the national epidemic would pass in early September. This prediction proved inaccurate.

Although gamma globulin was made available to Manitoba nurses, this did little to relieve the nursing shortage, forcing the Advisory Committee, once again, to turn to the press. Such a campaign, however, seemed to undermine other efforts to control public panic by trying to manage the media's coverage. The seriousness of the situation could not easily be muted with the press frequently issuing desperate calls for volunteer nurses, and anyone else, to help handle the overwhelming numbers of cases.<sup>165</sup>

The need for nurses was greatest at Winnipeg's King George Hospital (KGH), where all of the most serious cases were centralized. To deal with the crisis, prospective registered and practical nurses were offered bonus pay for polio work,<sup>166</sup> while physicians were asked to try and keep mild cases at home.<sup>167</sup> The situation, nevertheless, remained "greatly overtaxed," forcing Bell to make a direct appeal to the military.<sup>168</sup> Soon, Army, Navy and Air Force nurses and assistants began to arrive in Winnipeg, some of whom had served in the Yukon polio epidemic.<sup>169</sup> Direct appeals were also made to Ottawa in an effort to garner further military help from other parts of the country. Some 500 cases had been admitted to King George by mid-August, and 50 of these cases were being treated there in iron lungs.<sup>170</sup>

<sup>&</sup>quot;Appeal Goes Out For Polio Nurses," Winnipeg Free Press, (Sept. 9, 1952); "Government Pleads For Nurses To Help With Polio Victims," Winnipeg Free Press, (Sept. 25, 1953);
"Polio Nurse Shortage Acute - Bell," Winnipeg Free Press, (Oct. 12, 1953).

Minutes, Special Advisory Committee on Poliomyelitis, July 15, 1953; Minutes, Advisory Committee on Poliomyelitis Nursing Subcommittee, July 28, 1953, MA, G157, B64, file H-5-9-2a; "Polio Nurses Awarded Extra Pay," Winnipeg Free Press, (Aug. 7, 1953).

<sup>167</sup> Minutes, Special Advisory Committee on Poliomyelitis, July 27, 1953, Ibid.; "Mild Polio Gets Home Care," Winnipeg Free Press, (July 28, 1953).

<sup>&</sup>lt;sup>168</sup> Minutes, *Ibid.*; Letter, Bell to Major-General N.E. Rodger, G.O.C. Prairie Command, Winnipeg, July 28, 1953, MA, G157, B64, file H-4-9-2a.

<sup>169</sup> Press Release, attached to Letter, W.M. Lee, Deputy Director of Public Relations, RCAF, to D. Wallace, Director of Information Services, Department of National Health and Welfare, August 5, 1953, NAC, RG29, Vol. 112A, file 181-6-9.

Letters: Elliott to Cameron, July 30, 1953, NAC, RG29, Vol. 192, file 311-P11-1, part 1;
 Bell to E. Lapointe, Minister of Veterans Affairs, August 18, 1953; E.L.M. Burns, Deputy

The high number of bulbar cases requiring iron lung treatment became the source of greatest concern in Manitoba as the numbers of cases grew alarmingly. They were rapidly depleting the province's stockpile of iron lungs that was bolstered after the 1952 epidemic.<sup>171</sup> As the 1953 epidemic began there were 21 adult size iron lungs and one child-size respirator in Winnipeg, but of these 13 were still occupied by cases from 1952. These respirators were of various types, and included new ones, a number of older models, and two that were borrowed from Ontario. There were also five old and neglected "Nuffields" available. In a search for more equipment, the local Army and the Canadian Foundation for Poliomyelitis were asked to survey their supply. The province had also purchased five commercial "Emerson" models and ordered two more in early July, which left it confident "that the respiratory situation is fairly well in hand for the time being."<sup>172</sup>

Over the next few weeks this confidence was shattered as the number of bulbar cases rapidly escalated.<sup>173</sup> By the end of July t e reserve was almost exhausted, forcing the province to order six new Emerson models.<sup>174</sup> Even the Nuffields were called into use in early August when at least 45 cases required iron lung treatment. Ten new respirators were ordered and to expedite their transport from their Boston manufacturer, they were flown to Winnipeg by the Royal Canadian Air Force.<sup>175</sup> This crisis grew sharply worse. A total of 64 patients needed iron lungs by the end of August, 72 a week later, 82 by September 21, and an overwhelming 92 cases depen-

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Minister of Veteran Affairs, to Bell, August 20, 1953, MA, G157, B64, file H-4-9-2a; Elliott to Cameron, August 12, 1953, NAC, RG29, Vol. 199, file 311-P11-10, part 2; Burns to Bell, August 20, 1953, *Ibid.*; Bell to R.W. Bend, MLA, Stonewall, Manitoba, August 27, 1953, MA, G157, B64, file H-4-9-2a.

J.A. Hildes, "Report on Visit to Medical Centres Dealing With Poliomyelitis, April 10-25, 1953," May 15, 1953, attached to Memo, C.R. Donovan, Acting Deputy Minister of Health, to Bell, June 1, 1953, *Ibid.*.

<sup>172</sup> Minutes, Sub-Committee on Respirators of the Technical Advisory Committee to the Minister, July 6, 1953, attached to Memo, Elliott to Bell, July 9, 1953, *Ibid.*.

<sup>173</sup> Minutes, Sub-Committee on Respirators, July 21, 1953, Ibid..

<sup>174</sup> Minutes, Special Advisory Committee on Poliomyelitis, July 27, 1953, Ibid..

<sup>175</sup> Minutes, Special Meeting of Medical Members of the Technical Advisory Committee on Poliomyelitis, August 11, 1953, *Ibid.*.

dent on respirators at once at KGH at the beginning of October.<sup>176</sup> In total, 165 cases were treated in iron lungs, 62 of whom died during the epidemic.<sup>177</sup> By the end of the epidemic, a total of 72 Emerson respirators had been bought at an average cost of \$2,000 each, 14 of which were delivered from Boston by the Air Force, while others were borrowed from the Kenny Institute in Minneapolis, other provinces and the Army.<sup>178</sup> This dramatic and desperate search and transport of iron lungs, and of patients in need of them by the Air Force, or any other means, was repeated, though on somewhat lesser scale, across Canada in 1953.<sup>179</sup>

The 1953 Manitoba epidemic, especially, created extraordinarily complex medical, technical and nursing challenges, particularly during its peak when desperate efforts were needed to keep the supply of respirators ahead of the wave of cases needing them. The experience gained with respiratory cases through the 1952 epidemic was particularly valuable and contributed to the lower death rate in Manitoba in 1953 than experienced elsewhere with a large number of bulbar cases.<sup>180</sup> Military precision was required and much of the overall credit for managing the crisis at KGH belonged to Dr. J.A. Hildes, who had been a Lieutenant Colonel, and "knew how to give orders."<sup>181</sup> The emergency was comparable to dealing with the effects of a war or a major natural disaster.<sup>182</sup>

Minutes, Technical Advisory Committee on Poliomyelitis, August 27, 1953, September 3, 1953, September 21, 1953, October 2, 1953, *Ibid.*

<sup>&</sup>lt;sup>177</sup> Manitoba Department of Health and Public Welfare, Annual Report, 1953, p. 73.

F.C. Bell, "Poliomyelitis in Manitoba," Radio Speech, October 10, 1953, MA, G157, B63, file A18-1-4; Manitoba Department of Health and Public Welfare, Annual Report, 1953, p. 74.

<sup>179</sup> This was particularly true in British Columbia, Alberta and Newfoundland; McDermott, "Poliomyelitis in the Province of Newfoundland, 1953," p. 286; B.C. Department of Health and Welfare, Annual Report, 1953, p. 32-33; "The Poliomyelitis Program in British Columbia," Bulletin of the Vancouver Medical Association, 30 (Apr. 1954): 293-94; Russell F. Taylor, Polio '53: A Memorial for Russell Frederick Taylor, (Edmonton: University of Alberta Press, 1990), p. 18

J.A. Hides, "Inside the King George Hospital - 1953," University of Manitoba Medical Journal, 25 (Dec.-Jan. 1953-54): 5.

<sup>181</sup> Interview with Dr. John Alcock, September 13, 1993, in Winnipeg, prepared for CBC Prime Time News Documentary, "Conquering the Crippler," broadcast December 7, 1993.

<sup>182</sup> Lyn Chandler, "Small In Number, A 'Fighting' Few Stand Polio Siege," Winnipeg Free Press, (Sept. 5, 1953). See also "Hospital Taxed To Full Capacity," Brandon Sun, (Sept. 30, 1953).

A similar siege occurred in Edmonton's Royal Alexandra Hospital (RAH), which was the focus of Alberta's 1953 polio crisis. In 1953, the province registered a total of 1,458 cases and 111 deaths.<sup>183</sup> The RAH managed 107 respirator cases and had a maximum of 33 cases in iron lungs at one time. There, the cruelty of polio was manifested powerfully as it suddenly claimed five nurses (two died), two doctors, three teachers, and a lawyer and his wife, both of whom were in iron lungs at the same time. The husband later died along with two other lawyers and a newly-married woman.<sup>184</sup> The experience of the 1953 Manitoba epidemic continued for a number of patients who remained in KGH for the rest of their lives. Twenty people were still living in the hospital thirty years later, and about half of these individuals remain there as this is written. For many of these people polio caused a double tragedy, striking adults with families and forcing marriages and families apart.<sup>185</sup>

The financial costs of the 1953 polio epidemic in Manitoba in particular, and in Canada generally, were extremely high, leaving many wondering who would pay the bills. The epidemic occurred within a context of rising interest in public health insurance and a federal election in which it became an issue.<sup>186</sup> In Manitoba, this was

Follow up studies of these cases include: L.R. Sherman, "Manitoba's Response to a Major Epidemic of Poliomyelitis and the Consequences for Rehabilitation Services," University of Manitoba Medical Journal, 50 (1980): 80-83; A.J.W. Alcock, J.A. Hildes, P.A. Kaufert, J.M. Kaufert and J. Bickford, "Respiratory Poliomyelitis: A Follow-Up Study," CMAJ, 130 (May 15, 1984): 1305-10; Joseph M. Kaufert and Patricia A. Kaufert, "After the Epidemic: The Long-Term Impact of Poliomyelitis," in D. Coburn, C. D'Arcy, G.M. Torrance and P. New (eds.), *Pualth and Canadian Society: Sociological Perspectives* (Markham: Fitzhenry & Whiteside, 1987), p. 345-62; Joseph M. Kaufert and David Locker, "Rehabilitation Ideology and Respiratory Support Technology," Social Science and Medicine, 30 (1990): 867-77.

 <sup>183</sup> Alberta Department of Public Health, Annual Report, 1953, p. 20; E.S. Orford Smith and B.E. Cole, "A Winter Epidemic of Poliomyelitis in Northern Alberta."

<sup>184</sup> Taylor, Polio '53, p. 16; H.V. Rice, "Poliomyelitis in Edmonton, 1953," Alberta Medical Review, 19 (Nov. 1954): 45-60.

<sup>185</sup> S. Whysall, "The 20 Who Can't Forget the 1953 Polio Epidemic," Winnipeg Tribune, (Nov. 21, 1978), p. 21; Carlyle-Gordge, "Summer of Fear;" Carlyle-Gordge, "Polio Terror Ruled a City," Winnipeg Sun, (June 20, 1983); Documentary, "Conquering the Crippler," CBC Prime Time News: Magazine, Canadian Broadcasting Company Television, Broadcast December 7, 1993.

<sup>Province Must Pay Polio Costs Says Knowles," Winnipeg Free Press, (July 18, 1953); Paul Martin, A Very Public Life, Volume II: So Many Worlds, (Toronto: Deneau Publishers, 1985), p. 68-71, 129-36, 225-26; Canada, House of Commons Debates, 1952-53, Vol. 5, May 8, 1953, (Ottawa: 1953), p. 4986-88.</sup> 

reinforced by a controversy over polio insurance. Federal CCF leader, M.J. Coldwell, stressed this issue in a debate with Prime Minister St. Laurent, describing the plight of many families with no protection against the high costs of the disease and who were being exploited by private insurance companies seeking only to profit.<sup>187</sup>

The business of polio insurance began in Canada around 1949, but posed a difficult actuarial challenge in light of polio's unpredictability and potential for demanding major expenses.<sup>188</sup> The 1952 Manitoba epidemic sparked a boom in polio insurance, with "every agent in town... selling it." It was also a risky business, and some companies lost money and worried about being swamped in 1953.<sup>189</sup> This is exactly what happened, forcing many companies to stop selling new policies "because of extremely heavy losses."<sup>190</sup>

This situation was very distressing to those wanting financial protection but who could no longer get it. This put considerable pressure on the province to clarify and expand its polio policy. As was stressed to the Minister of Health by a rural Manitoba newspaper publisher, it was "a serious matter when parents feel that they face one, two, or even more years of a hospital bill, even if they are in a reasonably good financial position. To them the situation appears a disaster far worse than the Red River Flood,"<sup>191</sup> which struck Winnipeg in 1950. Worrisome to many adult patients was that under the current policy they were responsible for all costs during 39 days of hospitalization. For most polio patients this imposed "a grave financial burden."

<sup>187 &</sup>quot;St. Laurent Challenged by Coldwell: CCF Chief Demands PM Declare Stand on Health Plan," Winnipeg Free Press, (July 28, 1953).

<sup>188</sup> V. Egan, "Polio And Your Pocket Book: In the Rare Case, It Can Be A Financial Crippler," Financial Post, (Aug. 28, 1954): 19.

<sup>&</sup>lt;sup>189</sup> J. Gelmon, "75,000 Polio Policies Sold in Past Year: One Firm Now Selling 500 Daily, Spurred by Epidemic," Winnipeg Free Press, (Aug. 7, 1953). See, for example advertisements in Winnipeg Free Press, (July 27, 1953), p. 9; (July 28, 1953), p. 7, 9.

<sup>&</sup>lt;sup>190</sup> "Firms Cease Issuing Polio Insurance," Winnipeg Free Press, (Jan. 4, 1954); "Doctor Raps Stipulations on Polio Insurance Plans," Winnipeg Free Press, (Oct. 15, 1953); "Insurance On Polio Defended," Winnipeg Free Press, (Oct. 17, 1953)

<sup>191</sup> Letters: G.A. McMorran, Publisher. The Souris *Plaindealer*, to Bell, November 23, 1953; Bell to McMorran, November 25, 1953; McMorran to Bell, January 8, 1953, MA, G157, B64, file H-4-9-2a.

Many were married, with families to support, but with no income, and little prospect for any. This often forced spouses to work, homes to be sold, and forced families apart, just "to realize sufficient money to live on."<sup>192</sup>

The Manitoba government felt that it had already responded sufficiently by reducing the period of patient responsibility to 39 days. The province also provided full hospitalization coverage for those requiring respiratory care, and for all other hospitalized cases covered the hospital costs up to \$8.00 per day, except during the 39 day interim period, Otherwise, "no additional charges" were to be made against the patient.<sup>193</sup> These payments were made under a special "Contingency for Epidemics" appropriation statute, estimated to total some \$200,000.<sup>194</sup> The cost assumed by the province for the many iron lungs and other equipment, which totaled more than \$160,000, was later absorbed by a special Federal Health Grant.<sup>195</sup> The epidemic was believed to have been the "World's Worst,"<sup>196</sup> and by February 1954 its final cost to the province amounted to almost \$500,000, less the Health Grant for the respirators.<sup>197</sup> Despite criticism in the legislature from the opposition, Bell defended his government's management of the epidemic. As the legislative columnist for the Winnipeg Free Press observed, "not only had the Government been most fair financ ally to the polio victims and the hospitals, but its whole conduct during the polio epi-lemic was exemplary."<sup>198</sup>

<sup>192</sup> Letter/Petition, "Merry Menders Club," KGH and Princess Elizabeth Hospital, to Bell, February 25, 1954, Ibid..

<sup>193</sup> Letter, Bell to J.H. McIntyre, Secretary, Winnipeg Municipal Hospitals, July 24, 1953, Ibid..

<sup>194</sup> Memo, A.E. Turner, Hospital Accountant, Department of Health and Public Welfare, to Bell, October 19, 1953; Letter, Bell to G.D. Iliffe, Comptroller-General, Government of Manitoba, October 20, 1953, Ibid..

<sup>195</sup> Letter, Bell to Campbell, Premier of Manitoba, December 30, 1953, Ibid..

<sup>196 &</sup>quot;1953 Polio Epidemic Called World's Worst," Winnipeg Free Press, (Nov. 27, 1953).

<sup>&</sup>lt;sup>197</sup> "Polio Cost Province \$485,000, Says Bell In Defense of Govt.," Winnipeg Free Press, (Feb. 16, 1954).

<sup>H.R.D., "Under the Dome," Winnipeg Free Press, (Feb. 16, 1954); Speech by F.C. Bell,
"Poliomyeliti. 1953," (February 15, 1954), MA, G157, 364, file H-4-9-2a. See also: "Stinson Paps Govt. 'Delay' In Handling Polio Outbreak," Winnipeg Free Press, (Feb. 9, 1954);
"Province Accused Of Shirking Full Share of Polio Burden," Winnipeg Free Press, (Feb. 12,</sup> 

In a effort to reduce the long-term hospitalization costs of this epidemic, and to minimize future costs, Manitoba developed an innovative polio home care program, although one particular case from 1941 brought this issue to the forefront. The local municipality had paid the hospital costs for this case between 1941 and 1953, but was refusing to cover any extra charges, particularly for a \$300 operation in 1954. How would the government manage all the new cases and the inevitable long-term hospitalization costs for a large percentage of them, especially the iron lung cases?<sup>199</sup> The home care plan was designed to allow polio patients, even respirator cases, to be cared for at home. The policy, implemented in December 1954, provided for the loan of iron lungs, or any other necessary equipment, to private homes, transportation to and from hospital, and special nursing care. If hospital re-admission was required, it would be paid for in full. A special Home Care Subcommittee would decide if the patient's medical condition, financial need and family and home circumstances were suitable for care in the home environment. In the program's first year the province was able to discharge 14 patients to their homes at a saving of 33,252,200 By May 1957, a total of 27 patients had been discharged home at a toal saving of \$144,770. The economic and social benefits were obvious, "even though it has placed financial and social stresses on the family."201

Other provinces also spent considerable amounts of money to battle polio in 1953. In Newfoundland, the government paid all the hospitalization costs for acute and paralytic cases, expanded hospital facilities and hired extra physiotherapists to

<sup>1954); &</sup>quot;Polio Cost Province \$485,000 Says Bell In Defense Of Govt.," Winnipeg Free Press, (Feb. 16, 1954).

<sup>199</sup> Memo, Elliott to Bell, September 24, 1954; Minutes, Technical Advisory Committee on Poliomyelitis, August 16, 1954, MA, G157, B64, file H4-9-2a.

<sup>200</sup> Letter, Elliott to J.A. Hildes, Medical Director, Winnipeg Municipal Hospitals, December 3, 1954; W.N. Boyd, "Special Report on the Home Care Polio Program," June 11, 1956, attached to Memo, K.O. Mackenzie, Deputy Minister of Public Welfare, to R.W. Bend, Minister of Health and Public Welfare, June 15, 1956, *Ibid.* 

<sup>201</sup> W.N. Boyd, "Progress Report on Home Care Polio Program for Department of National Health and Welfare, June 1954 to May 31, 1957," July 30, 1957, attached to Memo, Boyd to Bend, July 18, 1957, *Ibid.*.

handle the emergency. The government spent close to \$100,000 in this small and relatively poor province, which did not "take into account the economic loss due to permanent disabilities," which was impossible to evaluate.<sup>202</sup> In Ontario, the province spent more than \$126,000 just to cover the nursing costs for 130 respiratory cases.<sup>203</sup>

Saskatchewan's polio program underwent a further challenge in the wake of the 1953 epidemic over the issue of whether the province was responsible for the full costs of polio care for residents who had little choice but to be treated in another province.<sup>204</sup> The Saskatchewan program provided decentralized rehabilitation services, but on an out-patient basis. There was thus a natural tendency for patients to seek out hospital-based care in Manitoba or Alberta.<sup>205</sup> However, the Saskatchewan government felt its services were superior and saw no reason to broaden them, or allow out-of-province benefits.<sup>206</sup> This confidence may have been exaggerated. The government was paying less attention to the conditions of the existing polio clinics, such as in Saskatoon, which was thought to be a "fire trap."<sup>207</sup> The problem of polio significantly challenged the province's hospital infrastructure. But under a system of universal public hospitalization insurance the government did not want to encourage what it saw as unnecessary and expensive polio admissions.

Complicating the situation in Saskatchewan was the expansion of Alberta's Polio Act after the 1952 epidemic to cover "almost all charges" for the first three

<sup>202</sup> McDermott, "Poliomyelitis in the Province of Newfoundland, 1953," p. 284-88.

<sup>203</sup> Report, "Poliomyelitis," (undated, likely Jan. or Feb. 1954), AO, RG10-106, file 249.2.

Letters: E.G. McCullough, Member of Parliament for Moose Mountain, Sask., to Bentley, March 25, 1954; Bentley to McCullough, April 2, 1954, SA, R11, file 14-87.

<sup>205</sup> Letters: G. Sawyer, Irchkeith, Saskatchewan, to Premier T.C. Douglas, November 30, 1953; Sawyer to Bentley, February 19, 1954, SA, R11, file 14-87.

<sup>206</sup> Memo, (Roth) to Bentley, "Poliomyelitis Program," April 14, 1954, Ibid..

<sup>207</sup> Memo, G. Kinneard, Director, Regional Health Services Branch, to Rentley, May 26, 1954, attached to Memo, Bentley to Roth, June 1, 1954, SA, R11, file 14-87. Dr. Kinneard made the following comments while he was Acting Deputy Minister when Dr. Roth was absent: "Canada has an unenviable reputation for burning patients in Catholic institutions and by allowing a 'polio centre' to be housed in a 'fire trap' I cannot see what possible defense could be made if a fire actually occurred. The fact that it was financially inconvenient to do otherwise would hardly be adequate."

weeks of acute care.<sup>208</sup> This proved costly to the Alberta government, which in the epidemic's aftermath, budgeted \$900,000 for the treatment of polio sufferers in 1954-55. It represented an almost \$800,000 increase over 1953-54 and was the largest single increase in the entire public health services budget of \$18,204,200.<sup>209</sup> The polio policy of British Columbia emerged in 1952 and continued in 1953, but in contrast to Alberta, it involved much less direct government control and financial investment. Polio committees in Vancouver General Hospital and the Royal Jubilee Hospital in Victoria acted as consultants to private physicians, whose fees the patient was always responsible for through the entire course of the disease, including rehabilitation. B.C.'s hospital insurance plan was not universal. Patients were charged a minimal daily fee and were only covered during the acute stage of the disease.<sup>210</sup>

The B.C. policy was very decentralized and remained largely dependent on a strong cooperative relationship with the B.C. Foundation for Poliomyelitis. During the 1953 epidemic 26 new respirators were bought, along with other equipment, through the Federal Crippled Children's Grants, but the provincial share was paid by the Polio Foundation, with no government contribution at all. The relationship between the B.C. government and the Polio Foundation was "exceptionally close," with the voluntary group acting very much like a government agency, paying for hospital equipment, hiring physiotherapists, and funding polio research at the Univer-

<sup>208</sup> The 1952 polio epidemic in Alberta involved 774 cases and 81 deaths, at a case rate of 76.3 per 100,000; Alberta Department of Public Health, Annual Report, 1952, (Edmonton, 1953), p. 32-33; Alberta Statutes, 1953, Chapter 91, "An Act to ammend the Poliomyelitis Sufferers Act, (Assented to March 31, 1953); Memo, Roth to Bentley, December 11, 1953; "Gov't Will Pay Quarantine Polio Costs: Scheme Will Defray Almost All Charges For 14 Days' Care," Calgary Herald, (Nov. 25, 1953), attached to Memo, Bentley to Roth, December 4, 1953, SA, R11, file 14-87; Memo, Elliott to Bell, December 1, 1953, MA, G157, B64, file H-4-9-2a.

<sup>209</sup> Alberta, Budget Speech of The Hon. Ernest C. Manning, Treasurer, March 5, 1954, (Edmonton: 1954), p. 17. To compare, the 1954-55 budget included \$1,692,800 for tuberculosis patients, \$290,900 for cancer treatment, \$4,180,000 for mental institutions, \$2,650,000 for hospital and medical care to pensioners, \$4,180,000 for grants to hospitals and local authorities, and \$1,397,600 for general health services.

B.C. Department of Health and Welfare, Annual Report, 1953, p. 32-33; "The Poliomyelitis Program in British Columbia," Bulletin of the Vancouver Medical Association, 30 (Apr. 1954): 293-94.

sity of British Columbia. This large voluntary role paralleled that of the B.C. Cancer Foundation. The province, frustrated with Ottawa's limited efforts, conducted some epidemiological research into polio.<sup>211</sup> Moreover, in 1954 the province established a "Poliomyelitis Pavilion" near the Pearson Tuberculosis Hospital, in which 36 polio patients were being treated by the end of 1955.<sup>212</sup> This was a significant juxtaposition. By this time polio had become a more serious cause of death in Canada than tuberculosis,<sup>213</sup> simultaneously underlining quiet medical progress against one major health threat and prominent impotence against another.

Paul Martin, in a speech in the House of Commons on December 2, 1953, made much of federal financial involvement in the 1953 national epidemic. He contrasted the progress against other diseases, particularly against tuberculosis, but fully realized "that poliomyelicis has now assumed a new prominence as a major public health problem in Canada." To deal with the problem Martin outlined the National Health Grants that were earmarked to the provinces specifically for polio, which amounted to over \$1,500,000, half of which was committed for further gamma globulin resear-

<sup>211 &</sup>quot;The Poliomyelitis Program in British Columbia," p. 294. The BC Polio Foundation established the Kinsmen Chair of Neurological Research in the UBC Medical School; British Columbia Department of Health and Welfare, Annual Report, 1952, (Victoria: 1953), p. 30-33, and Annual Report, 1953, (Victoria: 1954), p. 32; Report, "Poliomyelitis in British Columbia - 1952," February 12, 1953, attached to Letter, A.J. Nelson, Director, V.D. Division and Epidemiology Consultant, B.C. Department of Health and Welfare, to Peart, February 12, 1953, NAC, RG29, Vol. 204, file 311-P11-29, part 1.

On other provincial frustrations with Ottawa's polio investigations, see: Letters: Roth. to Peart, September 5, 1952; Peart to Roth, September 9, 1952; Nelson, to Gibbard, September 12, 1952; Peart to Nelson, September 16, 1952, NAC, RG29, Vol. 204, file 311-P11-28, part 1; J.D. Adamson, Chair Manitoba Advisory Committee on Poliomyelitis, to J. Gibbard, Director, Laboratory of Hygiene, September 16, 1952; Gibbard to Adamson, September 22, 1952, NAC, RG29, Accession 83-84/119, Vol. 30, file 355-P-4, part 4.

<sup>British Columbia Department of Health and Welfare, Annual Report, 1954 (Victoria: 1955),
p. 37; B.C. Department of Health and Welfare, Annual Report, 1955 (Victoria: 1956), p. 4344. See also: Ronald Walmsley, "Life in A Polio Pavilion," Canadian Welfare, 33 (June 15, 1957): 55-7.</sup> 

<sup>213</sup> Alberta Department of Public Health, Annual Report, 1953 (Edmonton: 1954), p. 17, notes the high incidence of polio in the province, "which has made it the major communicable disease in place of tuberculosis. It has replaced this disease as a cause of death and as a cause of permanent disability and has placed a heavy burden on the hospital services under the Poliomyelitis Act." This Alberta report also noted the death toll of car accidents, which "retained the fourth place among the causes of death in Alberta... Of a total of 667 accidental deaths, motor vehicles tops the list with 263" (see Table 6).

ch. The rest went to pay for Manitoba's 73 respirators, 56 respirators for Ontario, \$159,000 to help with New Brunswick's new polio clinic, \$46,000 for the extension of Alberta's Polio Act, and \$46,000 to Nova Scotia for various polio services and equipment. There were also grants to the University of Montreal, Connaught, and the Hospital for Sick Children for polio research and virus typing.<sup>214</sup>

While many of the provinces competed to provide the most comprehensive polio policy, the severity of the 1953 epidemic and the large numbers of respiratory cases also provoked more of a spirit of provincial cooperation. Manitoba's desperate need for iron lungs and other respirator equipment resulted in a substantial number of idle lungs after the epidemic was over. As the emergency declined, Manitoba's Deputy Minister of Health suggested to the Dominion Council of Health that a pool of respirator equipment should be established with Manitoba's respirators and those of other provinces. A Central Registry of such equipment was required so that in the event of another major epidemic there would be no need for each province to desper ately search for iron lungs to borrow, or face the expense of buying more new ones. This supply could then be deployed where most needed by a central committee much like gamma globulin was during the epidemic.<sup>215</sup>

 <sup>&</sup>lt;sup>214</sup> Canada, House of Commons Debates, 1953-54, Vol. 1, December 2, 1953 (Ottawa: 1954), p. 541-44; "Polio Now Major Issue Says Martin," Winnipeg Free Press, (Dec. 3, 1953); (Canadian Press), "Canada Hard Hit By Polio Epidemic," Winnipeg Free Press, (Dec. 10, 1953).

<sup>215</sup> Minutes, Meeting of Dominion Council of Health, October 5-7, 1953, AO, RG10-05-15, Box. 3.; Letter, Elliott to K.C. Charron, Principal Medical Officer, Environmental Health and Special Projects, Department of National Health and Welfare, October 23, 1953, NAC, RG29, Accession 85-86/248, Vol. 34, file 311-P11-27; "Provinces Agree to Pool Iron Lungs In Epidemics: '53 Siege Costs Over \$400,000," Winnipeg Free Press, (Jan. 11, 1954).

Through 1954 this register was developed and a provisional list was ready by late August. The survey revealed the following available respirator equipment, with the obvious omission of Quebec, which seemed to have opted out of the idea: Newfoundland (5), P.E.I. (4), Nova Scotia (32), New Brunswick (12), Ontario (87), Manitoba (94), Saskatchewan (72), Alberta (113), B.C. (78), Armed Forces (50), for a total of 547 respirators and related equipment of a variety of types; Listing of Respirators, attached to Letter, B.D.B. Layton, (Assistant) Deputy Minister of Health, to All Provincial Deputy Ministers of Health, July 9, 1954; Listing of Respirators, attached to Letter, Latyon to All Provincial Deputy Ministers of Health, August 27, 1954, NAC, RG29, Accession 85-86/248, Vol. 34, rile 311-P11-27.

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The unusual degree of federal-provincial cooperation demonstrated through the 1953 gamma globulin program was widely recognized as a success. Martin told the Canadian Public Health Association that "Gamma Globulin is Canada's health story of the year." In initiating and assuming control of the procurement of GG, Martin was clearly responding to "an emergency situation...."<sup>216</sup> But the principal issue Martin and the federal government faced was explaining to Canadians why the government was not offering gamma globulin to the public on a broad basis to help contain polio epidemics. This was being done in the United States through the NFIP, and was being widely reported on in the Canadian media. Polio's seriousness, and the preciousness of GG as the only prophylactic against it, demanded a centralized and national response. Such a response also involved pragmatic and long-term goals. Public interest in the potential protective effect of GG against polio provided a prominent spark to stimulate the Canadian Red Cross' blood donor program, and thus a valuable opportunity to establish a modern Canadian blood fractionation capacity.

By November 1953, however, the results of the large NFIP trials and mounting American medical criticism of GG sharply dampened Ottawa's enthusiasm for an expanded gamma globulin effort. Another, more important factor was the rapid development of the Salk vaccine v.hich was set for a large NFIP trial in 1954. If such a vaccine was effective then why bother with gamma globulin to fight polio?<sup>217</sup> These were serious questions Martin had to face, the urgency of which was fanned by constant publicity that was "unfortunate, but inevitable." Echoing similar arguments used by his provincial counterparts regarding convalescent serum over twenty years earlier, Cameron stressed to critics that there was clear evidence that GG had

257

<sup>216</sup> P. Martin, "First National Report on Gamma Globulin," Address to Annual Meeting of Canadian Public Health Association, Toronto, October 1, 1953, NAC, RG29, Vol. 204, file 311-P11-25, part 1.; "Anti-Polio Serum Termed Health Story Of The Year," Winnipeg Free Press, (Oct. 1, 1953).

<sup>217</sup> Letters: W. Bovey, President, Reddy Memorial Hospital, Montreal, to Cameron, November 24, 1953; M. Mackenzie, Pathologist, Reddy Memorial Hospital, to Bovey, November (?), 1953, NAC, RG29, Vol. 200, file 311-P11-10, part 4.

at least a modifying effect on polio, but was not a preventive, as many had assumed. Whatever its actual or perceived value, GG was "actually the only thing we have at our disposal at the moment" and its use in Canada had been different than in the U.S. There GG was employed in mass programs in the hope of preventing or minimizing an approaching polio epidemic. The Canadian plans for 1954 were to continue to use GG on an individual contact basis where epidemics were developing or in progress. To attempt an American-style trial was impossible due to the severely limited Canadian supply of the serum. Cameron also stressed the many other uses for GG than just polio, and the other blood products derived from fractionation could be used for a variety of medical purposes.<sup>218</sup>

Through 1953 the polio vaccine issue became a major media story.<sup>219</sup> Cameron relied heavily upon the advice of Defries, who, was "in an excellent position to forecast the future of polio vaccine and fully aware of the difficulties which may arise in finally bringing to perfection a product as potentially dangerous as it will be." While the level of public anticipation in Canada for a polio vaccine was extremely high, the level of concern among many in the medical profession about its safety was also high and was exacerbated by the same press coverage. The 1935 Brodie and Kolmer polio vaccine fiascos still haunted many doctors and public health officials and reinforced a conservative attitude in Cameron. At the same time he went ahead with the blood fractionation program, even though "subsequent events may prove that a large part of the expenditure was unnecessary, but, I believe that having regard for all the factors it is a chance that we should take."<sup>220</sup>

<sup>218</sup> Letter, Cameron to Bovey, November 25, 1953, Ibid..

<sup>W.L. Laurence (New York Times Service), "New Vaccine Provides Immunity Against Polio,"</sup> Globe and Mail, (Mar. 27, 1953); "Toronto Team Grows Polio Virus in Quantity," Globe and Mail, (Sept. 24, 1953); (Associated Press, New York), "Polio Foundation Gambles, Buys \$9,000,000 In Vaccine," Globe and Mail, (Oct. 20, 1953); A.L. Blakeslee (Associated Press, New York), "Hope-Laden Polio Vaccine For Million U.S. Children," Ottawa Journal, (Nov. 17, 1953).

<sup>220</sup> Letter, Cameron to Bovey, November 25, 1953, NAC, RG29, Vol. 200, file 311-P11-10, part 4.

This blood program aimed to collect 100,000 blood donations. The Canadian Red Cross Society received a direct payment from the federal government to assist in the program, but as was recommended by the Dominion Council of Health, there was a "need to avoid any public reference or suggestion to payment to the Red Cross for the blood." The program needed "a good deal of promotion and any reference to payments to be made for it could seriously prejudice the effort."<sup>221</sup> Further reports about the American GG trials were being released, which were actually "quite innocuous" about its efficacy as a polio prophylactic. Nevertheless, the publicity surrounding these reports had significant Canadian effects. As Martin's Executive Secretary. George Carty, told Martin, they were generating doubts about spending substantial public funds for something of little value, and "there was a danger it would adversely affect the Red Cross Society's appeals -- both for blood donations and financial support."<sup>222</sup> These worries were realized, but, despite a disappointing public response,<sup>223</sup> Ottawa remained convinced of the need for blood fractionation facilities in Canada. This need would continue no matter what the real value of GG for polio turned out to be, or if a polio vaccine should prove effective or not.<sup>224</sup> With such a view, a National Health Grant of \$450,000 was approved for a new blood fractionation building at Connaught.<sup>225</sup>

259

<sup>221</sup> Minutes, 64th Meeting of Dominion Council of Health, October 5-7, 1953, p. 13-14, AO, RG10-05-15, Box 3. See also Letter and Draft Press Release, W.S. Stanbury, National Commissioner, Canadian Red Cross, to B.D. Layton, September 9, 1953; Letter, Layton to Stanbury, September 16, 1953, NAC, RG29, Vol. 200, file 311-P11-10, part 3; K.W. MacTaggart, "150,000 Pints of Blood Needed in 1954 to Mount Gamma Globulin Fight on Polio," Globe and Mail, (Jan. 22, 1954); F. Cronin, "The Battle Over Blood," Maclean's, (Dec. 1, 1953): 22, 40-45.

<sup>222</sup> Memo, George Carty, Executive Secretary for Paul Martin, to Martin, March 11, 1954, NAC, RG29, Vol. 200, file 311-P11-10, part 4.

<sup>223</sup> Minutes, Technical Advisory Committe on Poliomyelitis, Winnipeg, February 9, 1954, MA, G157, B64, file H-4-9-2a.

<sup>224</sup> Minutes, 2nd Meeting of Gamma Globulin Advisory Committee, March 5, 1954, NAC, RG29, Vol. 203, file 311-P11-25, part 1.

<sup>225</sup> Memos: Cameron to Martin, March 8, 1954; J.H. Horowicz, Administrative Officer, Health Insurance Studies, to Cameron, April 5, 1954, NAC, RG29, Vol. 200, file 311-P11-10, part 4; A.F. Charles, "Blood Fractionation," *Canadian Chemical Processing*, (Dec. 1954).

In the spring of 1954 the Department of National Health and Welfare found itself in a similar situation as 1953 and wondering what it should do about polio before another, and perhaps even worse, polio season began. Cameron recognized that the new polio vaccine had to be made available to Canadians, "just as soon as its use is justified, in the opinion of our expert advisors." Salk's initial results were encouraging, and if further tests proved similarly so, "the point will be reached inevitably when it would be reasonable to start giving it in Canada, even though the fully analyzed results of the much bigger trial in the U.S. are not available." $^{226}$  This situation echoed what had happened with gamma globulin in 1952. It paralleled the predicament provincial governments faced when public hopes and publicity surrounding convalescent serum, nasal sprays, and even Sister Kenny, originating south of the border, coincided with major provincial polio epidemics, or their impending threat. If the Americans had a vaccine, it was now incumbent upon Ottawa to do everything possible to have it available for Canadians on the most equitable basis possible. However, with respect to the more immediate problem of using gamma globulin during the 1954 polio season,

the Department could not afford to do nothing if the country is hit with a severe polio epidemic during the coming summer. In spite of unfavorable reports there is some real merit in using gamma globulin not only for the treatment of public opinion.<sup>227</sup>

Public pressure to do something against polio was very strong, even if that something had limited or no real therapeutic value. This value was less important than the very real political value involved in freely and unconditionally providing convalescent serum, or gamma globulin, or the Salk vaccine to all Canadians. The threat of polio demanded that something, anything, be done and it was Ottawa's responsibility to provide it on as broad a public basis as possible. The omnipresence of American publicity, and in particular the NFIP, added further pressures to Canad-

<sup>226</sup> Memo, Cameron to Martin, March 15, 1954, Ibid..

<sup>227</sup> Memo, Horowicz to Cameron, April 5, 1954, Ibid..

ian governments to match and adapt any new and promising polio preventive measures that existed in the U.S. In the wake of the epidemics of 1953, the development and introduction of the Salk vaccine, made possible by the polio research and production efforts of Connaught, brought such pressures to act to a dramatic climax.

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## CHAPTER 7:

## "Hopeful Science:"<sup>1</sup> Connaught Laboratories, American Dimes, Canadian Science and the Making of the Polio Vaccine, 1947-1953

The onset of Canada's fourth wave of polio epidemics in 1947 converged with a major renewal of scientific energies focused towards solving this enigma. This period climaxed in 1953 with the dramatic announcement that the Salk vaccine would be subjected to the largest medical experiment in history. This scientific renewal was fuelled by a sharp rise in the National Foundation for infantile Paralysis' financial commitment to polio research. Such growth in research funding had important scientific implications in Canada, especially for the development of the vaccine itself. Connaught Medical Research Laboratories (CMRL) at the University of Toronto played a unique and crucial role in the Salk vaccine story that has yet to be fully explored and historically appreciated. Connaught's involvement followed logically from its considerable research and production experience and international reputation with biologicals and vaccines generally, its long interest in the polio problem, and its intimate links with provincial and federal health authorities, especially through its Director, Dr. Robert D. Defries (1889-1975).

Beginning in 1947, the NFIP financed a comprehensive polio research program at Connaught. This support also stimulated, and was reinforced by, substantial levels of Canadian private and government funding. Total grants to CMRL for polio research between 1947 and 1954 were often greater than for any other research area, and accounted for some 20 to 50 percent of all its outside funding (see Table 5). Such funding sparked major expansions of CMRL's virus research facilities, promoted closer ties between CMRL and the federal government, and supported Ottawa's capacity to investigate virus diseases and test and control polio vaccines. The NFIP's

 <sup>(</sup>Canadian Press, New York), "Hopeful Science Sifts Clues For Drive To Pin Polio Virus," Winnipeg Free Press, (Mar. 28, 1950).

investment in CMRL was based on the Laboratory's established reputation in vaccine development and production. The Foundation's interest was further encouraged in 1947 by the arrival of an man with considerable experience and authority in the science of virology and the understanding of polio: Dr. Andrew J. Rhodes (1911-1995).

The problem of poliomyelitis grew increasingly frustrating as epidemics worsened and public expectations for visible progress intensified. Dependence upon monkeys to isolate and identify the poliovirus, and on large monkey colonies to generate statistically useful data, made polio research a highly complex and expensive enterprise. Even with the NFIP's unprecedented levels of funding, the number of laboratories willing and able to get involved in comprehensive polio research was limited. However, a method of isolating the poliovirus without monkeys, using tissue culture techniques in test tubes, developed in 1949, led to a significant expansion of polio investigators. Yet monkeys were still needed in dealing with the poliovirus, especially when their kidneys became the basis of a polio vaccine and large numbers of monkeys were necessary to test its safety and effectiveness before human use.

This situation generated an unusual degree of scientific cooperation among the polio research community, and this cooperative spirit, like the poliovirus itself, did not respect international borders. Connaught offered several advantages not readily available in the U.S. It had considerable experience with manufacturing vaccines on a large scale, and more importantly, was a non-commercial, universitybased institution. Connaught was Canada's national serum institute whose university and government connections distinguished it internationally, especially from the U.S., where a similar national serum institute did not exist, even on the state level. With Connaught, there were no private shareholders, company secrets or competitors to worry about. Moreover, in light of the pressing demands for a polio vaccine, the potential benefits of Connaught's work were more likely to be freely shared. Thus, a polio research program led by Rhodes, along with CMRL's capacity for a large

monkey colony, made this unique Canadian institution particularly promising to the NFIP and its seemingly unlimited supply of American dimes.

Between 1947 and the summer of 1953, Rhodes directed a growing research team in a variety of projects that systematically tackled many of the outstanding practical research problems posed by polio. These investigations focused on the problems of diagnosis, how the poliovirus was transmitted, and how it could be differentiated from other viruses more easily. He also led studies to prepare a concentrated monkey immune serum, which in turn sparked efforts to cultivate the poliovirus in ever larger quantities. Rhodes' investigations of the devastating Arctic polio epidemic among Eskimos in the winter of 1948-49 were the most internationally recognized. His research was driven by the need for improved methods of laboratory diagnosis of polio, a better understanding of the natural epidemiology and immunology of the disease, and the advancement of tissue culture techniques in order to cultivate the poliovirus in the bulk quantities necessary for a practical vaccine.

Two key Connaught contributions made a large supply of a polio vaccine possible. The first was the development of the first fully synthetic medium for cultivating the poliovirus in a fully controlled and pure form. This was known as "Medium 199," originally developed separately at CMRL for cancer research in 1949, and which. through a process of personal and scientific cross-pollination in 1951, proved ideal for poliovirus cultivation. The second crucial contribution was the development, in 1953, of the "Toronto method" of cultivating the poliovirus using an array of large rocking bottles. This technique enabled enough bulk poliovirus fluids to be produced to supply the NFIP for its unprecedented field trial of the Salk vaccine in 1954.<sup>2</sup>

Connaught's program of basic polio research has yet to be examined, while its contributions to the Salk vaccine have only been noted in passing See for example: John R. Paul, A History of Poliomyelitis (New Haven: Yale University Press, 1971), p. 42%; Saul Benison, Tom Rivers: Reflections on a Life in Medicine and Science (Cambridge, Mass.: MIT Press, 1967), p. 490, 514, 525-26; Greer Williams, Virus Hunters (New York City: Alfred A. Knopf, 1959), p. 106, 281, 306; Jane S. Smith, Patenting the Sun: Polio and the Salk Vaccine (New York City: William Morrow and Company, 1990), p. 131, 206, 217, 251.

## 7.1) Early Polio Research in Canada, 1937-46

The convplex history of Connaught Medical Research Laboratories, founded in 1914, as noted at the start of this study, is a largely untold, but highly significant story in the development of the Canadian public health system, as well as on the international stage.<sup>3</sup> Integral to Connaught's research, education and public health role was the founding of the University of Toronto's School of Hygiene in 1927, made possible by the Rockefeller Foundation.<sup>4</sup> A modern School of Hygiene Building was '-uilt that also served as Connaught's administrative centre, and was known as its College Street Division. The building housed Connaught's Insulin plant and other research and production activities. These included the production of diphtheria and tetanus toxoids, a simpler rabies vaccine, and by 1928, poliomyelitis convalescent serum.<sup>5</sup> In 1931 Connaught began potency tests of the serum, which involved installing equipment and accommodations for a small colony of monkeys in the basement of School of Hygiene. Polio research and vaccine work dominated CMRL's post-war activities and was the foundation and fuel for its rapid growth between 1946 and 1962.

<sup>3</sup> Published histories of Connaught Laboratories are limited to: Robert D. Defries, The First Forty Years, 1914-1955: Connaught Medical Research Laboratories, University of Toronto (Toronto: University of Toronto Press, 1968); Paul A. Pator with Andrew J. Rhodes, Within Reach of Everyone: A History of the University of Toronto School of Hygiene and the Connaught Laboratories, Vol. 1, 1927-1955, (Ottawa: Canadian Public Health Association, 1990). Bator has prepared Volume Two (in press), which covers the period from 1775 to the present. See also: R.D. Defries, "The Connaught Medical Research Laboratoric., 1914-1948," CJPH, 39 (Aug. 1948): 330-44; R.D. Defries, "The Connaught Medical Research Laboratories During the Second World War, 1939-1945," CJPH, 40 (Aug 1949): 348-60; Robert J. Wilson, "Connaught's Contributions to Communicable Disease Control," unpublished Seminar. Connaught Laboratories. January 9, 1967, Connaught Archives (hereafter CA), 83-012-03; Memo, R.J. Wilson to W.A. Cochrane, "Connaught History Outline," August 19, 1983, CA, 83-012-03. For popular accounts see for example: G. Bates, "Lowering the Cost of Life-Saving," Maclean's Magazine, (Aug. 1915); F. Edwards, "A Peacetime Munitions Plant Where science fashions its weapons for the war against the armies of Disease," Maclean's, (Jan. 15, 1928); "A Unique Canadian Institution," Canadian Chemistry and Metallurgy, 1C (Feb. 1932): 36-38: J. Callwood, "The Miracle Factory that began in a Stable," Maclean's, (Oct. 1, 1955).

<sup>&</sup>lt;sup>4</sup> On the School of Hygiene, see also R.D. Defries, "Postgraduate Teaching in Public Health in the University of Toronto, 1913-1955," *CJPH*, 48 (July 1957): 285-94.

<sup>&</sup>lt;sup>5</sup> Defries, "The Connaught Medical Research Laboratories, 1914-1948," p. 331-37: Defries. First Forty Years, p. 25-101: Bator with Rhodes, Within the of Everyone, p. 21-37.

Beyond preparing and testing the server, Connaught's involvement in polio research began during the 1937 Ontario epidemic, and as discussed in Chapter 3, included the Toronto nasal spray trial.<sup>6</sup> This trial was orchestrated by Defries, who was Associate Director of both Connaught and the School of Hygiene, and from 1940 to 1955, the Director of both institutions. Connaught's initial polio studies were led by Dr. James Craigie, a leading virologist who came to Toronto in 1931 from Scotland.<sup>7</sup> The 1937 epidemic also afforded an opportunity for Craigie to study pre-paralytic cases to see if the poliovirus was present in the blood. His negative results seemed to confirm the observations of others that the virus was not present in the blood in any significant amount.<sup>8</sup> This erroneous conclusion held until 1951.

The successful isolation of the poliovirus from the human gastrointestinal tract in 1937-38 was an extremely important step to understanding the natural disease and its baffling epidemiology.<sup>9</sup> This advance opened up polio research significantly, but it also highlighted the practical and technical limits of knowledge about the disease.<sup>10</sup> Polio researchers continued to be frustrated as they remained dependent upon monkeys that were inordinately expensive to import, accommodate and work with (if they survived the trip from India alive and healthy) since the poliovirus could not be cultured outside of the nervous system of a living host. This situation was somewhat minimized in 1939 when one particular strain of poliovirus, the Lansing strain, was adapted to cotton rats, and then to mice, which reduced costs con-

<sup>6</sup> Report to Director, Connaught Laboratories, Annual Report, 1937-38, p. 4-5, CA, 83-005-06, Box 11, file 6/11.

<sup>&</sup>lt;sup>7</sup> Bator with Rhodes, Within Reach of Everyone, p. 53-54; Defries, First Forty Years, p. 119.

<sup>&</sup>lt;sup>8</sup> Report to Director, "Section of Filterable Viruses, Epidenbiology, and Biometrics," Connaught Laboratories, Annual Report, 1937-38, p. 2, CA, 83-005-06, Box 11, file 6/11.

J.D. Trask, A.J. Vignec and J.R. Paul, "Isolation of Poliomyelitic Virus from Human Stools," Proceedings of the Society for Experimental Biology and Medicine, 38 (Feb. 1938): 147-49; Topics of Current Interest, "Poliomyelitis Infectivity of Human Stools," CMAJ, 39 (July 1938): 89-90.

Editorial, "Recent Findings in the Epidemiology of Poliomyelitis," CPHJ, 29 (Aug. 1938):
 407-8; H.H. Ranks, "Acute Poliomyel' is," letter to Editor, Nova Scotia Medical Bulletin, 18 (Apr. 1939): 214-15; Paul, History of Poliomyelitis, p. 279-90.

siderably for certain aspects of polio research.<sup>11</sup> But until a decade later, when all types of poliovirus could be cultivated in non-nervous human tissues in test tubes, monkeys remained central to all polio research. The limited numbers of monkeys that laboratories could afford to keep made it difficult to develop statistically relevant data on the behaviour of the poliovirus.<sup>12</sup> Connaught was one of the few North American laboratories equipped to accommodate a significant number of monkeys.

Connaught's first substantial epidemiological field study 5° oolio focused on a localized outbreak in the Sarnia and Windsor region of Western Ontario in 1939. Cooperating with the Ontario Department of Health, Connaught researchers successfully isolated the poliovirus from stool samples in the laboratory.<sup>13</sup> These were samples taken from an abortive case one month after the illness, and from specimens stored for six months.<sup>14</sup> These findings were similar to those reported by a group of researchers at Yale University and prompted more intensive studies along these lines at Connaugh, during 1940-41.<sup>15</sup>

In 1940, Craigie and his assistant, J.W. Fisher, were able to expand their work with the support of the NFIP and a "substantial grant" of \$9,200.<sup>16</sup> Before 1946 out-

<sup>11</sup> Paul, Ibid., p. 271-78.

Benison, Tom Rivers, p. 269-70. The NFIP initially bought monkeys from an animal dealer in New York City who could get them from the Far East for \$10 to \$15 each. This worked well until World War Two when the price began to rise. In 1942 the NFIP arranged to buy and import monkeys from India itself and between 1942 and 1943 bought and shipped some 11,000 monkeys from India, but only about 3,000 survived the trip to research laboratories. After the war the NFIP established its own monkey farm in Oktatie, South Carolina, from which all grantees were required to order their supply of monkeys.

Ontario Department of Health, Annual Report, 1939 (Toronto: 1940), p. 85-89; R.D. Defries, "Report of the [Acting] Director of the Connaught Laboratories, (1939-40), p. 5, CA, 83-005-06, Box 11, file 8/11; "Sarnia Poliomyelitis Study, 1939: Summary to Date," August 8, 1939; Letters: Andrew L. MacNabb, Director of Laboratories, Ontario Department of Health, to Defries, August 10, 1939; Defries to Dr. M.F. McGavin, Sarnia, August 11, 1939; "Summary of Sarnia Field Study of Poliomyelitis," August 22, 1939, CA, 83-015-03, file 1/4.

Defries, "Report of the [Acting] Director of the Connaught Laboratories, (1939-40), p. 5, CA, 83-005-06, Box 11, file 8/11.

Editorial, "Some Recent Developments in Poliomyelitis Research, " CPHJ, 31 (Mar. 1940): 133-35.

<sup>16</sup> Draft report of Virus Department to Connaught's Director, 1940-41, CA, 83-005-06, Box 11, file 9/11; List of "Canadian Grants" from NFIP, May 12, 1945, attached to Letter, Robert F.

size research grants to Connaught were rare and modest, with research funded primarily by the proceeds of product sales to the provincial governments. For example, one of the few outside sources was National Research Council Grants, which in 1946 ranged from \$4,555 to \$6,891. Even by the standards set in 1947 for polio and other research efforts at CMRL, a \$9,200 investment from the NFIP was "substantial," especially in the context of World War II (see Table 5).<sup>17</sup> With this grant Craigie and Fisher could afford to use several hundred monkeys to focus on the technical problems of inoculating stool specimens to isolate the poliovirus. Of interest was whether infrequent isolations of the virus from the human alimentary tract were due to its sporadic or accidental presence there, or were imperfections in the methods only detecting the virus in a small percentage of individuals actually harbouring it?<sup>18</sup>

During 1941-42 the NFIP continued its support and Craigie and Fisher expanded their epidemiological field work in association with the Province through a special investigation near Lake Huron.<sup>19</sup> Stool samples and samples of flies were collected. Fisher found that a combination of high-speed centrifugation and various chemical treatments proved to be a promising method of isolating the poliovirus from obvious suspect cases, and to his surprise, also from mild and abortive cases where its presence seemed improbable. He also isolated the virus from many of  $t^*$  y samples. This work reinforced the conclusion that there was "a very significant gastro-intestinal tract carrier rate for poliomyelitis." But there seemed to be different levels of virulence between poliovirus found in the central nervous system of fatal cases, and that

Sherman, Leamington, Ontario, to Department of National Health and Welfare, June 11, 1945, NAC, RG29, Vol. 192, file 311-P11-1, part 1; Defries, First Forty Years, p. 155.

<sup>17</sup> Listings: "General Research Including Development and Improvement of Products, April to November 1946, April to November 1945," CA, 83-005-06, Box 12, file 3/8; "General Research Including Development and Improvement of Products, April to December 1947, April to December 1946," CA, 83-005-06, Box 12, file 8/8; "Grants From Outside Sources to CMRL, 1948-1949," CA, 83-005-06, Box 1, file 1/5.

<sup>18</sup> Draft report of Virus Department to Connaught's Director, 1940-41, CA, 83-005-06, Box 11, file 9/11.

<sup>&</sup>lt;sup>19</sup> Ontario Department of Health, Annual Report, 1941 (Toronto: 1942), p. 42.

found in the stools of abortive cases. These were significant clues to the differing types of poliovirus and the epidemiological importance of non-paralytic polio.<sup>20</sup>

These studies continued during 1942-43 with a larger grant from the NFIP and focused primarily on the non-paralytic strains of the poliovirus. But inoculating monkeys and waiting for paralytic symptoms to develop was the only way to confirm a diagnosis of polio. How then could non-paralytic polio be diagnosed? This was disturbing to Craigie and highlighted the major difficulties that had to be overcome in order to fully understand the epidemiological importance of poliovirus associated with the alimentary tract. Thought was given to trying tissue culture methods in an attempt to cultivate these non-paralytic strains, but Connaught's isolation facilities for their monkey colony were inadequate. Independent observation of these non-paralytic strains was also needed. These challenges emerged as demands for Connaught to supply typhus vaccine for the Canadian Armed Forces became urgent, forcing the discontinuation of all active polio studies until 1947.<sup>21</sup>

During the War active research into polio also went on in the School of Hygiene. Between 1940 and 1950, the Head of the Department of Physiological Hygiene, Dr. Donald Y. Solandt, received NFIP grants to investigate the physiological impact of poliomyelitis on musc'es and skeletal structures. These grants were worth up to \$5,150 per year.<sup>22</sup> This work was stimulated, in part, by the work of Sister Kenny,

Letter, Defries to Sydney Smith, President, University of Toronto, University of Toronto Archives (hereafter UTA), A68-0007, Box 064, file 06; Financial Statements, NFIP Grant to Solandt, July 23, 1945, March 18, 1947, UTA, A73-0025, Box 080, file 02; List of "Cana-

269

<sup>20 &</sup>quot;Report of Virus Section, Year Ending March 1942," Connaught Laboratories, p. 1-2, and Appendix to Report, J.W. Fisher, "Studies on the Virus of Poliomyelitis," p. i-vi, CA, 83-005-06, Box 11, file 11/11.

<sup>&</sup>lt;sup>21</sup> "Poliomyelitis," Virus Section Research Report, Connaught Laboratories, 1942-43, CA, 83-005-06, Box 12, file 1/8. See also Defries, *First Forty Years*, p. 155, 172-77. R.C. Parker, "Virus Studies," Report, April 1945, Connaught Laboratories, p. 1, CA, 83-005-006, Box 12, file 4/8. Between April 1945 and December 1946 a total of only \$10.88 was spent on polio research, although \$100.00 was budgeted; Project Listing #235-B, "Research Projects, Connaught Laboratories, Estimated Expenditures, 1945-46;" Project Listing #235, "General Research Including Development and Improvement of Products, April to November 1946, April to November 1945," CA, 83-005-06, Box 12, file 3/8; Project Listing #235, "General Research Including Development and Improvement of Products, April to December 1947, April to December 1946," January 28, 1947, CA, 83-005-06, Box 12, file 8/8.

and by the reaction against it by the medical profession. The pathological study of her concepts of "spasm," "incoordination" and "mental alienation" was of particular interest.<sup>23</sup>

Connaught was able to meet the urgent need for typhus vaccine during the latter part of the War, but this experience demonstrated the limits of its virus research capabilities. Craigie stressed these limitations to Defries, and pointed out how such intense work on the typhus vaccine "precludes research on other viruses...." There was a serious shortage of experienced virologists in Canada to conduct the "time-consuming and expensive research" required in such fields as poliomyelitis. This situation was complicated by the lack of efficient laboratory diagnostic tests.<sup>24</sup> In 1946, prompted also by Craigie's departure to England to conduct cancer research, Defries responded with a determined effort to seek out qualified staff and new sources of financial support. Within a month Defries had recruited Craigie's replacement in Dr. Clennel E. van Rooyen from the University of Edinburgh, who joined Connaught in September 1946. Van Rooyen was the co-author of one of the few authoritative textbooks on virology at the time, *Virus Diseases of Man*, the first edition of which was published in 1940.<sup>25</sup>

With van Rooyen's arrival, the focus of Connaught's virus research work was moved to the Dufferin Division, or "the Farm" north of Toronto. Craigie's work had been based in the School of Hygiene Building on the main University campus, but to provide expanded laboratory and arimal isolation facilities, new laboratories were

<sup>24</sup> Letter and Report, J. Craigie to Defries, June 5, 1945, CA, 83-005-06, Bo 12, file 4/8.

<sup>25</sup> Bator with Rhodes, Within Reach of Everyone, p. 170-72; C.E. van Rooyen and A.J. Rhodes, Virus Diseases of Man (London: Oxford University Press, 1940).

dian Grants" from NFIP, May 12, 1945, attached to Letter, Sherman to Department of National Health and Welfare, June 11, 1945, NAC, RG29, Vol. 192, file 311-P11-1, part 1.

<sup>23</sup> Editorial, "The Expanding Patholgy of Poliomyelitis," CMAJ, 48 (Jan. 1943): 57-8. Examples of Dr. Solandt's papers include: D.Y. Solandt and J.W. Magladery, "The Relation of Atrophy to Fibrillation in Denervated Muscle," Brain, 63 (1940): 255-63: J.W. Magladery and D.Y. Solandt, "Relation of Fibrillation to Acetylcholine and Potassium Sensitivity in Denervated Skelet: I Muscle," Journal of Neurophysiology, 5 (1942): 357-62; D.Y. Solandt, D.B. Delury and J. Hunter, "Effect of Electral Stimulation on Atrophy of Denervated Skeletal Muscle," Arc. ives of Neurology and Psychiatry, 49 (June 1943): 802-07.

needed and the budget was tripled to equip them properly.<sup>26</sup> One particular new piece of equipment that was to be shared within the University, an electron microscope, caught the attention of van Rooyen's friend and co-author, Dr. Andrew J. Rhodes, and helped him decide to join Connaught as well in June 1947. Indeed, Defries recruited Rhodes through van Rooyen's help.<sup>27</sup>

7.2) Polio Investigations, Research Funding and the Building of a Canadian Virus Laboratory, 1947-1949

Rhodes was born in Scotland in 1911 and his interest in the scientific challenge of polio developed as a hobby after he graduated from Edinburgh University Medical School in 1934. Although he had little direct personal experience with the disease, he recognized the need for a level of serious and systematic research that had yet to be attempted.<sup>28</sup> While working towards his M.D. at Edinburgh between 1935 and 1941, Rhodes lectured in the Department of Bacteriology and worked in the Bacteriology Laboratory of Edinburgh Hospital, where he met van Rooyen. In 1945, Rhodes joined the London School of Hygiene and Tropical Mediciue at the University of London. His concentrated attention on polio was sparked by the unexpected recognition of polio as an international problem, brought to light by the military's direct experience with it during World War II, especially in the tropics. Using the School's "world class library," Rhodes then focused his full attention on synthesizing the

<sup>26</sup> Defries, First Forty Years, p. 242; Projects Listing #230, "Office and Administration, Virus Sub-Department, Dr. C.E. von Rooyen, "General Research Including Development and Improvement of Products, April to November 1946, April to November 1945," CA, 83-005-06, Box 12, file 3/8. This budget rose from \$1,934.41 in 1945, to \$5,668.23 in 1946. By April-December 1944, this general funding was reduced to \$1,932.75; Project Listing #230, "General Research Including Development and Improvement of Products, April to December 1946," January 2<sup>8</sup>, 1947, CA, 8300506, Box 12, file 8/8.

<sup>&</sup>lt;sup>27</sup> Defries, *First Forty Years*, p. 242; Interview between Paul Bator and Andrew J. Rhodes, July 16, 1985, interview notes, UTA, B89-0009.

<sup>28</sup> Informal interview with Andrew J. Rhodes by the Author, March 29, 1993, at Dr. Rhodes' Toi nto home; A.J. Rhodes, "Poliomyelitis - Past, Present and Future: The First C.E. Kinley Lecture," Nova Scotia Medical Bulletin, 38 (Nov. 1959): 417.

existing polio literature.<sup>29</sup> Much had been learned about polio since Rhodes wrote an encyclopaedic chapter on polio for *Virus Diseases of Man* in 1938-39. But in 1947 he was more concerned about applying such knowledge practically, as he made clear in a major article in the *Bulletin of Hygiene* just before he left Britain.<sup>30</sup>

It was while Rhodes was writing this article that Defries approached him to join Connaught. According to Rhodes, Defries "had a good vision" and was well aware of the implications of the polio problem and was looking for productive researchers, especially those who were self-motivated and could work effectively on a team. Rhodes accepted Defries' "challenging offer," taking up his new position on June 23, 1947 in the new virus laboratories being set up at the Dufferin Division.<sup>31</sup> In anticipation of his arrival, enlargements were made "to house monkeys to provide facilities for research on poliomyelitis and neurotropic diseases in accordance with the long term policy requirements of the National Foundation for Infantile Paralysis."<sup>32</sup>

The arrival of Rhodes in Toronto coincided with a widespread recognition of the growing threat of virus diseases in Canada,<sup>33</sup> a renewed interest in polio resear-

<sup>&</sup>lt;sup>29</sup> Interview with Andrew J. Rhodes by Paul Bator, July 16, 1985, UTA, B89-0009; Andrew J. Rhodes, Curriculum Vitae, CA, Biographical File; Bator with Rhodes, Within Reach of Everyone, p. 172; A.J. Rhodes, "The Geographical Incidence of Poliomyelitis With Special Reference to Some Features of the Disease in the Tropics," Proceedings of the Fourth International Congress on Tropical Medicine and Malaria, Washington, May 10-18, 1948, (Washington: U.S. Government Printing House, 1949), p. 536-43. This article stressed that "The disease proved unexpededly common in British, American, and other Allied troops serving in the Middle East, India, the Philippines, China and Japan. In fact it was estimated that the incidence in these theatres was about 10 times that in home commands. These troops served as human guinen pigs and drew attention to the presence of poliomyelitis virus in communities where the disease did not appear to be prevalent in the native population at the time" (p. 536).

<sup>30</sup> A.J. Rhodes, "Acute Anterior Poliomyelitis: A Survey of Present Knowledge, With Particular Reference to the Method of Spread," *Bulletin of Hygiene*, 22 (June 1947): 353-85.

<sup>31</sup> Interview, Rhodes with author, March 29, 1993: Interview, Rhodes with Bator, July 16, 1985, UTA, F89-0009; Bator with Rhodes, With Can Reach of Everyone, p. 172; Connaught Medical Ri search Labortaories, "Dufferin Division, Annual Report," April 1, 1947 to March 31, 1948, CA, 83-005-06, Box 12, file 7/8.

<sup>&</sup>lt;sup>32</sup> "Dufferin Division:, Annual Report," April 1, 1947 to March 31, 1948, CA, 83-005-06, Box 12, file 7/8. See also Pamphlet, National Foundation for Infantile Paralysis, "Policies Governing the Making of Grants and Rules Governing Grant," January 1, 1948, CA, 83-005-06, Box 2, file 4/4.

<sup>33</sup> See for example: J.D. Adamson and R.H. McFarlane, "Virus Epidemic, 1947," Manitoba Medical Review, 27 (Oct. 1947): 570-73.

ch at Connaught, and the consolidation of polio research priorities by the NFIP under its new Research Director, Dr. Harry Weaver. Weaver acted as a major catalyst for the reorganization and prioritization of the NFIP's research funding program.<sup>34</sup> The Foundation had been traditionally reluctant to establish such a policy, preferring to give money to any projects that seemed to be of interest through a system of "organized empiricism" that was originally administered by Dr. Paul de Kruif. Such "empiriicism" had led to the disastrous for the and there vaccine experimence of 1935.<sup>35</sup> By 1939 the particular issue of supporting polio vaccine  $\frac{1}{2}$  h was officially relegated to the bottom of the NFIP's priority list. There were a host of fundamental research questions that needed to be addressed before anyone could even think about producing a human polio vaccine.<sup>36</sup>

By the summer of 1947 interest in developing a polio vaccine had not risen very high on the NFIP's priority list, although if and when a vaccine was ever developed, Weaver foresaw that "it could not be held back and it would require ample trial."<sup>37</sup> But Weaver's most immediate research concern was the problem of differentiating the many strains of poliovirus that seemed to cause the human disease, especially the many non-paralytic strains. Another major problem was how to diagnose polio quickly and accurately in such cases.

<sup>34</sup> Benison, Tom Rivers, p. 404-05.

<sup>35</sup> Saul Benison, "The History of Polio Research in the United States: Appraisal and Lessons," in G. Holton (ed.), The Twentieth Century Sciences: Studies in the Biography of Ideas (New York City: W.W. Norton & Co., Inc., 1970, 1972), p. 320-22. See also Paul, History of Pol<sup>3</sup>omyelitis, p. 300-23.

<sup>36</sup> Paul, Ibid., p. 322-23. These resarch problems were first outlined by the NFIP's Scientific Research Committee chaired by Dr. Thomas Rivers of the Rockefeller Institute in the spring of 1939: "1) The pathology of poliomyelitis in human beings, 2) Portal of entry and exit of virus, 3) Purification and concentration of virus, 4) What is to be called poliomyelitis, 5) Mode of transmission of virus from man to man, 6) Transmission of virus along the nerves, 7) Further attempts to establish poliomyelitus in small laboratory animals, 8) Settlement of the question of chemical blockade, 9) Chemotherapy of poliomyelitis, 10) Relation of constitution to susceptibility, 11) Production of a good vaccine."

<sup>37</sup> Draft memo notes, re. Interview in New York City with Dr. Weaver, NFIP, July 11, 1947, CA, 83-005-06, Box 1, file 1/5.

In mid-July, 1947, Defries and Rhodes met with Weaver in the NFIP's head office in New York City to discuss these and other outstanding research problems. Weaver highlighted the "terrific demand" for NFIP research funds, not only from American researchers, but also from abroad. He noted how some felt that research grants should be restricted to American researchers since these funds were raised from the American public on the assumption that the money would be spent at home, "unless an unusual job is offered." This policy worried Defries, as it might exclude Connaught from a significant source of research money.<sup>38</sup> Fortunately, Rhodes had some research ideas that seemed "unusual" enough to qualify for NFIP support. As an internationally recognized virologist, now employed in Canada by CMRL, also internationally recognized for its long history of vaccine production, Rhodes carried significant clout and research potential that Weaver could not afford to ignore.

Rhodes' principal interest was to develop better methods of polio diagnosis in the laboratory. He proposed a project to the NFIP in July 1947. He thought one potentially simpler method of detecting the poliovirus might be to utilize the "interference phenomenon." This idea was first suggested in 1943, but had not been pursued. It made "use of the possible interfering effect caused by human virus on infections induced in eggs, hamsters, and mice, by rodent strains." The major objective of this project was to eliminate the expense of monkeys to confirm a diagnosis of polio in the laboratory. Rhodes received two years of NFIP funding for this project, at \$4,300 per year, but he was ultimately unsuccessful in his goal of using the interference effect as a simpler means of diagnosing polio. He and his assistants, however, acquired valuable experience working with the poliovirus.<sup>39</sup>

<sup>38</sup> Ibid..

A.J. Rhodes, NFIP Grant Application, July 14, 1947, CA, 83-005-06, Box 12, file 6/8. The interference phenomenon was first discussed in G Dalldorf and E. Whitney, "On the Interference Thenomenon in Hamsters," Science, 98 (1943): 477. See also A.J. Rhodes, NFIP Grant Application, July 15, 1948, asking for \$4,500, CA, 83-005-06, Box 1, file 1/5; A.J. Rhodes and N. Chapman, "Some Observations on Interference Between Neurotropic Viruses," Canadian Journal of Research, Series E, 27 (Dec. 1949): 341-48; A.J. Rhodes and M. Chapman, Re-

Connaught was not the only Canadian institution interested in undertaking serious polio research in 1947. At Toronto's Hospital for Sick Children (HSC), Dr. Nelles Silverthorne, who had extensive clinical experience with polio, planned a broad epidemiological, clinical, and field study in the Toronto area. He wanted to investigate the mode of transmission of the virus in homes, and conduct hospital investigations of abortive cases. He was especially interested in isolating both neurotropic and gastrointestinal strains of the poliovirus. Silverthorne outlined his plans to D<sup>-</sup> fries, Rhodes and van Rooyen in June 1947 with the idea of Connaught cooperating in this study. Bu<sup>+</sup> CMRL's facilities for accommodating monkeys at the Dufferin Division were not yet ready and Rhodes wanted to be free to conduct his own research without additional responsibilities. Rhodes assisted as much as possible, and Silverthorne relied on limited facilities in the School of Hygiene's basement to carry out a small number of monkey inoculations. In order for CMRL to become more fully involved in the HSC study there was a need for a full-time staff to carry forward a larger program of virus isolations at the Dufferin Division.<sup>40</sup>

Rhodes resisted becoming closely involved in this project, but the results of the few monkey inoculations conducted by early 1948 dramatically demonstrated the technical difficulties of isolating and differentiating the non-paralytic and paralytic strains in monkeys.<sup>41</sup> These findings and the long standing problems of diagnosing polio and differentiating it from other virus diseases, very much interested Rhodes and prompted him to push for the establishment of a Canadian diagnostic facility for

port, Research #532, "Interference Phenomenon", April 1, 1949 to March 31, 1950, CA, 83-005-06, Box 2, file 1/4.

<sup>40</sup> Minutes, "Conference on Poliomyelitis," June 19, 1947, CA, 83-015-05, file 5/7.

<sup>A.J. Rhodes, "Poliomyelitis Investigation, Life Officers Grant: Final Report on Virus Studies, 1947," attached to Memo, Rhodes to Defries, January 23, 1948, CA, 83-005-06, Box 1, file 2/5. See also: N. Silverthorne, A.M. Goodfellow, C. Anglin, A.J. Rhodes, T.E. Roy and C.E. Snelling, "Non-Paralytic Poliomyelitis: Sor a Observations on Differential Diagnosis," CMAJ, 60 (Apr. 1949): 356-59; A.J. Rhodes, L. McClelland and W.L. Donahue, "Laboratory Studies on Poliomyelitis, Toronto, 1947," CMAJ, 60 (Apr. 1949): 359-62.</sup>
virus diseases at the Dufferin Division. But Rhodes only had a small staff assisting him, with only one fully trained in virus diseases, Dr. Laurella McClelland.<sup>42</sup>

Rhodes needed to expand the Dufferin virus laboratories further than planned. To finance this expansion, and to take part in the HSC study, Rhodes suggested approaching the Canadian Life Insurance Officers Association (CLIOA), which was already supporting Silverthorne's study, for a direct grant for Connaught.<sup>43</sup> As discussed in the previous chapter, the 1947 British Columbia polio epidemic and Ottawa's botched efforts to conduct an epidemiological study strongly highlighted to Rhodes the limits of Canadian capabilities to study and control virus diseases, especially polio.<sup>44</sup> Rhodes brought these issues before the medical community and the public, stressing the urgent need in Canada to fully investigate neurotropic virus diseases in the laboratory.<sup>45</sup>

Despite Rhodes' NFIP funding, between 1947 and 1949, the most significant supporter of CMRL's polio research expansion was the Canadian Life Insurance Officers Association. In 1948 the CLIOA made a grant of \$10,000 directly to CMRL as part of a larger annual grant of \$16,500 used to expand HSC's epidemiological, clinical and laboratory study of polio over the next three years. This project was originally des-

276

<sup>42</sup> Defries, First Forty Years, p. 155, 242-44.

<sup>43</sup> Memos: van Rooyen and Rhodes to Defries, January 26, 1948; van Rooyen and Rhodes to Defries, "The Laboratory Diagnosis of Neurotropic Virus Infections," January 26, 1948, CA, 83-005-06, Box 1, file 2/5.

<sup>44</sup> Letters: James Gibbard, Chief, Laboratory of Hygiene, Ottawa, to Defries, February 18, 1948; Defries to Gibbard, February 20, 1948; Gibbard to Defries, February 25, 1948, CA, 83-015-05, file 5/7; Memo, Rhodes, "Laboratory Aid in the Diagnosis of Epidemic Neuro-tropic Virus Diseases," attached to letter, Helen E. Farmer, Secretary to Rhodes, to Gibbard, May 11, 1948; Letter, Gibbard, to all Directors of Provincial Laboratories, July 9, 1948, NAC, RG29, Accession 83-84/119, Vol. 30, file 355-P-4, part 3.

A.J. Rhodes, "Virus Infections of the Central Nervous System," CMAJ, 59 (July 1948): 32-36, paper read January 28, 1948 before the Montreal Neurological Society; A.J. Rhodes, "Poliomyelitis: A Discussion of Recent Advances in Knowledge, with Main Reference to Epidemiology," University of Western Ontario Medical Journal, 18 (Jan. 1948): 1-9, read at the UWO Medical School, October 1, 1947; "Synthetic Polio Vaccine Predicted By Researcher," London Free Press, (Oct. 4, 1947).

igned to have a national scope,<sup>46</sup> but was instead focused on the Dufferin County area north of Toronto, especially in the towns of Orangeville and Shelburne. The local MOH in the area was eager for some publicity to announce this project, but Defries hesitated, arguing it would be premature and night prejudice the participation of others should polio cases occur in a nearby county. "Further, it is possible that the people of Dufferin County might not want to come to their physicians, as requested, if they feel that some type of scientific investigation is being planned at this time." If cases did actually occur, then Defries felt that this situation would change "and the public would quickly respond to any invitation."<sup>47</sup> By the fall of 1948, numerous newspaper articles finally appeared, stressing how Connaught and HSC workers "Trap Flies, Test Sewage, Seek Sources of Polio."<sup>48</sup>

Another important source of funding for Connaught's polio and other research efforts emerged with the implementation of the Federal F. 2alth Grants Program in May 1948, which included Public Health Research Grants. Rhodes was the first at CMRL to benefit from such federal funding for his plans for a systematic national survey of poliomyelitis and the neurotropic virus diseases group.<sup>49</sup> But Rhodes had to change his plans because the project's broad scope conflicted with the Laboratory of Hygiene's plans in this general area.<sup>50</sup> Rather than interfere with Ottawa's eff-

Frederick F. Tisdall, Research Laboratories, Hospital for Sick Children, Toronto, "A Request to the Public Health Committee of the Canadian Life Insurance Officers Association for funds to continue a Study on Poliomyelitis (Infantile Paralysis)," March 10, 1 J48; R.D. Defries, "Request of the Connaught Medical Research Laboratories... for assistance in the conduct of Laboratory Investigations forming part of the Studies in Poliomyelitis being made by the Hospital for Sick Children, Toronto," attached to Letter, Defries to Tisdall, March 11, 1948, CA, 83-005-06, Box 1, file 2/5.

<sup>47</sup> Letters: Tisdall to Defries, June 10, 1948, attached to Draft Press Release; Defries to Tisdall, June 21, 1948, CA, 83-015-05, file 5/7.

<sup>48 &</sup>quot;Trap Flies, Test Sewage, Seek Sources of Polio," Globe and Mail, (Sept. 11, 1948); Ross Gregory, "Hunt Tiniest Murderer As 14 of Village's 1,400 Polio Victims, One Dies," Globe and Mail, (Sept. 1, 1948).

<sup>49</sup> Connaught Medical Research Laboratories, "Applications for Aid in Research, 1949-1950," CA, 83-005-06, Box 11, file 2/11; Dufferin Division, CMRL, "Annual Report, April 1, 1947-March 31, 1948: Report of the Virus Section," CA, 83-005-06, Box 12, file 7/8.

<sup>&</sup>lt;sup>50</sup> A.J. Rhodes, "Application for a Grant for Research," (written on a National Research Council form), July 6, 1948, attached to "Explanitory Note" from Defries to J.T. Phair, Ontario Dep-

orts, Rhodes encouraged the Laboratory of Hygiene "to establish facilities for the diagnosis of neurotropic infections at the earliest possible time." Meanwhile, if an epidemic occurred anywhere in the country, Rhodes would assist with any federal investigations as long as Ottawa covered the costs from "ordinary funds and not from research grants."<sup>51</sup>

With this initial Public Health Research Grant secured and work started by August 1948,<sup>52</sup> Rhodes turned to the more specific, and as yet unexplored question of whether the poliovirus was present in infected water and sewage, particularly during the fall, winter and spring interepidemic periods. The epidemiological significance of this project was clear, but Rhodes wanted to develop more sensitive methods of isolating and concentrating the poliovirus from waters which also contained numerous bacteria so that a purified sample could be more reliably inoculated into monkeys. Possible methods included freeze-drying, chemical precipitation, and the use of the ultracentrifuge (although Rhodes did not have access to one and very few laboratories had one capable of depositing the poliovirus).<sup>53</sup> Once an effective method was established, water and sewage samples would be artificially infected with poliovirus, held under different conditions and tested at set times to see if the virus had survived. In December, these plans led to the transforming of Rhodes' original Public Health Grant into a study of polio in sewage and other waters.<sup>54</sup>

uty Minister of Health, (through whom all Public Health Research Grants in Ontario were administered), July 7, 1948, CA, 83-005-06, Box 1, file 2/5.

One of the few to work with the ultracentrifuge to concentrate poliovirus was Joseph Melnick of Yale University; J.L. Melnick, "Polion/yelitis Virus in Urban Sewage in Epidemic

278

<sup>&</sup>lt;sup>51</sup> Meeting Resolutions, "Conference wth Doctors Tisdall, Silverthorne, Rhodes, MacLean and Defries: Neurotropic Virus Research," December 2, 1948, CA, 83-005-06, Box 2, file 4/4.

<sup>52</sup> H. Hickey, "Ottawa Aids Doctor Study Polio Cause," Globe and Mail, (Dec. 29, 1948).

<sup>53</sup> Alfred Grafe, A History of Experimental Virology (Translated by Elvira Reckendorf) (Berlin: Springer-Verlag, 1991), p. 51-54.

<sup>54</sup> Meeting Resolutions, "Conference wth Doctors... Neurotropic Virus Research," December 2, 1948, CA, 83-005-06, Box 2, file 4/4; Letter, Defries to Phair, December 13, 1948; A.J. Rhodes, "Application for a Public Health Research Grant," December 13, 1948, "Investigation of the Role of Sewage and Water Supplies in the Spread of Poliomyelitis," CA, 83-005-06, Box 1, file 2/5; A.J. Rhodes, "Application for a Public Health Research Grant," January 27, 1949, CA, 83-005-06. Box 2, file 4/4.

Rhodes' polio research efforts, were initially sparked by the funding of the NFIP, but with the substantial financial support of the CLIOA, and then the Federal Research Grants, his laboratory facilities and staff at the Dufferin Division underwent a major expansion during 1948.<sup>55</sup> Thus, an effective polio research group was consolidated that consisted of Eina Clark, Dorothy Knowles. Laura Stewart and Frank Shimada. Clark was Rhodes' principal Research Assistant and responsible for carrying out most of the laboratory work, especially any bacteriological and serological studies with the technical assistance of Knowles and Stewart.<sup>56</sup> Frank Shimada. was originally hired as an Animal Attendant, or "monkey catcher," but soon became one of Rhodes' principal technicians, and remained with Connaught until his retirement in 1988.<sup>57</sup> For the NFIP study of the interference phenomenon, the bulk of the rather tedious job of inoculating, testing and seconding the reactions of hundreds of mice and hamsters to the various viruses fell to another of Rhodes' Research Assistants. Marion Chapman.<sup>58</sup> The prominence of women among Rhodes' polio research team continued and was not restricted to technical assistants; a number of women with Masters and Ph.D. degrees played important and leading roles. This was true of Connaught generally, which represented an attractive environment for women with a love for science and public health, reinforced by the shortage of qualified men during Connaught's major growth periods during both world wars.<sup>59</sup>

Despite such staff expansion, there was one particular piece of equipment that Rhodes very much needed for his laboratory. In the fall of 1949 his Public Health

and in Nonepidemic Times," American Journal of Hygiene, 45 (Mar. 1947): 240-53. See also Paul, History of Poliomyelitis, p. 279-90.

<sup>55</sup> G. Clark, "Polio Fight: Childhood's Cruelest Enemy Is Being Cornered By Canadian Medical Research," *The Standard* (Montreal), (Apr. 16, 1949).

<sup>56</sup> Memo, NFIP Grant Report, June 30, 1948, CA, 83-005-06, Box 1, file 1/5.

<sup>57</sup> Three interviews with Frank Shimada were recorded at his Toronto home by the author that cover the period between 1948 and 1962. They were taped on July 15, 1993, August 10, 1993, and August 31, 1993, and will be deposited in Connaught's Archives.

<sup>58</sup> Rhodes, "Application for a NFIP Grant," July 15, 1948, CA, 83-005-06, Box 1, file 1/5; Rhodes and Chapman, "Some Observations on Interference Between Neurotropic Viruses."

<sup>&</sup>lt;sup>59</sup> Bator with Rhodes, *Within Reach of Everyone*, p. 79-81.

Research Grant enabled Connaught to buy an ultracentrifuge, which turned out be a highly significant tool during the next phase of Rhodes' research program.<sup>60</sup>

## 7.3) Epidemiology, Canadian Research Experience and Eskimo Polio, 1949-1951

Connaught's polio research efforts expanded on all fronts during 1949, prompted by greater physical capacity and staff support, as well as wider epidemiological, geographical and immunological research opportunities. With new equipment Rhodes was able to diffrentiate more precisely non-paralytic and paralytic strains of poliovirus from other viruses that often mimicked the early pre-paralytic symptoms of polio.

During 1949 and into 1950, with the funding of the CLIOA, Rhodes broadened his study of where the poliovirus went during interepidemic period to include, in cooperation with HSC, a comprehensive clinical study of school children in Dufferin County. This involved following a group of children at regular intervals throughout the year and a systematic search for the poliovirus in stool samples.<sup>61</sup> Rhodes could easily isolate the poliovirus from paralytic cases, but he could not isolate it from several non-paralytic cases. He hoped improved methods of specimen collection and preparation would result in more sensitive laboratory tests that could be correlated with clinical diagnosis.<sup>62</sup> A new Public Health Research Grant enabled Rhodes to conduct just such a project.

<sup>60</sup> A.J. Rhodes and E.M. Clark, "Report on Federal Public Health Grant for Period to Ma.ch 31, 1949: The Survival of Poliomyelitis Virus and Related Neurotropic Viruses in Water and Sewage," CA, 83-005-06, Box 1, file 4/5.

A.J. Rhodes and R.D. Defries, "Request of the Connaught Medical Research Laboratories... for Assistance in the Conduct of Laboratory Investigation Forming Part of the Studies in Poliomyelitis being made by the Hospital for Sick Children," (undated, but likely March 1949); A.J. Rhodes, CMRL Research Project #533, April 1, 1949 to March 31, 1950, "Diagnosis of Neurotropic Virus Infections, with Special Reference to Poliomyelitis (in Collaboration with Dr. Silverthorne)," March 15, 1949, CA, 83-005-06, Box 2, file 4/4.

A.J. Rhodes, E.M. Clarke, W.L. Donahue and A.M. Goodfellow, "Report to the Health Committee of the Canadian Life Insurance Officers Association," July 1, 1948 to June 30, 1949, (undated, but likely July 11, 1949), CA, 83-005-06, Box 2, file 4/4; N. Silverthorne, M.P. Armstrong, F.H. Wilson, W.L. Donahue, A.M. Goodfellow, T.E. Roy, L. McCielland, E.M. Clark

When Rhodes received the ultracentrifuge in the fall of 1949, he connected his CLIOA and Public Health Grant projects and developed a clear direction for further studies. The sewage study would be complete by the spring and he was anxious to study the applications of the new ultracentrifuge, and the ultrasonorator. His new federally funded project focused on "The Technical Methods of Poliomyelitis Virus Recovery *i*rom Pathological Specimens," which fitted in well with his other polio projects and created little extra work. The ultrasonorator used ultrasonic waves and had been used before to liberate other viruses from cells, but it had yet to be used in polio research. Rhodes planned to study the poliovirus before and after exposure to ultrasonic vibration, and then concentrate the virus suspension using differential ultracentrifugation.<sup>63</sup> The ultracentrifuge was a massive, very expensive and difficult machine to use and few laboratories could afford one. Only J.L. Melnick of Yale University had applied this machine to polio research, but not in the systematic way Rhodes had planned.<sup>64</sup>

By the end of 1949, 'he results yielded from these new machines were striking. Rhodes confirmed that polio did indeed occur among schoo! children in Dufferin County during the winter months, but as a mild and generally unrecognized illness.<sup>65</sup> When stool samples from some of these children in the town of Orangeville

and A.J. Rhodes, "Studies on Poliomyelitis in Ontario: I, Observations on the Apparent Infectiousness of the Acute Case," CMAJ, 61 (Sept. 1949): 241-50.

<sup>63</sup> Memo, Rhodes to Defries, November 4, 1949; A.J. Rhodes, Draft Application for Public Health Research Grant, attached to Memo, Rhodes to Defries, November 9, 1949; A.J. Rhodes, CMRL Research Project #639 for April 1, 1950 to March 31, 1951, "Polio in Sewage," February 27, 1950; CA, 83-005-06, Box 4, file 3/5.

<sup>64</sup> Shimada interview #1, July 15, 1993, Tape 1, Side B. On the use of the ultracentrifuge in general virus and polio research see Benison, Tom Rivers, p. 216-18, 220, 270; Melnick, "Poliomyelitis Virus in Urban Sewage in Epidemic and in Nonepidemic Times," p. 241-42, 252-53; W.M. Stanley, "The concentration and purification of tobacco mosaic virus by means of the Sharples super-centrifuge," Journal of the American Chemical Society, 64 (1942): 1804; J.L. Melnick, "Concentration of dilute solutions of virus of encephalomyelitis by pervaporation and ultracentrifugation," Proceedings of the Society of Experimental Biology and Medicine, 49 (1942): 553; J.L. Melnick, "The ultracentrifuge as an aid in the detection of poliomyelitis virus," Journal of Experimental Medicine, 77 (1943): 195.

<sup>65</sup> A.J. Rhodes, "Poliomyelitis Research in the Laboratories, 1947-1953," Ontario Medical Review, 20 (Sept. 1953): 604.

were subjected to ultracentrifugation and inoculated into monkeys, none developed paralytic polio, and none showed pathological evidence typical of polio. These were epidemiologically significant results, suggesting an endemic strain of polio existed in the town which infected the community year-round and caused a mild illness. Superimposed upon this endemic infection were "foreign" strains of poliovirus, introduced by non-residents of this rather isolated community during the warmer months, likely causing polio outbreaks of the more serious paralytic type.<sup>66</sup> Such evidence was strongly suggestive of the existence of immunologically distinct types of polioviruses, which had not yet been precisely classified, and helped erplain why such rural and isolated communities were often hit by severe polio epidemics.

As 1950 began, Rhodes tested new stool samples collected from two families in another small town north of Toronto. He was successful in isolating the newly discovered "Coxsakie" virus from all the samples.<sup>67</sup> The discovery of this "new" intestinal virus, or enterovirus in 1947, named after the small New York town from which it was first isolated, was important, not only for polio researchers, but for all virologists. This was the first of many ECHO, or enteroviruses to be discovered and linked to a specific disease.<sup>68</sup> The Coxsackie virus was closely associated with polio, but seemed to mimic non-paralytic polio. More importantly, this virus could be easily differentiated from the poliovirus by inoculating suckling mice (less than a week old), rather than monkeys. The Coxsackie virus did not attack the nervous system, but rather

282

<sup>66</sup> A.J. Rhodes, E.M. Clark and W.L. Donahue, "Poliomyelitis Investigations in Dufferin County During the Winter of 1948-1949: Supplementary Report to the... CLIOA," attached to Memo, Rhodes to Defries, December 8, 1949, CA, 83-005-06, Box 2, file 4/4.

<sup>67</sup> M.P. Armstrong, F.H. Wilson, W.J. McLean, N. Silverthorne, E.M. Clark, A.J. Rhodes, D.S. Knowles, R.C. Ritchie and W.L. Donahue, "Studies on Poliomyelitis in Ontario: II, Isolation of the Coxsackie Virus in Association with Poliomyelitis Virus: A Preliminary Report," CJPH, 41 (Feb. 1950): 51-59.

<sup>&</sup>lt;sup>68</sup> 'They were originally called ECHO viruses (Enteric Cytopathogenic Human Orphans), which meant they were found in the human intestine, destroyed cells, but did not seem to cause diseases -- "orphan viruses in search of a disease," as some called them; Williams, Virus Hunters, p. 362-63.

caused a singular type of paralysis in the suckling mice due to lesions in the skeletal muscles.<sup>69</sup>

Others soon isolated the "Coxsackie" virus elsewhere in the U.S., but Rhodes was also able to isolate both Coxsackie and typical monkey pathogenic poliovirus from the same samples. This discovery raised important questions about the relationship between these two viruses.<sup>70</sup> The Coxsackie virus, and more precisely, the use of a new research animal, the suckling mouse, "opened a veritable Pandora's box containing a huge family of new viruses," associated with a variety of clinical syndromes that were similar to mild polio, and others that were quite different. This discovery was a reversal of the usual pattern of infectious diseases in which "the discovery of an array of viruses came first, to be followed by the bewildering task of sorting out the types of illnesses from which they could be isolated."<sup>71</sup> To Rhodes, the Coxsackie discovery

represents one of the most interesting and probably one of the most important developments in research into the ætiology, pathogenesis, and epidemiology of poliomyelitis that 'Lave been made within recent years. Further developments are eagerly awaited.<sup>72</sup>

These developments included additional isolations of the Coxsackie virus in the Dufferin County area, and more significantly, isolations of two strains from samples of Toronto sewage in the absence of the poliovirus.<sup>73</sup> Rhodes' group had consistently

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<sup>&</sup>lt;sup>69</sup> Paul, *History of Poliomyelitis*, p. 397-98, 263-78; G. Dalldorf and G.M. Sickles, "An unidentified, filterable agent isolated from the feces of children with paralysis," *Science*, 108 (1948): 61-62.

Armstrong (et al.), "Studies on Poliomyelitis in Ontario: II," p. 51-52; A.J. Rhodes, "Interim Report on Laboratory Studies Carried Out at the Connaught Medical Research Laboratories During the Period Beginning July 1, 1949," p. 4, attached to Memo, Rhodes to Defries, January 28, 1950, CA, 83-005-06, Box 4, file 3/5; A.J. Rhodes, "Recent Developments in the Clinical Laboratory Diagnosis of Poliomyelitis," Modern Medicine of Canada, 5 (July 1950): 19-25, 54-56.

<sup>71</sup> Paul, History of Poliomyelitis, p. 398-99.

Armstrong (et al.), "Studies on Poliomyelitis in Ontario: II," p. 59. See also James Y. Nichol,
"MDs Isolate New Virus: First Time In Canada: May Help In Polio War," Toronto Telegram,
(Dec. 1950?).

N. Silverthorne, M.P. Armstrong, C.S. Anglin, A.M. Goodfellow, N.F. Walker and A.J. Rhodes, "Report to the Standing Committee on Public Health of the CLIOA: Poliomyelitis Research Carried out at the HSC and the CMRL in the Period Commencing July 1, 1949," p. 1, attached

isolated poliovirus from Toronto sewage at various times, and had also successfully infected river water artificially with the poliovirus. He found that the poliovirus remained viable in the river water suspension after at least 188 days of storage.<sup>74</sup>

These results were highly significant to Defries and he stressed this, and the urgency of Rhodes' entire range of polio research, to the CLIOA, to whom Rhodes was applying for further funding. Connaught was prepared to spend \$60,000 to operate Rhodes' polio laboratory in 1950-51, and while NFIP and federal funds were important, Defries stressed that the Canadian Life Insurance Officer's investments were "the foundation on which Dr. Rhodes has established his work."<sup>75</sup> The scope of the entire Dufferin County, joint HSC CMRL polio study in 1949-1950 not only involved Rhodes' laboratory work, but had grown to include significant clinical, genetic and field investigations of polio. A January 1950 report to the CLICA noted how the results of this work were applicable to t...? whole country. Moreover, "no other group of investigators has tackled the problem of poliomyelitis in quite this way."<sup>76</sup>

Through 1950 Rhodes' Coxsackie and sewage projects grew closer, but the complex task of differentiating and establishing the precise nature of these viruses and their relationship to other strains recovered in Toronto and elsewhere, put further work on hold until 1952.<sup>77</sup> This decision was also necessitated by the move of much of Rhodes' laboratory work to the new Hospital for Sick Children's Virus Laboratory,

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to Letter, T.G.H. Drake, Director, Research Laboratories, HSC, to H.E. Cather, Secretary, Standing Committee on Public Health, CLIOA, January 31, 1950, CA, 83-005-06, Box 2, file 4/4; Letter, Rhodes to F.P. Nagler, Laboratory of Hygiene, September 28, 1950, NAC, RG29, Accession 83-84/119, Box 30, file 355-P-4, part 4; Memo, Rhodes to Defries, November 3, 1950, CA, 83-005-06, Box 4, file 3/5.

<sup>&</sup>lt;sup>74</sup> Rhodes (*et al.*), "Prolonged Survival of Human Poliomyelitis Virus in Experimentally Infected River Water;" A.J. Rhodes, E.M. Clark, D.S. Knowles, F. Shimada, A.M. Goodfellow, R.C. Ritchie and W.L. Donahue, "Poliomyelitis Virus in Urban Sewage: An Examination for its Presence Over a Period of Twelve Months," *CJPH*, 41 (June 1950): 248-54.

<sup>75</sup> Letter, Defries to Cather, January 28, 1950, CA, 83-005-06, Box 4, file 3/5.

<sup>&</sup>lt;sup>76</sup> Silverthorne (*et al.*) "Report to the Standing Committee on Public Health of the CLIOA" p. 1, attached to Letter, Drake to Cather, January 31, 1950, CA, 83-005-06, Box 2, file 4/4.

<sup>&</sup>lt;sup>77</sup> Memo, Rhodes to Defries. November 3, 1950, CA, 83-005-06, Box 4, file 3/5; E.M. Clark, D.S. Knowles, F.T. Shimada, A.J. Rhodes, R.C. Ritchie and W.L. Donahue, "Coxsackie Virus in Urban Sewage: Recovery of Virus in Season of Low Incidence of Reported Poliomyelitis," *CJPH*, 42 (Mar. 1951): 103-07.

which he designed. The new hospital opened in January 1951<sup>78</sup> and beginning in the spring became the primary focus of Rhodes' research work, especially the Coxsackie project, the bulk of which was handled by Dorothy Knowles.<sup>79</sup>

The polio research projects supported by the Canadian Life Insurance Officers and the Federal Health Grants were focused on improving the understanding of polio's epidemiology. After the discovery of the Coxsackie virus, this work tended to converge, and in 1952 was exclusively funded by Federal Public Health Research Grants. Federal funding and direct involvement played a large, though frequently problematic role in Rhodes' investigations of the 1948-49 Arctic polio epidemic among Canadian Eskimos. This unusual and severe epidemic focused international attention on the even more important and complex issue of polio immunology. It provided a rare and very well defined opportunity to investigate how the poliovirus was transmitted in an isolated environment.<sup>80</sup>

Rhodes first heard of a mysterious outbreak affecting Eskimos in the Eskimo Point and Chesterfield Inlet, N.W.T. area in mid-February 1949. Word came though a telegram from the Indian Health Services Field Medical Officer of Health for the East-

Rhodes' further work with Coxsackie virus include: N. Silverthorne, C. Anglin, J.B.J. McKendry, D.S. Knowles, E.M. Clark, F.T. Shimada, A.J. Rhodes, T.E. Roy, R.C. Ritchie and W.L. Donahue, "Studies on Poliomyelitis in Ontario: V, Further Observations on the Recovery of Coxsackie Viruses from Cases of Clinical Poliomyelitis," *CMAJ*, 65 (Dec. 1951): 536-42; A.J. Rhodes, E.M. Clark, W. Wood, F.T. Shimada, N. Silverthorne, J.B.J. McKendry, D. Duncan, C.S. Anglin, "Studies on Poliomyelitis in Ontario: VI, Additional Laboratory Studies on Cases of Clinical Poliomyelitis Excreting Coxsackie Virus," *CMAJ*, 68 (May 1953): 438-43.

Max Braithwaite, Sick Kids: The Story of the Hospital for Sick Children in Toronto (Toronto: McClelland and Stewart, 1974), p. 115-26.

<sup>&</sup>lt;sup>79</sup> Memo, Rhodes to Defries, January 19, 1951; A.J. Rhodes, CMRL Research Project #747, "Cooperative Research into Poliomyelitis with Hospital for Sick Children," January 31, 1951, CA, 83-005-06, Box 5, file 3/6. See also N. Silverthorne, M.P. Armstrong, A.M. Goodfellow, T.E. Roy, R.C. Ritchie, W.L. Donahue, A.J. Rhodes, E.M. Clark, D.S. Knowles, F.T. Shimada and F.H. Wilson, "Studies on Poliomyelitis in Ontario: IV, Further Observations on the Spread of Poliomyelitis and Coxsackie Infections in Small Communities," CMAJ, 64 (April 1951): 309-17. On the new HSC laboratories see Letter, Defries to Cather, January 29, 1951, CA, 83-005-06, Box 5, file 3/6.

<sup>&</sup>lt;sup>80</sup> There are few historical studies of Eskimo or Inuit health and the impact of infectious diseases in the twentieth century. The most recent is Pat Sandiford Grygier, *A Long Way From Home: The Tuberculosis Epidemic Among the Inuit* (Montreal & Kingston: McGill-Queen's University Press, 1994).

ern Arctic region, Dr. J.P. Moody.<sup>81</sup> By the end of the month some 25 cases and four deaths had occurred from the, as yet, undiagnosed illness.<sup>82</sup> A team of six doctors was flown into the area by the Air Force on March 2 to diagnose and treat cases and also determine the epidemiology of the outbreak.<sup>83</sup> In mid-March, just as Moody imposed the largest regional quarantine in medical history, Rhodes received initial stool and other clinical samples from the stricken cases. The costs of testing these samples were to be paid by the Department of Indian Affairs.<sup>84</sup>

It did not take Rhodes long to discover that the outbreak was caused by the poliovirus, but further examinations were necessary to confirm this.<sup>85</sup> However he lacked blood serum samples, which would confirm a polio diagnosis more precisely, and perhaps determine whether or not the easily identifiable Lansing strain of polio was to blame. The adaptation of the Lansing strain to mice provided a useful means to measure the concentration of Lansing poliovirus antibodies in human blood serum. However, a problem developed for Rhodes when the Laboratory of Hygiene also expressed interest in analyzing these serum samples. The Department of National Health and Welfare hoped to use the epidemic to gain experience with conducting serum neutralization tests for the Lansing strain, and thus garner much-needed political credit for determining the responsible virus strain. Moody had collected blood sera from 20 to 30 Eskimo and white abortive cases and those who seemed to suffer no ill effects during the epidemic. Moody also hoped to collect a stool sample

<sup>81</sup> Telegrams: J.P. Moody, Chesterfield Inlet, N.W.T., to Rhodes, undated (likely February 17, 1949); Rhodes to Moody, undated (likely February 18, 1949), CA, 83-015-05, file 5/7.

<sup>&</sup>lt;sup>82</sup> Memo, J. Gibbard, Chief, Laboratory of Hygiene, to J.W. Fisher, Virologist, Laboratory of Hygiene, February 24, 1949, NAC, RG29, Accession 83-84/119, Box 30, file 355-P-8.

<sup>83</sup> A.F.W. Peart, "An Outbreak of Poliomyelitis in Canadian Eskimos in Wintertime: Epidemiological Features," CJPH, 40 (Oct. 1949): 406; J.D. Adamson, J.P. Moody, A.F.W. Peart, R.A. Smillie, J.C. Wilt and W.J. Wood, "Poliomyelitis in the Arctic," CMAJ, 61 (Oct. 1949): 339.

<sup>&</sup>lt;sup>84</sup> A.J. Rhodes, CMRL Research Project #535, "Investigation of Poliomyelitis in Eskimos at Chesterfield Inlet," March 15, 1949, CA, 83-005-06, Box 3, file 2/4.

<sup>85</sup> A.J. Rhodes, CMRL Project #481, "Report on Examination of Material Received From Outbreak of Suspected Poliomyelitis ar Chesterfield Inlet, N.W.T.: Period from April 1, 1948 to March 31, 1949," CA, 83-005-06, Box 1, file 4/5.

from the suspected source of the epidemic, Father Dionne, to determine his role in spreading the virus.<sup>86</sup> Father Dionne, who was not stricken himself, was a missionary priest who took up residence at the Chesterfield Inlet Hospital just before 15 Eskimos contracted polio. He was also the only known contact between Chesterfield Inlet and a smaller outbreak in Eskimo Point, and had visited a number of Eskimos and white settlers in his travels throughout the region.<sup>87</sup>

Considerable interest developed in this epidemic and Rhodes hoped to write a short report of his laboratory work for early publication along with a full epidemiological report.<sup>88</sup> Rhodes tried to obtain the serum samples from Ottawa, but the Laboratory of Hygiene wanted to keep them and collect more. A second federal trip to the Chesterfield district, however, was delayed by an epidemic of influenza in Cambridge Bay, N.W.T. in April 1949.<sup>89</sup>

This delay created a difficult situation for Rhodes with respect to his American polio research colleagues, and his relationship with Ottawa. A polio diagnosis had noty yet been reported in the press, but when asked about his test results, Rhodes felt he needed permission from the Chief of the Laboratory of Hygiene before he could provide details.<sup>90</sup> There were plans for a federal report from the Division of Epidemiology, to which Rhodes could append his laboratory work.<sup>91</sup> But these reports, along with a consultant's from the University of Manitoba, were delayed through the summer of 1949 due to scheduling problems in Canada's two major medical journals, the

<sup>86</sup> Letter, Peart to Adamson, March 30, 1949; Memo, Peart to Cameron, April 16, 1949, NAC, RG29, Vol. 203, file 311-P11-22, part 2.

<sup>&</sup>lt;sup>87</sup> Letters: Adamson to Peart, March 24, 1949; Peart to Adamson, March 30, 1949, NAC, RG29, Vol. 203, file 311-P11-22, part 2; Adamson (et al.), "Poliomyelitis in the Arctic," p. 342; Peart, "An Outbreak of Polimyelitis in Canadian Eskimos in Wintertime," p. 409. On the Chesterfield Inlet Hospital see Charles Choque, St. Theresa Hospital, Chesterfield Inlet, N.W.T.: 50th Anniversary, 1931-1981 (Churchill-Hudson Bay, 1982).

<sup>&</sup>lt;sup>88</sup> Letter, Rhodes to Gibbard, April 20, 1949, NAC, RG29, Vol. 203, file 311-P11-22, part 2.

<sup>89</sup> Letter, Peart to Adamson, April 30, 1949, Ibid..

<sup>&</sup>lt;sup>90</sup> Letter, Rhodes to Gibbard, May 3, 1949, NAC, RG29, Acc. 83-84/119, Vol. 30, file 355-P-8.

<sup>&</sup>lt;sup>91</sup> Letter, Gibbard to Rhodes, May 7, 1949, *Ibid.*.

*CMAJ* and *CJPH*.<sup>92</sup> Rhodes, meanwhile, grew embarrassed under increasing pressure from his American colleagues for the results of Lansing antibody tests. Rhodes was frustrated because the serum samples remained in Ottawa, where such tests had been planned, hui were never done.<sup>93</sup> Yet, he grew more personally concerned that if such tests were delayed any further, "considerable criticism will be levied against those of us who have carried out the loboratory work. It will be rightly said that we have only made a half-job of the work and have neglected the opportunity to throw light on an important aspect of poliomyelitis." Echoing the fiasco during the 1947 B.C. investigation, Ottawa was finally forced to admit to Rhodes, some nine months after collecting the serum samples, "that they were not in a position to do these antibody tests."<sup>94</sup> The facilities at the Laboratory of Hygiene for such work were still "very poor and extremely limited."<sup>95</sup>

Rhodes finally received the samples in April 1950, conducted the Lansing tests, and was surprised to find they were negative. This suggested, not only that the Lansing strain was not responsible for the epidemic, but also the Eskimos had little, if any, previous exposure to the Lansing strain. Furthermore, it was clear that a single exposure to a poliovirus strain rot of the Lansing type did not stimulate the production of

<sup>92</sup> Letters: Defries to Gibbard, May 18, 1949; Cameron to Defries, May 21, 1949; Adamson to Peart, June 1, 1949; Peart to Adamson, June 11, 1949; Memo, Peart to Cameron, April 16, 1949; Letter, Peart to Adamson, April 30, 1949; A.F.W. Peart, "An Epidemic of Poliomy-elitic Amongst Canadian Eskimos," manuscript of paper presented June 27, 1949, Annual Meeting, Canadian Public Health Assocation, Halifax; Letter, Adamson to Peart, June 23, 1949, NAC, RG29, Vol. 203, file 311-P11-22, part 2; Adamson (et al.), "Poliomyelitis in the Arctic;" Peart, "An Outbreak of Polimyelitis in Canadian Eskimos in Wintertime;" A.J. Rhodes, E.M. Clark, A. Goodfellow and W.L. Donahue, "An Outbreak of Poliomyelitis in Canadian Eskimos in Wintertime: Laboratory Investigations," CJPH, 40 (Oct. 1949): 418-19.

<sup>93</sup> Letters: Rhodes to Dr. F. Nagler, Virologist, Laboratory of Hygiene, January 18, 1950; Rhodes to Nagler, February 6, 1950, NAC, RG29, Acc. 83-84/119, Vol. 30, file 355-P-8.

<sup>94</sup> Memo, Rhodes to Defries, February 18, 1950, CA, 83-005-06, Box 3, file 2/4.

<sup>95</sup> Memo, Gibbard to H.A. Ansley, Director of Health Services, Department of National Health and Welfare, February 25, 1950, NAC, RG29, Accession 83-84/119, Vol. 30, file 355-P-8; Letters: Defries to Gibbard, February 22, 1950; Gibbard to Defries, February 28, 1950, CA, 83-005-06, Box 3, file 2/4; A.J. Rhodes, CMRL Project #640, April 1, 1950 to March 31, 1951, "Study of Poliomyelitis Antibody in Eskimos form Chesterfield Inlet, N.W.T.," February 27, 1950, CA, 83-005-06, Box 4, file 3/5.

Lansing antibodies. Such preliminary results were "extremely interesting" to Rhodes and threw "considerable light on the immunology of poliomyelitis."<sup>96</sup> By the end of the year additional tests revealed the "striking fact" that only half of the 34 Eskimos whose serum was tested actually had Lansing antibody present, and this was highest among the older age groups, suggesting an exposure some years earlier. These findings echoed Eskimo serum surveys done in Alaska by the Yale polio group, prompted by the Chesterfield epidemic, although no outbreak was evident there since 1930. This evidence led Rhodes to conclude that the Lansing poliovirus strain had a world-wide distribution. The question still remained as to whether Lansing antibody was specific or not to the Lansing virus.<sup>97</sup>

A new Public Health Research Grant enabled Rhodes' polio group to further investigate the Eskimo epidemic and the particular relationship between the type of virus involved, and the role of the host. Were there any particular immunological or other susceptibility factors to polio among the Eskimo race? This was a broad project conducted in cooperation with the Department of Indian Affairs, which also involved studies of other Canadian Eskimo communities.<sup>98</sup>

Rhodes hoped to determine the precise type of poliovirus responsible for the Eskimo epidemic. This process involved a large number of monkey inoculations.<sup>99</sup> Typing of these strains required that antiserum pools of the three known distinct types of poliovirus ("Brunhilde," (I), "Lansing." (II), "Leon," (III)) be tested against the Eskimo strains. This was a long, tedious and very expensive process requiring

289

<sup>96</sup> Letter, Rhodes to Gibbard, April 17, 1950, attached to A.J. Rhodes and E.M. Clark, "Preliminary and Confidential Report: Poliomyelitis in Eskimos at Chesterfield Inlet, N.W.T.,"

<sup>97</sup> Letter, Rhodes to Gibbard, December 13, 1950, NAC, RG29, Accession 83-84/119. Vol. 30, file 355-P-8. See also E.M. Clark and A.J. Rhodes, "Poliomyelitis in Canadian Eskimos: Laboratory Studies, II," Canadian Journal of Medical Sciences, 29 (Aug. 1951): 216-35; Paul, History of Poliomyelitis, p. 360-68.

<sup>98</sup> A.J. Rhodes, "Application for a Public Health Research Grant: Laboratory Investigations of Poliomyelitis in Canadian Eskimos...," December 11, 1950, CA, 83-005-06, Box 5, file 3/6.

<sup>99</sup> Shimada interview #1, July 15, 1993, Tape 1, Side B: A.J. Rhodes, "Federal Public Health Research Grant: Poliomyelitis in Canadian Eskimos, Interim Report," November 1951, CA, 83-005-06, Box 6, file 1/5.

some 100-150 monkeys.<sup>100</sup> By early 1952 it was clear that the poliovirus type responsible for the Chesterfield epidemic was actually the Brunhilde type. This type was responsible for most North American polio epidemics.<sup>101</sup> Rhodes also studied the immunological status of other Arctic Eskimo communities on Baffin Island and found that the Lansing virus was widespread, but, generally only in the older age groups. These results reinforced the conclusion "that poliomyelitis antibody is universally present in human communities, and that by inference poliomyelitis virus is likewise widely distributed."<sup>102</sup> But this distribution had significant demographic and geog raphic gaps in countries with the most advanced public health infrastructures, in which polio epidemics were generated.<sup>103</sup>

In 1952, Rhodes conducted further studies of Eskimo polio using the newer tissue culture methods. Rhodes found that, again, much to his surprise, the sera of the Baffin Island Eskimos tested positive for all three virus types, some of whom had antibodies to more than a single type. But no Eskimo below the age of 15 had any poliovirus antibodies. With increasing age, increasing antibody presence was evident. Thus, as Rhodes concluded, "It was likely that infection from all three types was also universal."<sup>104</sup> These Eskimo studies, funded by Federal Public Health Research Grants, made important contributions to understanding the immunology of

 <sup>100</sup> Rhodes, "Interim Report," November 1951, *Ibid.*. On the NFIP Typing Project see Paul, *History of Poliomyelitis*, p. 233-35. Of the 196 strains typed, their distribution was: 82.1% Type I, 10.2% Type II, and 7.7% Type III.

A.J. Rhodes, E.M. Clark, W.Wood and F.T. Shimada, "Federal Public Health Research Grant #605-7-42: Report on Work carried out April 1, 1951 - March 31, 1952," p. 3, CA, 83-005-06, Box 4, file 5/5.

E.M. Clark and A.J. Rhodes, "Poliomyelitis in Canadian Eskimos: Laboratory Studies, III: Lansing Antibody Levels in Baffin Island Eskimos," *Canadian Journal of Medical Sciences*, 30 (Oct. 1952): 390-402.

<sup>103</sup> Paul, A History of Poliomyelitis, p. 357-68.

A.J. Rhodes, E.M. Clark, W. Wood and F.T. Shimada, "CMRL Research Project #849: Poliomyelitis in Canadian Eskimos, Final Report on Work Carried out April 1, 1952 - March 31, 1953," attached to Memo, Rhodes to MacLean, CA, 83-005-06, Box 6, file 1/5; W. Wood, E.M. Clark, F.T. Shimada and A.J. Rhodes, "Poliomyelitis in Canadian Eskimos, IV: Antigenic Typing of Virus in Monkeys and in Tissue Cultures," Canadian Journal of Medical Sciences, 31 (June 1953): 207-21.

poliomyelitis that were increasingly noticed by the NFIP. Indeed, in 1949, while Rhodes was waiting for Eskimo serum samples from Ottawa, the NFIP quietly began to substantially increase its level of funding to Connaught for a major new project that led directly to discovering how to make a practical polio vaccine.

7.4) The Money, the Medium, and the Methods: Polio Immunity, Virus Cultivation, and American Dimes, 1949-1953

Coinciding with the Eskimo epidemic of 1948-49, a new era in the history of polio began when a short paper was published in the journal *Science*, entitled "Cultivation of the Lansing Strain of Poliomyelitis Virus in Cultures of Various Human Embryonic Tissues."<sup>105</sup> This paper was by John F. Enders, Thomas H. Weller and Frederick C. Robbins, of Boston Children's Hospital and Harvard Medical School, who solved the long standing problem of culturing the poliovirus in test tubes using nonnervous human tissues. This finally provided a research method to demonstrate the presence of the poliovirus free from the expensive process of inoculating monkeys. Enders' group provided an inexpensive alternative to researchers who did not have the capacity to house monkeys, but were interested in studying the poliovirus.

Connaught Laboratories was one of the few polio research laboratories that could exploit the advances opened up by Enders' Nobel Prize winning methods while maintaining research and vaccine production advantages offered by large monkey colony facilities. Between 1947 and 1949 Canadian private and federal research funding provided the physical foundation for CMRL's polio research program, and helped pay for an expanded staff increasingly experienced with the poliovirus. During this same period the NFIP funded Rhodes' "interference phenomenon" project, but in 1950 boosted their grants to Connaught for a project to study passive immunity to polio and the possible use of concentrated monkey immune serum – gamma globulin

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<sup>105</sup> J.F. Enders, T.H. Weller and F.C. Robbins, "Cultivation of the Lansing Strain of Poliomyelitis in Cultures of Various Human Embryonic Tissues," *Science*, 109 (Jan. 28, 1949): 85-87. On the background to the work of Ender's group see Paul, *History of Poliomyelitis*, p. 369-81.

- as a possible source for human use. The major funding of the NFIP for this project led to increasingly important advances in tissue culture cultivation of the poliovirus at CMRL that proved crucial to the development of the Salk vaccine. The fact that this NFIP money came from the American public remained ar, underlying concern for both the NFIP and Connaught. Their relationship was carefully managed to prevent uncortrolled publicity about the escalating spending of U.S. dimes in Canada.

Renewed interest in the preventive possibilities of concentrated human immune serums based on the gamma globulin blood fraction emerged with the development of more sophisticated blood fractionation techniques during World War II. Blood donations could be pooled, as was clone to make convalescent serum in the late 1920s and 1930s, but they could now be concentrated and fractionated for their collective antibodies and used to passively immunize individuals against a variety of diseases, such as measles, infectious hepatitis, and perhaps polio.<sup>106</sup> At the time it was unclear whether poliovirus antibodies in the bloodstream would protect an individual from an attack of polio, since there was little evidence showing the poliovirus present in the bloodstream during the course of the disease. The presence of polio antibodies was thought to be a secondary effect of general immunity. Boosting their levels might provide some passive protection and modify the course of the disease.<sup>107</sup>

Scientific interest in studying such immunity and the possible production and application of gamma globulin as a source of passive immunity against polio developed out of the work of Dr. Isabel Morgan of Johns Hopkins University in 1949. Morgan discovered that a series of small intramuscular injections of Lansing poliovirus in monkeys, over a period of four months, yielded high concentrations of poliovirus antibodies in the blood serum. She was able to measure this level of immunity using the antibody neutralization test with Lansing poliovirus propagated in large numbers of mice. The resulting "hyperimmune" monkey tood serum could be collected

107 Ibid., p. 382-94.

<sup>106</sup> Paul, History of Poliomyelitis, p. 199, 390; Benison, Tom Rivers, p. 469-74.

and gamma globulin could be fractionated from it.<sup>108</sup> The collection of gamma globulin in this manner from large numbers of monkeys offered a means of concentrating specific types of polio antibodies against which various strains could be typed and studied.

In July 1949 the NFIP approached Connaught to conduct a major study of passive immunity and the production of hyperimmune poliovirus anti-serum. Of interest to the Foundation was CMRL's considerable capacity for a large colony of monkeys. Connaught, however, did not yet have blood fractionation capabilities and relied on the American Red Cross for the final step in this process.<sup>109</sup> The NFIP was anxious to build a supply of hyperimmune serum for fractionation into gamma globulin for possible human use during the summer of 1950, and wanted Rhodes to push ahead rapidly. This project involved more than 300 monkeys and was financed by a NFIP grant of just under \$30,000, the largest outside grant CMRL had received to date.<sup>110</sup>

The size of this NFIP grant prompted Defries to ensure that the University of Toronto's administration was made fully aware of the importance of this project and the heightened relationship it represented between the NFIP and the University. Defries had not felt this necessary with previous grants from the NFIP, or other agencies, but arranged to keep the University's President, Sidney Smith, "informed of the applications which are filed on behalf of the Laboratories."<sup>111</sup> Underlying Def-

<sup>108</sup> Ibid., p. 385-86, 357-59; I.M. Morgan, "Level of serum antibody associated with intracerebral immunity in monkeys vaccinated with Lansing poliomyelitis virus," Journal of Immunology, 62 (1949): 301-10.

<sup>109</sup> Letter, Defries to Weaver, July 27, 1949, CA. 83-005-06, Box 2, file 4/4.

<sup>110</sup> Letter, Basil O'Connor, President, NFIP, to Rhodes, December 8, 1949. See also Letter, H.E. White, Comptroller, NFIP, to K.E. Allen, Comptroller, CMRL, January 16, 1950, CA, 83-005-06, Box 2, file 4/4. See also: A.J. Rhodes, E.M. Clark and F.T. Shimada, "Studies on Passive Immunity in Poliomyelitis, I: Some Observations on the Production of an Immune Serum to Lansing Poliomyelitis Virus in the Horse," CJPH, 42 (Jan. 1951): 23-31; A.J. Rhodes and E.M. Clark, 'Passive Immunity in Poliomyelitis, II: Lansing Antibody Content of Human GammaGlobulins," Proceedings of the Society for Experimental Biology and Medicine (PSEBM), 76 (Feb. 1951): 379-81.

<sup>111</sup> Letter, Defries to Sidney Smith, President, University of Toronto, December 16, 1949, UTA. A68-0007, Box 064, file 06.

ries' concerns was his understanding that the NFIP was "embarrassed by making grants for this work in the University of Toronto from the campaign funds of the March of Dimes in the United States." Thus, "they would appreciate no public announcement of these grants" outside of their control.<sup>112</sup>

One part of this NFIP project that grew in importance was experimenting with the cultivation of the Lansing virus using the human tissue culture techniques pioneered by Enders' group. Rhodes had made a trip to Enders' Boston laboratory in May 1949 to learn the techniques, but it took more than a year before the full advantages of Enders' tissue culture methods became apparent and practical.<sup>113</sup> Rhodes' interest in applying Enders' methods grew after attending a meeting on passive immunity at the NFIP's offices in late January 1950.<sup>114</sup> The pressure to perform Lansing antibody tests on the Eslimo polio outbreak also gave Rhodes further motivation to cultivate a pool of Lansing virus. This could be used to immunize the monkeys to prepare the hyperimmune serum, and to test the Eskimo sera. Rhodes also recognized how the cultivating of poliovirus in human non-nervous tissues had potential utility for investigating general polio immunity and improving prospects for a human vaccine.

Rhodes' initial experiments with poliovirus tissue cultivation began in the spring of 1950 and he had little trouble confirming Enders' results using human infant foreskin and various human foetal tissues.<sup>115</sup> CMRL had already become a leader in studying the broader problems of tissue culture work, based on the work of Dr. Raymond C. Parker, who was the author of one of the standard textbooks on the sub-

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<sup>112</sup> Letter, Defries to Smith, December 17, 1949. On the publicity question see Letters: Smith to Defries, December 20, 1949; K.S. Edy, Public Relations, President's Office, U. of T., to Defries, December 28, 1949, UTA, A68-0007, Box 064, file 06.

<sup>&</sup>lt;sup>113</sup> Memo, Rhodes to Defries, November 13, 1950, CA, 83-005-06, Box 4, file 3/5.

<sup>114</sup> Letter, Rhodes to Nagler, Feb. 6, 1950, NAC, RG29, Acc. 83-84/119, Box 30, file 355-P-8.

<sup>115</sup> Rhodes (et al.), "Tissue Cultivation Studies," in "Report to the NFIP for the period November 1, 1949 to June 30, 1950: Studies in the Production of Hyperimmune Serum to Lansing Poliomyelitis Virus," p. 44-55, attached to Memo, Rhodes to MacLean, June 26, 1950, CA, 83-005-06, Box 2, file 2/4.

ject, *Methods of Tissue Culture*.<sup>116</sup> Rhodes' plans for this NFIP study expanded in its second year, prompted by the success in preparing hyperimmune serum to the Lansing poliovirus, and by his growing interest in tissue cultivation of the poliovirus. The NFIP's investment also expanded significantly, to \$55,935 for 1951.<sup>117</sup>

Although the passive immunity project began to investigate whether a source of human gamma globulin could be found among local blood donors, Rhodes was most interested in intensifying the tistate cultivation studies of the poliovirus. He used human embryos in this work and tested the growth promoting properties of a variety of cells and nutrients. He also conducted these experiments using larger containers and concentrated the virus using the ultracentrifuge and various chemical treatments. The expansion of the project required at least 400 monkeys, and an significantly expanded research staff.<sup>118</sup> Beginning in November, 1950, Rhodes prepared to "push forward" Connaught's "heavy commitment" to a tissue cultivation program at the new HSC laboratory.<sup>119</sup> He took the opportunity to revisit Boston to update himself on Enders' techniques.<sup>120</sup>

By early 1951 significant developments in polio research finally allowed the NFIP to raise the priority of vaccine research. Enders' and Morgan's critical work in 1949 was followed in early 1951 by the NFIP's Typing Project report that confirmed the existence of three distinct types of poliovirus.<sup>121</sup> Rhodes' immunological work

Defries, First Forty Years, p. 238-39; Bator with Rhodes, Within Reach of Everyone, p. 79, 173; R.C. Parker, Methods of Tissue Culture, Second Edition (New York: Paul B. Hoeber, Inc., 1950), with the first edition published in 1938.

A.J. Rhodes, "Application for a NFIP Grant," June 1, 1950; A.J. Rhodes, CMRL Project #642, April 1, 1950 to March 31, 1951, "Preparation of Antiserum to Lansing Virus," February 27, 1950, CA, 83-005-06, Box 4, file 3/5.

<sup>&</sup>lt;sup>118</sup> Rhodes, "Application for NFIP Grant," June 1, 1950, *Ibid.*.

<sup>119</sup> Memos: Rhodes to Defries, November 3, 1950; Rhodes to Defries, November 13, 1950; Letter, Defries to Weaver, November 20, 1950, *Ibid*; A.J. Rhodes, CMRL Research Project #750, April 1, 1951 - March 31, 1952, "Passive Immunity in Poliomyelitis," January 31, 1951, CA, 83-005-06, Box 5, file 3/5.

<sup>120</sup> Memo, Rhodes to Defries, November 13, 1950, *Ibid.*.

<sup>121</sup> Paul, History of Poliomyelitis, p. 385-86; and on the typing project, p. 233-39; The Committee on Typing of the NFIP, "Immunologic classification of poliomyelitis viruses: I, A

with Eskimo polio was also significant, as was his less dramatic, though rapid progress with the passive immunity project for the NFIP.<sup>122</sup> This work prompted the Foundation to ask Rhodes in May 1951 to sit on their newly established "Committee on Immunization."<sup>123</sup> Rhodes felt it "a considerable honour" to be a part of this important committee, which was made up of eleven members, including: David Bodian, John Enders, Thomas Francis Jr., William McD. Hammon, Howard Howe, John Paul, Albert Sabin and Jonas Salk.<sup>124</sup> The first meeting on May 17, 1951 focused on Hammon's proposal to field test passive immunization using human gamma globulin supplied by the American Red Cross.<sup>125</sup> Rapid movement to human field trials was prompted by Dr. Dorothy Horstmann's discovery of the poliovirus in the bloodstream of orally infected monkeys before the appearance of paralytic symptoms. In 1952 she demonstrated the same results in human cases.<sup>126</sup> This discovery was particularly significant to Salk and the prospects of a vaccine. The stimulation of poliovirus antibody production in the bloodstream with an inactivated vaccine might be sufficient to protect against the paralytic disease.<sup>127</sup> There were, however, a number of practical challenges that needed to be overcome before such a vaccine was possible.

Cooperative program for the typing of one hundred strains," American Journal of Hygiene, 54 (1951): 191-274.

- 123 Letter, Weaver to Rhodes, May 3, 1951, CA, 83-005-06, Box 5, file 3/6.
- 124 Ibid.; Memo, Rhodes to Defries, May 9, 1951, Ibid..

<sup>122</sup> A.J. Rhodes, E.M. Clark, F.T. Shimada, W.L. Donahue and R.C. Ritchie, "Studies of Passive Immunity in Poliomyelitis: III, Production of Immune Serum to Lansing Poliomyelitis Virus in Rhesus Monkeys," *Canadian Journal of Medical Sciences*, 30 (Feb. 1952): 54-67.

<sup>125</sup> Paul, History of Poliomyelitis, p. 387-93; and on the Committee on Immunization and its politics, see p, 407-11; Benison, Tom Rivers, p. 474-87; W. McD. Hammon, L.L. Coriell and J. Stokes, Jr., "Evaluation of Red Cross gamma globulin as a prophylactic agent for poliomyelitis, I: Plan of controlled field tests and results of 1951 pilot study in Utah," JAMA, 150 (1952): 739; W. McD. Hammon and E.C. Roberts, "Serum neutralizing antibodies to the infecting strain of virus in poliomyelitis patients," PSEBM, 69 (1948): 256-58.

<sup>126</sup> Paul, Ibid., p. 387-89; D.M. Hortsmann, "Discussion of Symposium 4," in Poliomyelitis: Papers and Discussions Presented at the Second International Poliomyelitis Conference, Copenhagen, September 3-7, 1951 (Philadelphia: Lippincott, 1952), p. 336; D.M. Hortsmann, "Poliomyelitis Virus in Blood of Orally Infected Monkeys and Chimpanzees," PSEBM, 79 (Mar. 1952): 417-19.

<sup>127</sup> Paul, Ibid., p. 417.

Work intensified at CMRL through 1951 on the production of hyperimmune serum,<sup>128</sup> but Rhodes' interest in tissue cultivation increasingly dominated the direction of the project.<sup>129</sup> The move to the new HSC virus laboratories stimulated rapid progress in this area, particularly by bringing Rhodes physically closer to fresh human tissue specimens from HSC and other nearby hospitals.<sup>130</sup> Rhodes' progress led to a further expansion of the NFIP's investment to close to \$55,000 for 1952-53.<sup>131</sup>

Rhodes cultivated the Lansing strain in a variety of human and monkey tissues in small flasks using a traditional "Hanks-Simms" nutrient solution made from filtered animal (ox) serum added to a salt solution.<sup>132</sup> Rhodes foresaw that "further interest in this field will lie in the possibility of adapting the method so as to yield large quantities of virus that can be used in active immunization."<sup>133</sup> Towards this end, in late 1951, an unexpected and informal scientific cross pollination shifted the project towards active immunization more rapidly than Rhodes could have hoped.

This sudden change had its origins with the separate work of two Connaught employees who both had Ph.D. degrees in Biochemistry. Dr. Arthur E. Franklin joined Rhodes' polio group in early June 1951 and quickly found himself involved in the passive immunity project at the Dufferin Division. One day at the end of the summer, Franklin went with Rhodes downtown to the HSC laboratory and saw the tissue cult-

<sup>128</sup> A.J. Rhodes, F.T. Shimada, E.M. Clark, W. Wood and R.C. Ritchie, "Passive Immunity in Poliomyelitis: IV, Protection of Rhesus Monkeys Against Cerebral Challenge," *PSEBM*, 79 (Mar. 1952): 421-24; W. Wood, E.M. Clark, J.B.J. McKendry and A.J. Rhodes, "Studies on Passive Immunity in Poliomyelitis: V, Lansing Antibody Levels in Humans After Gamma Globulin Administration," *PSEBM*, 80 (July 1952): 522-24.

A.J. Rhodes, E.M. Clark, J. Thicke, W. Wood, D.B.W. Ried, W.L. Donahue and R.C. Ritchie, "Report to the NFIP for the Period January 1, 1951 to June 30, 1951: Studies on the Production of Hyperimmune Serum to Lansing Poliomyelitis Virus and the Cultivation of Lansing Virus in Tissue Culture," (stamped July 25, 1951), CA, 83-005-06, Box 5, file 1/6.

<sup>130</sup> Ibid., p. 80. He was also closer Raymond Parker, who advised Rhodes on tissue culture techniques at his nearby lab in the School of Hygiene Building; Memo, Defries to Weaver, July 9, 1951; Letter, O'Connor to Rhodes, December 21, 1951, CA, 83-005-06, Box 5, file 3/6.

Listing, "CMRL Research Applications, 1952-53," (undated, but likely prepared in March 1952), CA, 83-005-06, Box 11, file 2/11.

 <sup>132</sup> Rhodes (et al.), "Report to the NFIP for the Period January 1, 1951 to June 30, 1951," p. 80-84, CA, 83-005-06, Box 5, file 1/6.

<sup>133</sup> *Ibid.*, p. 108-13.

ure work that was being done there by Joan Thicke and Darline Duncan. Franklin was fascinated with this work and Rhodes decided to have him join the HSC group, where his biochemistry background more closely suited the work at HSC.<sup>134</sup>

As Franklin grew more familiar with the techniques, he noticed that the traditional nutrient medium was not buffering the pH properly, making it difficult to determine whether the tissue cultures had actually been infected by the poliovirus.<sup>135</sup> Enders had found that a high pH reading indicated that the culture had been successfully infected, while a low reading indicated that it had not.<sup>136</sup> A more frustrating problem with the Hanks-Simms medium was that it needed to be frequently changed every few days in order for the virus to multiply. This usually required inconven ient trips to the lab just for this purpose.<sup>137</sup> Franklin planned to modify the existing medium, or develop a new one to overcome these problems. In November 1951, however, Franklin tried a completely synthetic medium that had recently been developed for cancer research in Parker's laboratory by Dr. Joseph F. Morgan and Helen Morton. This synthetic medium quickly, and quite spectacularly solved the problems Franklin was having with cultivating the poliovirus.<sup>138</sup>

Morgan and Franklin had first met soon after Franklin was hired, most likely at one of the regular Connaught Seminars in the School of Hygiene Building. They

<sup>&</sup>lt;sup>134</sup> Taped interview with Dr. A.E. Franklin by the author, February 25, 1994, in Dr. Franklin's Banting Institute Office, University of Toronto; Memo, Rhodes to MacLean, August 20, 1951, CA, 83-005-06, Box 5, file 3/6; Dufferin Division, CMRL, "Annual Report, April 1, 1951 to March 31, 1952: Personnel," CA, 83-005-06, Box 5, file 6/6. Franklin received his Ph.D. from McGill in 1951.

<sup>135</sup> Franklin interview, February 25, 1994.

<sup>136</sup> F.C. Robbins, J.F. Enders, and T.H. Weller, "Cytopathogenic Effect of Poliomyelitis Viruses In vitro on Human Embryonic Tissues," *PSEBM*, 75 (Nov. 1950): 370-74.

<sup>137</sup> A.E. Franklin, "Tissue Cultivation of Lansing Virus," in A.J. Rhodes, W.M. Clark, W. Wood, A.E. Franklin, J.C. Thicke, D. Duncan, D.B.W. Ried, W.L. Donahue and R.C. Ritchie, "Studies on the Production of Hyperimmune Serum to Lansing Poliomyelitis Virus and the Cultivation of Lansing Virus in Tissue Culture," Report to NFIP for period July 1, 1951 to December 31, 1951, p. 64-5, attached to Memo, Rhodes to MacLean, Febbruary 22, 1952, CA, 83-005-06, Box 5, file 1/6.

<sup>138</sup> J.C. Thicke, D. Duncan, W. Wood, A.E. Franklin and A.J. Rhodes, "Cultivation of Poliomyelitis Virus in Tissue Culture: I, Growth of the Lansing Strain in Human Embryonic Tissues," *Canadian Journal of Medical Sciences*, 30 (June 1952): 231-45.

were of similar age and found that they also shared a rather rare credential at the time, a Ph.D. in the same field of biochemistry. To Franklin, Morgan was one o. the few at CMRL he could personally and scientifically relate to, and they become close friends.<sup>139</sup> Morgan's development of this synthetic medium, first called "Mixture #199," and which proved so crucial to the Salk vaccine, might well have gone untried for poliovirus cultivation if not for the friendship between Franklin and Morgan.

Mixture #199, or more commonly, Medium 199, was developed at Connaught Laboratories between 1947 and 1950 and proved highly significant, but not only to the history of polio.<sup>140</sup> This synthetic medium, and its successors (#858 and #1066) also provided the foundation for the modern industry of tissue culture supplies, and its application to polio vaccines significantly influenced the entire field of virology and the production of viral vaccines.<sup>141</sup> The medium represented the 199th combination of a known mixture of 60 ingredients made up of experimental amino acids, vitamins, cell surface agents, nucleic acids, growth factors, and iron. This mixture supported cell growth for four to five weeks, and up to ten weeks with some cultures, "which was in striking contrast to the results obtained with simpler mixtures."<sup>142</sup> When Rhodes' initially found out about Franklin's remarkable results with 199, in an

<sup>139</sup> Franklin interview, February 25, 1994; J.F. Morgan, H.J. Morton and R.C. Parker, "Nutrition of Animal Cells in Tissue Culture: I, Initial Studies on a Synthetic Medium," *PSEBM*, 73 (Jan. 1950): 1-8.

<sup>140</sup> On the Medium 199 story see: J.F. Morgan, "Development of Synthetic Media," in R.C. Parker, Methods of Tissue Culture, Second Edition (New York: Paul B. Hoeber, Inc., 1950), p. 115-28; Letter, J.F. Morgan, to J.H.W. Ferguson, Director, CMRL, October 10, 1955; CA, 83-003-03.

<sup>Blythe Eagles, "Joseph Francis Morgan, 1918-1976," in Proceedings and Transactions of the Royal Society of Canada, Series IV, 14 (1976): 86-89; Robert J. Wilson, "Raymond Crandall Parker, 1903-1974: The Parker Legacy: Methods, Media, Medical Progress," Tissue Culture Association Report, 16 (Mar. - Apr. 1974): 7-8; R.C. Parker, Methods of Tissue Culture, Third Editon (New York: Paul B. Hoeber, Inc., 1961), especially chapters "Chemically Defined Media," p. 62-80, and "Cultures for Virus Studies," p. 245-66. See also: M.M. Burr, M.E. Campbell, J.F. Morgan and F.P. Nagler, "Studies in the Propagation of Influenza and Mumps Viruses in Tissue Culture with Chemically-Defined Media," Canadian Journal of Microbiology, 1 (1954): 158-69; H.J. Morton, "A Survey of Commercially Available Tissue Culture Media," In Vitro, 6 (1970): 89-108.</sup> 

<sup>&</sup>lt;sup>142</sup> Morgan, Morton and Parker, "Nutrition of Animal Cells in Tissue Culture: I, Initial Studies on a Synthetic Medium," p. 7.

uncharacteristic display of excitement, he jumped up on a chair and cheered.<sup>143</sup> However, as with many other medical discoveries, the history of this medium and its application to the Salk vaccine, is a complex and controversial story.<sup>144</sup>

With Morgan's help, Franklin quickly learned to make his own supply of 199 and became interested in modifying it, primarily because some of the 60 ingredients in the medium were expensive. Franklin would later discover that a large number of ingredients in the medium could be removed with no apparent effect on the production of poliovirus. It was also clear the medium was really only acting as a cell maintenance medium, keeping the cells alive long enough to be infected by the virus and allowing it to multiply until the cells were completely destroyed, leaving only the poliovirus suspended in a solution of medium 199.<sup>145</sup>

Connaught's remarkable results with 199 in growing poliovirus soon attracted the attention of the NFIP. This was first apparent in early 1952 when Dorothy Horstmann was sent by the NFIP to investigate the progress being made by Rhodes' group. Excitement about the potential of this new medium began to spread among American polio researchers before the first publication of Franklin's preliminary results with

While Parker was clearly the man ultimately responsible for the research work that went on in his lab, his role in 199's history was minimal and at times even antagonistic, to the intellectual and painstaking work of Morgan, and his close associate, Helen Morton, who systematically prepared the first truly synthetic medium. Parker was a traditional cell specialist, and rather reluctantly agreed to the project, leaving Morgan to pursue it on his own. Parker's credit for the successful use of 199 for the polio vaccine is especially inaccurate and ironic as he was quite worried when Franklin was later moved to a small laboratory room next to Parker's in order to more closely study the use of 199 for poliovirus cultivation. Franklin, in particular, remembers that until Salk had demonstrated that 199 indeed made a polio vaccine possible, safe and effective in 1953-54, Parker wanted as little to do with the poliovirus as possible; Informal interview with Frankin, February 4, 1994; Taped interview with Franklin, February 25, 1994.

145 Ibid.; A.E. Franklin, D. Duncan, W. Wood and A.J. Rhodes, "Cultivation of Lansing Poliomyelitis Virus in Tissue Culture: II, Utilization of Glucose in Synthetic Medium," PSEBM, 79 (Apr. 1952): 715-18.

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<sup>143</sup> Franklin interview, February 25, 1994.

<sup>144</sup> Historians of polio, when they mention Medium 199 at all, only mention its role in passing, often as just more "grist for Jonas Salk's mill." It is usually referred to as "Parker's medium," and recountings of its development often get the basic facts wrong; Paul, History of Poliomyelitis, p. 418; Benison, Tom Rivers, p. 490. The medium 199 story most echoes the controversial history of the discovery of insulin, which also took place at the University of Toronto; Michael Bliss, The Discovery of Insulin (Toronto: McClelland and Stewart, 1982).

the medium in the spring of 1952.<sup>146</sup> Dr. Jonas Salk, at the University of Pittsburgh, initially found out about Medium 199 at this time. Salk had been experimenting with growing the poliovirus in tissue cultures of monkey testes using roller tubes rather than in small flasks.<sup>147</sup> Roller tubes involved a large round wheel in which hundreds of test tubes containing small poliovirus cell cultures with a nutrient medium were placed and spun at a rate to promote the multiplication of the virus in the monolayer of cells on the test tube wall. When he heard about 199, either from Horstmann, or through the NFIP, he phoned Parker at Connaught to ask for a small supply and the formula so that he could make his own supply.<sup>148</sup> Salk soon found that 199 was "highly satisfactory in roller tube cultures."<sup>149</sup>

By this time it was also clear all three types of poliovirus could be grown in roller tube tissue cultures using various human embryonic organs, adult human uterus tissue, and adult monkey testes or kidneys. Rhodes' group also demonstrated that such tissues grew "luxuriantly" in medium 199 and supported the growth of the Brunhilde and Lansing virus types. Strongly encouraged by such results, Rhodes grew anxious to take this work to the next stage and attempt "to produce poliomyelitis viruses in considerably larger containers than have been previously used."<sup>150</sup> Such a project would require significant expansion of Connaught's research capacity.

<sup>146</sup> Franklin interview, February 25, 1994.

<sup>147</sup> J.S. Youngner, E.N. Ward and J.E. Salk, "Studies on Poliomyelitis Viruses in Cultures of Monkey Testicular Tissue: I: Propagation of virus in Roller Tubes," American Journal of Hygiene, 55 (Mar. 1952): 291-300.

<sup>&</sup>lt;sup>148</sup> Transcript of television interview with Dr. Jonas Salk, September 15, 1993, Salk Institute, San Diego, conducted by CBC Television for a documentary, "Conquering the Crippler," CBC Prime Time News, December 7, 1993, Field Tape 3, p. 5.

<sup>149</sup> J.L. Melnick and J.T. Riordan, "Poliomyelitis Viruses in Tissue Culture: IV, Protien-Free Nutrient Media in Stationary and Roller Tube Cultures," PSEBM, 81 (Oct. 1952): 212, footnote 11, which refers to the Proceedings from this conference, 11 (1952); 480.

A.J. Rhodes, "Application for a NFIP Grant: To Investigate the possibility of adapting tissue culture techniques to the production of poliomyelitis virus in large quantities," June 27, 1952, CA, 83-005-06, Box 8, file 2/6. All of these developments were reported to the "Atlantic City Meeting on Tissue Culture," which was likely held around the same time as the Annual Meeting of the American Association of Immunologists in late April 1952. The Tissue Culture Meeting featured papers by John Enders, J.L. Melnick, Rhodes and his associates, J.T. Syverton and Jonas Salk.

The NFIP's Research Director, Harry Weaver quickly recognized the importance of these dramatic results and in May 1952 asked Defries for "a pilot study on the production of poliomyelitis in bulk."<sup>151</sup> The key to efforts to grow the poliovirus in larger containers was Dr. Leone Farrell, who had considerable experience with the large scale production of biologicals, such as penicillin, Pertussis, and Cholera vaccines.<sup>152</sup> Growing the poliovirus in bulk was a more complex problem than any bacteria. Rhodes was "very encouraged" by her "approach to the problem of translating the growth of virus in small containers into production in quantity."<sup>153</sup>

Through the summer of 1952, as Defries stressed to Weaver, "Every effort is being made to expedite the planning of the research so that most effective progress can be made."<sup>154</sup> All this activity at Connaught also attracted the interest of the press. In July, the *Globe and Mail* published a feature story, complete with pictures of Connaught scientists, that revealed how "Research Here Opens New Path in Search For Polio Vaccine." The press was also there when this "polio vaccine pilot plant" opened in early 1953.<sup>155</sup> The chance to achieve the goal of a polio vaccine through Canadian involvement led a *Globe and Mail* editorial to predict that "When that day comes Canadians will have the additional satisfaction of knowing that our nation did much to make possible this priceless boon to mankind."<sup>156</sup>

Under Rhodes' initial design, the pilot project required a NFIP grant of \$81,213 to cover the costs of 600 monkeys, a large amount of new equipment, and a consider-

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<sup>151</sup> Letter, Defries to Weaver, June 6, 1952, CA, 83-005-06, Box 7, file 1/7.

<sup>152</sup> File, "Leone Harwood Farrell," Connaught Archives Biographical Files. Farrell was born in April 1904 in Monkland Station, Ontario, and grew up in Toronto. She received her BA in Chemistry from the University of Toronto in 1928, her MA in 1929 from the University of London in 1929, and her Ph.D. from the University of Toronto in 1933. She never married, retired from CMRL in 1969 and died in Toronto in September 1986.

<sup>153</sup> Letter, Defries to Weaver, June 6, 1952, CA, 83-005-06, Box 7, file 1/7.

<sup>154</sup> Letter, Defries to Weaver, July 17, 1952, Ibid..

<sup>&</sup>lt;sup>155</sup> "Research Here Opens New Path in Search for Polio Vaccine," *Globe and Mail*, (July 18, 1952); "U of T to Open Polio Vaccine Pilot Plant," *Globe and Mail*, (Dec. 29, 1952).

<sup>156</sup> Editorial, "Approaching a Polio Vaccine," Globe and Mail, (Jan. 27, 1953).

ably expanded staff.<sup>157</sup> The final grant grew to \$104,486 and brought Connaught's total grants for polio research to \$174,926, which represented half of all outside grants to the institution (Table 5).<sup>158</sup> The study originally focused on experimenting with poliovirus tissue cultures in bottles up to four litres in size, or perhaps larger, which could somehow be rotated around their axis, like roller tubes, with as much as one litre of Medium 199. The project also experimented with a variety of tissues, but primarily monkey testes, and kidneys, while "serious consideration" was given to using human tissues, including uterine and embryonic tissues. The modification of 199 was another objective, and studies were planned of a continuous flow system of

the nutrient.<sup>159</sup>

One anticipated problem was adapting the traditional method of establishing cell cultures to larger bottles. This method used a small amount of chick blood plasma as a kind of glue to fix a colony of living human or monkey tissue culture cells to the side of the glass bottle. This allowed the cell cultures, supported by the nutrient medium, to grow in a monolayer before being inoculated with the poliovirus. But, as was clear to Rhodes, this study's "ultimate objective" was to develop a method of producing poliovirus in bulk using cell cultures containing as little non-human material as possible. Thus, the use of chick plasma had to be minimized or eliminated.<sup>160</sup>

On a considerably smaller scale, and essential to the success of the project, were efforts to develop efficient methods of culturing the poliovirus in test tubes so the specific type and concentration of the poliovirus could be easily identified and measured by its pathological effects on living tissue cultures. Such work involved roller tubes. This part of the work was done by Shimada, Clark and Wood. At Rhodes'

<sup>157</sup> Rhodes, "Application for a NFIP Grant," June 27, 1952, and Revision, Salaries schedule, CA, 83-005-06, Box 8, file 2/6.

<sup>158</sup> Letter, O'Connor to Rhodes, October 31, 1952, CA, 83-005-06, Box 7, file 1/7.

<sup>159</sup> Rhodes, "Application for a NFIP Grant," June 27, 1952, and Revision, Salaries schedule, CA, 83-005-06, Box 8, file 2/6.

<sup>160</sup> Ibid..

HSC virus laboratory, Franklin and Duncan focused on maximizing the production of poliovirus in small flasks using different human embryonic, post-natal and adult tissues, monkey tissues, and even beef tissues. They experimented with such tissues using 199, as well as modified versions of it.<sup>161</sup> By the end of 1952, the best tissues in terms of culture longevity and high virus concentration seemed to be human embryonic kidney and monkey testes.<sup>162</sup>

Yet, from the perspective of the NFIP, when prospects for a vaccine accelerated in early 1953, the potential legal and practical problems of basing a highly publicized vaccine for children on human embryos were significant. Monkey testes seemed the next best tissue source, but basing a vaccine on this indelicate source presented another set of public relations difficulties for the NFIP's middle class family funding base. Monkey testes were also too small to be practical as a virus culture base.<sup>163</sup> Other monkey tissues were considered and thoroughly tested before researchers finally settled on monkey kidneys. However, as later became clear, the kidneys were dirty organs and opened up a new set of filtering problems to make sure tissue cultures were sterile and free of other viruses before the poliovirus was introduced.<sup>164</sup>

Securing a stable supply of human tissues for small scale research purposes had been relatively easy for Rhodes' group through special arrangements with nearby hospitals. Indeed, Franklin was assigned the often delicate task of collecting human fœtal (pre- and post-natal) tissues from the hospitals as soon after they became available as possible, which often meant phone calls in the middle of the night, and the conveying of the whole fœtus in glass jars in his coat pocket to the lab in a taxi for immediate preservation and preparation; Informal iterview with Franklin, February 4, 1994; Franklin interview, February 25, 1994.

164 Shimada interview #3, August 31, 1993.

304

<sup>161</sup> W. Wood, A.E. Franklin, E.M. Clark, D. Duncan and A.J. Rhodes, "Cultivation of Poliomyelitis Virus in Tissue Culture: III, Synthetic Medium in Roller Tube Cultures," PSEBM, 81 (Nov. 1952): 434-38; A.E. Franklin, D. Duncan, W. Wood and A.J. Rhodes, "Cultivation of Poliomyelitis in Tissue Culture: IV, Further Observations of Virus Propogation in Human Tissues with a Synthetic Nutrient Medium," Canadian Journal of Medical Sciences, 31 (Feb. 1953): 64-74; D. Duncan, A.E. Franklin, W. Wood and A.J. Rhodes, "Cultivation of Poliomyelitis in Tissue Culture: V, Observations on Virus Propogation in Certain Animal Tissues with a Synthetic Nutrient Medium," Canadian Journal of Medical Science, 31 (Feb. 1953): 75-83.

A.J. Rhodes, "Report to NFIP for period July 1, 1951, through December 1951: Studies on the Cultivation of Poliomyelitis Virus in Tissue Culture," which included separate reports by W. Wood, E.M. Clark and F.T. Shimada, "Cultivation of Poliomyelitis Viruses in Tissue Culture by the Roller Tube Technique;" A.E. Franklin and D. Duncan, "Cultivation of Lansing Poliomyelitis Virus by the Flask Technique," CA, 83-005-06, Box 6, file 2/5.

<sup>163</sup> Franklin interviews, Ibid.

Salk's first human clinical trials of his vaccine prompted the NFIP to begin planning for a field trial, which as Defries discovered at a meeting with Weaver in February, would involve Connaught in a significant way.<sup>165</sup> The vaccine was based on the three types of poliovirus cultivated in monkey kidney tissue cultures using medium 199 in roller tubes and then inactivated using formalin according to a precise mathematical formula developed by Salk. Formalin inactivation was not new, but it had not been successfully done and rigorously evaluated with a virus disease, other than influenza, which was also developed by Salk, but with limited results.<sup>166</sup> Salk's first trial in late 1952 involved a crippled children's residence in Pennsylvania and a total of 98 children and adults between four and forty years of age who had recently suffered from polio or other crippling illnesses.<sup>167</sup> These first subjects were chosen to minimize any risks of the vaccine causing polio, measure increases in antibody production, as well as test for any general side effects during and after administration. Salk then conducted a second trial that involved 63 normal school children who were tested for their antibody response to the vaccine. Salk's encouraging results were first presented to the NFIP's Immunization Committee in late January 1953, and were published in March.<sup>168</sup> Weaver hoped to vaccinate 500,000 children in December 1953, who would be observed in the following summer. Connaught's role was to produce the bulk virus that was to be sent to an undefined centre in the U.S. to be finished into a vaccine. CMRL would also supply a key person familiar with bottling, testing and safety measures. These plans seemed somewhat unclear to Defries, but

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<sup>165</sup> Memo, R.D. Defries "Interview with Dr. Weaver, New York," February 19, 1953, CA, 83-015,05, file 1/7.

<sup>166</sup> Salk, J.E.: "Principles of Immunization as Applied to Poliomyelitis and Influenza," AJPH, 43 (Nov. 1953): 1384-98; Paul, History of Poliomyelitis, p. 415.

<sup>167</sup> J.E. Salk, "Studies in Human Subjects on Active Immunization Against Poliomyelitis: I, A Preliminary Report of Experiments in Progress," JAMA, 151 (Mar. 28, 1953): 1081-98.

<sup>168</sup> Paul, History of Poliomyelitis, p. 418-19; Ibid.; William L. Laurence (New York Times Service), "New Vaccine Provides Immunity Against Polio," Globe and Mail, (Mar. 27, 1953).

Weaver assured him "that the whole vaccine story was working out far better than he had anticipated."<sup>169</sup>

Despite Weaver's confidence in the vaccine and Connaught's involvement, some outstanding issues remained to be worked out before anyone could produce a finished vaccine for a large number of children. The most important of these was how to produce enough bulk virus fluid to supply vaccine for 500,000 children?

Connaught's pilot study got underway during the first half of 1953 and concentrated on cultivating the poliovirus in ever larger containers. This critical aspect of the project was led by Farrell, who conducted a series of experiments with various types and sizes of bottles that were rotated, or left stationary, with varying amounts of medium 199. Disappointing virus concentrations led Farrell to try a "deep-culture" technique she had originally developed for growing bulk Pertussis bacteria in a fluid medium between  $1^{0.20}$  and 1945. This method used five-litre "Povitsky" diphtheria toxin bottles that when placed flat held one litre of fluid and provided the suspended cells ample surface area exposed to the air. When the 'bottles were gently rocked in a specially adapted machine the cells, suspended in the nutrient solution, were kept in constant motion and fully aerated. Farrell adapted and expanded an earlier machine for the slower rocking motion necessary for poliovirus cultivation.<sup>170</sup>

This "rocking bottle" technique, dubbed the "Toronto Method" by Farrell, solved a number of outstanding problems essential to producing a large and safe supply of polio vaccine. It enabled the production of large amounts of virus fluids using large bottles and in higher concentration than was possible with any other method. The suspended virus fluids were also free from any extraneous animal

306

<sup>169</sup> Memo, "Interview with Weaver," February 19, 1953, CA, 83-015-05, file 1/7.

<sup>W. Wood, L.N. Farrell and F.T. Shimada, "The Large Scale Production of Poliomyeitis Viruses," in A.J. Rhodes, "Report to the NFIP for the period January 1, 1953 through June 30, 1953: Studies in the Cultivation of Poliomyelitis Viruses in Tissue Culture," CA, 83-005-06, Box 6, file 2/5. On Farrell's "deep-culture" methods, see L.N. Farreli and E.M. Taylor, "Notes on the Production of Phase I Pertussis Vaccine in a Fluid Medium," CPHJ, 36 (1945): 326-27; L.N. Farrell, "Outline of Proposed Writing Programme," Nov. 15, 1969, CA, 83-003-03, file 2/2.</sup> 

substances, other than the original monkey kidney cells in which the virus reproduced.<sup>171</sup> These were major advances that rapidly improved the prospects for preparing a vaccine for the large field trial the NFIP planned for the Salk vaccine. Indeed, without such production methods, any meaningful field trial was impossible.

The establishment of the "Toronto Method" of poliovirus cultivation marked the climax of Rhodes' and CMRL's polio research program and coincided with Canada's polio crisis of 1953. This eventful summer also marked the end of Rhodes' direct involvement with Connaught as he left to become Research Director at the Hospital for Sick Children.<sup>172</sup> From 1947 to 1953, the work of Rhodes' polio group contributed in a significant way to solving many of the practical problems surrounding poliovirus studies, and which made a vaccine possible. In the process he played a major role in the rapid expansion of Connaught itself and that of Canadian medical research with respect to polio and virus diseases generally. More immediately, Rhodes placed Connaught and Canada in a unique postion to play a leading role in all aspects of the polio vaccine story and the ultimate control of this disease world-wide.

By 1953 the problem of polio had grown to dominate Connaught's overall research agenda, much as recent polio epidemics threatened to severely challenge doctors, hospitals and the federal and provincial governments of Canada. As earlier chapters have described, the influence of the NFIP in Canada helped stimulate substantial and distinctive government and voluntary responses north of the border to the growing threat of polio. Similarly, but perhaps more directly, the NFIP's finan-

<sup>171</sup> Wood, Farrell and Shimade, *Ibid.*; L.N. Farrell, W. Wood, A.E. Franklin, F.T. Shimada, H.G. Macmorine and A.J. Rhodes, "Cultivation of Poliomyelitis Virus in Tissue Culture: VI, Methods for Quantity Production of Poliomyelitis Viruses in Cultures of Monkey Kidney," *CJPH*, 44 (Aug. 1953): 273-80. See also "Toronto Team Grows Polio Virus in Quantity," *Globe and Mail*, (Sept. 24, 1953).

<sup>172</sup> Connaught Medical Research Laboratories, Annual Report, 1952-53 (Toronto: 1953), p. 6-10. See also A.J. Rhodes, "Poliomyelitis Research, 1947-53, In the Laboratories," Ontario Medical Review, 20 (Sept. 1953): 603-05; A.J. Rhodes, "Research On the Development of a Poliomyelitis Vaccine: Toronto, 1950-1953," CMAJ, 75 (July 1, 1956): 48-49; A.J. Rhodes. "Poliomyelitis - Past, Present and Future: The First C.E. Kinley Lecture," Nova Scotia Medical Bulletin, 38 (Nov. 1959): 417-24.

cial power had important and distinctive effects on Canadian polio research. Beyond supplying American dimes to Canadian researchers, the NFIP's initial support sparked substantial Canadian funding to solve the polio problem. Such Canadian funding largely built the physical capacity and level of research experience at Connaught that the NFIP later found essential to making a polio vaccine work on a large scale. Connaught's involvement in making the NFIP's Salk vaccine trial of 1954 possible, and Canadian scientific and government involvement in its subsequent use on both sides of the border in 1955 is the focus of the next chapter.

## CHAPTER 8:

## "An Unusual Effort:" Canada and the Salk Vaccine Story 1953-1955

The first real hopes that a polio vaccine was finally possible emerged during Canada's worst epidemic year of 1953. Such a conjunction generated intense public interest in the Salk vaccine, but also a number of challenging political problems for Ottawa and the provincial governments, complicated by the substantial Canadian involvement in the vaccine's development. A key factor in expediting the vaccine's availability was the Canadian research work of Connaught Laboratories and its bulk poliovirus production methods. These were essential for a large and safe supply of an inactivated vaccine and allowed the NFIP to push ahead rapidly in 1954 with the largest experiment in medical history. Connaught's role was not limited only to the development of methods others might use. The NFIP depended upon Connaught to supply all the bulk poliovirus fluids required for an American field trial that would involve close to 2,000,000 children. As Salk himself stressed, this was a "herculean task,"<sup>1</sup> that only this Canadian institution was in a position to fulfill. If any one individual can be cast in the role of Hercules in this drama, it is surely Dr. Robert D. Defries.

The broad history of the Salk vaccine and the NFIP field trial is a relatively familiar story to medical historians and the public, but the focus of interest has been on Salk himself and the particular American experience with the vaccine.<sup>2</sup> Indeed,

Letter, J. Salk to R.D. Defries, January 28, 1954, CA, 83-015-05, folder 1/7. See also: K.W. MacTaggart, "All Virus for U.S. Polio Inoculations Made in Connaught Laboratories," *Globe and Mail*, (Apr. 5, 1954).

See for example: Saul Benison, Tom Rivers: Reflections on a Life in Medicine and Science, An Oral History Memoir, (Cambridge, Mass,: M.I.T. Press, 1967); John R. Paul, A History of Poliomyelitis, (New Haven: Yale University Press, 1971); Naomi Rogers, Dirt and Disease: Polio Before FDR, (New Brunswick, N.J.: Rutgers University Press, 1992); Jane S. Smith, Patenting the Sun: Polio and the Salk Vaccine, (New York: William Morrow and Co., 1990); Saul Benison, "The History of Polio Research in the United States: Appraisals and Lessons," in G. Holton (ed.), The Twentieth Century Sciences: Studies in the Biography of Ideas, (New York: W.W. Horton & Co., Inc., 1972), p. 308-43; David Bodian, "Poliomyelitis and the Sources of Useful Knowledge," Johns Hopkins Medical Journal, 138 (1976): 130-36; Allan M. Brandt, "Polio, Politics, Publicity, and Duplicity: Ethical Aspects in the Development of the Salk Vaccine," International Journal of Health Services, 8 (1978): 257-70; Dorothy M. Hors-

the story has been characterized as "an affirmation of American scientific and technological progress, ...a triumph of the American system... [which] demonstrated the continued viability of the promise of American life."<sup>3</sup> This is ironic in light of Connaught's intimate involvement with the vaccine's development and the trial, which, if mentioned at all by polio historians, is usually "played down" and glossed over, much to the chagrin of Connaught and federal officials, including G.D.W. Cameron, Deputy Minister of National Health.<sup>4</sup> Historians have also overlooked the broader Canadian experience with preparing, testing, distributing, controlling, evaluating and paying for the vaccine, the success of which stood in sharp contrast to the confusion and crisis surrounding its American introduction in 1955. Historians are similarly unaware of the significant role Connaught played in the Salk vaccine's ultimate international success.

Connaught's contributions depended upon a close and long standing relationship between Defries, who took direct control of the vaccine project after Rhodes' departure, and the federal and provincial governments. This was a distinctive Canadian linkage that was actively discouraged in the U.S. by pharmaceutical companies,

tmann, "The Poliomyelitis Story: A Scientific Hegira," Yale Journal of Biology and Medicine, 58 (1985): 79-90; Harry F. Dowling, Fighting Infection: Conquests of the Twentieth Century (Cambridge, Mass.: Harvard University Press, 1977), p. 211-16.

See also: Richard Carter, Breakthrough: The Saga of Jonas Salk, (New York: Trident Press, 1966); A.E. Klein, Trial by Fury: The Polio Vaccine Controversy, (New York: Charles Scribners, 1972); John R. Wilson, Margin of Safety: The Fight Against Polio, (London: Collins, 1963); Allen B. Weisse, "Polio: The Not-So-Twentieth-Century Disease," in his Medical Odysseys: The Different and Sometimes Unexpected Pathways to Twentieth-Century Medical Discoveries, (New Brunswick, N.J.: Rutgers University Press, 1991), p. 158-85; Greer Williams, Virus Hunters (New York City: Alfred A. Knopf, 1959), p. 270-355; Richard Carter, The Gentle Legions (Garden City, NY: Doubleday and Co., 1961), p. 125-36.

See also for younger readers: Carmen Bredeson, Jonas Salk: Discoverer of the Polio Vaccine (Hillside, N.J.: Enslow Publishers, Inc., 1993); Marjorie N. Curson, Jonas Salk (Englewood Cliffs, N.J.: Silver Burdett Press, 1990); Victoria Sherrow, Makers of Modern Medicine: Jonas Salk (New York: Facts on File, 1993).

<sup>&</sup>lt;sup>3</sup> Brandt, "Polio, Politics, Publicity, and Duplicity: Ethical Aspects in the Development of the Salk Vaccine," p. 265.

<sup>&</sup>lt;sup>4</sup> Letters: G.D.W. Cameron, Deputy Miniater of National Health, to J.K.W. Ferguson, Director, CMRL, June 1, 1964, CA, Uncatalogued Binder, National Technical Advisory Committee on Live Poliovirus Vaccines; R.J. Wilson, Assistant Director, CMRL, to Dr. A.R.J. Boyd, Toronto, March 11, 1966, CA, 83-012-03.

as well as by the NFIP itself. The story of the vaccine from a Canadian perspective suggests that its ultimate success was as symbolic of Canadian public health traditions of government interest and control as it was of American *laissez faire* scientific democracy. Such traditions, also evident in the general Canadian response to epidemic polio described so far, were built upon Defries' public health leadership and the strong connections forged through Connaught and the School of Hygiene among a generation of provincial and federal health authorities across Canada.

## 8.1) "A Herculean Task:"<sup>5</sup> Connaught Laboratories and the NFIP Field Trial, 1953-1954

News of Salk's first human trials of an inactivated polio vaccine first broke among polio scientists in January 1953 and set off a professional struggle between Salk and the more established researchers, such as John Paul and Albert Sabin, who had serious reservations about its safety and potency. They were particularly wary of the NFIP railroading Salk's vaccine over any other, such as the live attenuated versions Sabin and others were working on.

For its part, the Foundation was not interested in a perfect vaccine, just one that could offer some protection to as many children as possible until that theoretically perfect vaccine finally arrived, if ever. The American public had invested its dimes in the NFIP to an unprecedented degree to protect them from polio and they expected dividends. NFIP President, Basil O'Connor, was determined to do whatever he felt necessary to save lives while awaiting a vaccine. When gamma globulin seemed to be a valuable tool against polio in 1952-53, he bought the entire American supply, most of which was committed for soldiers in Korea, and distributed it for free so it did not become a black-market item. When asked about such an unprecedented move, he asked, "Wouldn't you have done the same? Why do you suppose the people gave us the money? They wanted us to fight polio. So we fought polio." Similarly, Salk's vac-

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<sup>5</sup> See note #1.
cine presented the NFIP with the best and fastest opportunity to satisfy the public. Salk understood this unusual situation and he had no problems with the NFIP supporting his work, especially since he was confident of his vaccine's safety and the immunological science behind it.<sup>6</sup> In fact, it was as an immunologist that Salk made his most important, if least appreciated, contributions towards preparing and evaluating an effective inactivated poliovirus vaccine

Salk's confidence was based on his earlier experience with an inactivated influenza vaccine.<sup>7</sup> Salk developed a new and precise mathematical model which extrapolated a precise relationship, expressed in an inactivation curve, between the amount of formalin, the concentration of poliovirus, and the length of time the formalin should be in contact with the virus to safely inactivate it. Using these principles Salk was confident that the infectivity of the poliovirus could be reliably destroyed without damaging its ability to stimulate poliovirus antibody production in the bloodstream.<sup>8</sup> In relying on a new mathematical virus inactivation and immunology model to prevent paralytic polio, the younger Salk clashed with older, conservative virologists and a more empirical reliance on a weakened live virus to provoke a natural, but mild, immunizing infection without causing the paralytic disease. This was an old tradition built on long experience with the smallpox vaccine. But to Salk, the risk of causing paralytic polio while inducing a natural immunity with a live vaccine was unnecessary.<sup>9</sup> This academic conflict over the best approach to a polio vaccine was bad enough, but when Salk allowed himself to be drawn into the NFIP's aggressive publicity machine and expressed his ideas and results publicly before

<sup>6</sup> Smith, Patenting the Sun, p. 177-84; Carter, The Gentle Legions, p. 127; Elizabeth W. Etheridge, Sentinel For Health: A History of the Centers For Disease Control (Berkeley: University of California Press, 1992), p. 67-70

<sup>7</sup> Paul, History of Poliomyelitis, p. 412-18.

<sup>&</sup>lt;sup>8</sup> J.E. Salk, "Principles of Immunology as Applied to Poliomyelitis and Influenza," AJPH, 43 (Nov. 1953): 1384-98; J.E. Salk (*et al.*), "Studies in Human Subjects on Active Immunization Against Poliomyelitis: I, A Preliminary Report of Experiments in Progress," JAMA, 151 (Mar. 28, 1953): 1081-98.

<sup>&</sup>lt;sup>9</sup> Salk, "Principles of Immunization as Applied to Poliomyelitis and Influenza," p. 1384-85.

presenting them to his scientific peers, a serious breach was created that has never fully healed.<sup>10</sup> This is what happened in March 1953 when Salk announced his results on a national radio program, but before his scientific paper was published.

This idea had been pushed by O'Connor in an publicity effort to generate funding for the impoverished foundation. In 1952 the NFIP had spent \$14.5 million on gamma globulin trials and \$25 million (or 69% of its total expenditures) on patient care services for 80,000 people in the wake of America's worst epidemic year. In 1953 more gamma globulin was needed and close to \$30 million would be spent on patient care. O'Connor needed to bolster the Foundation's income by promoting the potential of a vaccine Salk was actively testing. This broadcast and later publicity created a public perception that a polio vaccine existed, and all that was needed was to make enough of it.<sup>11</sup> O'Connor's plan worked and a record \$67.9 million was raised during the January 1954 "March of Dimes" campaign.<sup>12</sup>

Meanwhile, Salk proceeded with a quietly arranged vaccine trial during the spring of 1953 which involved 600 children, including his own, in a "family trial" designed to test how long high levels of poliovirus antibodies persisted after inoculation.<sup>13</sup> Perhaps Salk's greatest supporter for an expedited national field trial was

<sup>10</sup> Smith, Patenting the Sun, p. 169-260: Paul, History of Poliomyelitis, p. 413-25.

<sup>11</sup> Carter, The Gentle Legions, p. 126-7; David L. Sills, The Volunteers: Means and Ends in a National Organization (Glencoe, Ill.: The Free Press, 1957), p. 131; Smith, Patenting the Sun, p. 185-88; W.L. Laurence (New York Times Service), "New Vaccine Provides Immunity Against Polio," Globe and Mail, (Mar. 27, 1953).

<sup>12</sup> Carter, Ibid., p. 96; Sills, Ibid, p. 177-78. The 1954 income for the top six American health and welfare agencies was: 1,900 Community Chest Campaigns, \$302,500,000; American Red Cross, \$85,502,867; NFIP, \$67,907,000; National Tuberculosis Association, \$23,200,000; American Cancer Society, \$21,670,153; American Heart Association, \$11,350,195. The Community Chest Campaigns supported about 21,000 local health and welfare agencies. As Sills notes (p. 178), "Although the Community Chest Campaigns and the Red Cross Drive had more *income* in 1954 than any of the four voluntary health association campaigns, more *people* contributed to the March of Dimes and the Christmas Seal Sale than to either the Community Chest or the Red Cross." Their larger income was drawn from a smaller number of larger contributions, with 40% derived from business and industrial firms. A major reason for the success of the March of Dimes was that "a majority of people from even the lowest socio-economic group contribut[ed] to it.."

<sup>13</sup> Smith, Patenting the Sun, p. 188-91.

the NFIP's Director of Research, Harry Weaver, who had worked closely with Defries since the beginning of Rhodes' polio research program in 1947. Weaver's enthusiasm, however, created problems within the NFIP and with Salk over the question of who would plan and control the trial.<sup>14</sup> An important source of encouragement for Weaver's plans was the impressive results of Connaught's bulk poliovirus cultivation pilot project.<sup>15</sup>

Weaver officially asked Defries on July 3, 1953 for Connaught to supply the NFIP with 360 litres of poliovirus fluids consisting of each of the three virus types. The fluids were to be shipped to Salk's University of Pittsburgh virus laboratory, and to a number of other laboratories in the U.S.. Defries was also asked to investigate the inactivation process, although this step was not part of the original plan. For Defries, who had just assumed personal direction of Connaught's polio program, this was a major undertaking, requiring a significant expansion in staff, equipment and physical space that was to be paid for by a NFIP grant of close to \$125,000. Beyond the daunting scope of the project, Defries worried about the publicity surrounding the vaccine while Canada was in the grips of its worst epidemic. He asked that any publicity abor: t the Connaught project originate with the NFIP as "It would be embarrassing to have reporters 'discover' a story."<sup>16</sup> Weaver was "very grateful" for Defries' cooperation, and assured him that no public statement about any phase of the project was planned until the fall.<sup>17</sup>

A major advantage Connaught held over American commercial or research institutions, and one which did not escape the NFIP, was its ability to immediately

<sup>17</sup> Letter, Weaver to Defries, July 13, 1953, *Ibid.*.

<sup>14</sup> Ibid., p. 192-96; D. Preston, "Man Against Polio: 100,000 Vaccine Tests: Dr. Salk Wants to Be Sure Before Field Work Begins," The Pittsburgh Press, (June 18, 1953).

<sup>15</sup> L.N. Farrell, W. Wood, A.E. Franklin, F.T. Shimada, H.G. Macmorine and A.J. Rhodes, "Cultivation of Poliomyelitis Virus in Tissue Culture: VI, Methods for Quantity Production of Poliomyelitis Viruses in Cultures of Monkey Kidney," CJPH, 44 (Aug. 1953): 273-80.

<sup>16</sup> Letter, Defries to H.M. Weaver, Director of Research, NFIP, July 8, 1953, attached to Grant Application Budget, CA, 83-015-05, file 1/7.

deploy an experienced research staff to the practical problems of large scale poliovirus production. Defries had a principal team of six women and men who, in varying degrees, had been intimately involved with Rhodes' polio research program since 1948. Each was responsible for major stages of poliovirus production.<sup>18</sup>

O'Connor had purposefully avoided cultivating a close relationship with Washington. He held a deep contempt for federal bureaucracy and had little interest in federal funds for polio research, or government interference. This attitude suited the Department of Health, Education, and Welfare, which, unlike its Canadian counterpart, expressed minimal interest in polio. In 1953, Washington only spent \$72,000 on polio research, compared to the NFIP's \$2,000,000. At the same time Ottawa invested \$75,000 for gamma globulin alone, and as noted earlier, spent \$1.5 million on polio assistance generally. When prospects for a polio vaccine emerged it became necessary for O'Connor to forge alliances in Washington. He would need a federal license to distribute the vaccine following the field trial. The NFIP's mass gamma globulin programs also required federal involvement once the Foundation had moved from giving out money to giving out medicine. Indeed, the U.S. Public Health Service "had

<sup>18</sup> Hilda Macmorine was primarily in charge of preparing medium 199. Dr. William Wood directed the inspection and testing of monkeys, and the removal of their kidneys. Wood and Frank Shimada handled the process of identifying and measuring virus concentrations. Dr. Leone Farrell managed the bulk poliovirus production process. This involved carefully mincing the kidney by hand, cultivating these tissues in 199, seeding the cultures with the poliovirus, incubating them in the rocking bottle apparatus, and then harvesting the fluids. Dr. Arthur Franklin undertook studies to modify all aspects of production methods, including medium 199, to improve yields and reduce costs. Bacteriological control to comply with Laboratory of Hygiene standards was the responsibility of Mr. D.G. Graham. A large team of technicians, assistants and administrative personnel worked under each of these individuals to ensure a smooth running production process. See Chart, "Distribution of Responsibilities: Preparation of Poliomye'itis Culture Fluids," (July 1953), CA, 83-015-05, file 5/7; "Budget, "Application for Grant" attached to Letter, Defries to Weaver, July 8, 1953, CA, 83-015-05, file 1/7. Large scale poliovirus production was dependent upon 13 large rocking machines that were built by Tor nto Coppersmithing Co.. Five more machines were eventually needed; J.W. Boyd, CMLL Facilities, "Anr Jal Report for 1953-1954," June 22, 1954, CA, 83-005-06, Box 8, file 4/6.

realized that they had to step in or let Basil O'Connor create what was in effect a shadow network of health services."<sup>19</sup>

O'Connor desired the approval of the U.S. Laboratory of Biologics Control before the vaccine trial started to avoid potential problems with licensing, but this was not something the federal laboratory was easily prepared for. It granted or denied licenses to commercial biological products, but was not used to getting involved in product development. Many in Washington were interested in the Salk vaccine, but as the Chairman of the NFIP's Vaccination Advisory Committee, Tom Rivers, pointed out, "nobody in the Public Health Service knew anything about polio. So we got them tangled up in this mess and we had an awful time teaching them about polio."<sup>20</sup> This situation in Washington was in sharp contrast to Ottawa's active and expanding interest in polio studies since 1947. The Department of National Health and Welfare's efforts seemed hampered only by the physical and staff limitations of the Laboratory of Hygiene, but it maintained a necessarily close relationship with Connaught.

By July 1953, the Director of the U.S. Laboratory of Biologics Control, Dr. William Workman, agreed to an NFIP request that he visit Connaught to study their bulk poliovirus cultivation procedures, while another Director visited Salk's laboratory. O'Connor needed to establish standardized specifications for the production of the vaccine for the field trial, and if he hoped to get a license, then Washington had to be involved in this process. It was also necessary to get a federal customs permit so that Connaught's virus fluids could cross the border.<sup>21</sup> Workman was pleased with what he saw at Connaught in mid-July, and in particular, "was agreeably surprised at the

<sup>19</sup> Smith, Patenting the Sun, p. 248-50; Etheridge, Sentinel for Health: A History of The Centers for Disease Control, p. 67-70; "CMRL, Summary, Researches, Assisted by Outside Grants, 1953-1954," CA, 83-005-06, Box 11, file 2/11; Canada, House of Commons Debates, 1953-54, Vol. 1, December 2, 1953, (Ottawa: 1954), p. 541-44; "Polio Now Major Issue Says Martin," Winnipeg Free Press, (Dec. 3, 1953); (Canadian Press), "Canada Hard Hit By Polio Epidemic," Winnipeg Free Press, (Dec. 10, 1953).

<sup>20</sup> Smith, Ibid., p. 251.

<sup>21</sup> *Ibid.*, p. 251-52.

volumes which [were] being handled and the relatively high titres of virus." There were some minor points that needed to be addressed in Connaught's proposed methods, but overall there seemed to be reasonable hope that an effective vaccine could be prepared.<sup>22</sup> Soon after securing the NFIP's and Workman's confidence in Connaught's methods, Defries informed the Chief of Ottawa's Laboratory of Hygiene, James Gibbard, of Connaught's close involvement in the American field trial and invited him, or his Chief virologist, Dr. F.P. Nagler, to see what Connaught was up to.<sup>23</sup>

By the end of August, Defries was asked by the NFIP to aim for 186 litres of virus fluids a week from early November until the end of March. This represented a five-fold increase that would require some 4,000 monkeys at a rate of 165 per week.<sup>24</sup> The NFIP was prepared to assume all costs, at a rate of 30¢ per c.c., as well as all the necessary capital costs of expanding CMRL's facilities. Dr. Hart E. Van Riper, who had assumed administrative control of the NFIP's trial plans after forcing Weaver's resignation, made a point of stressing his appreciation to Defries for agreeing to this increasingly "unusual effort."<sup>25</sup>

<sup>&</sup>lt;sup>22</sup> "Proposed Method of Production of Poliomyelitis virus in Bulk," July 13, 1953, CA, 83-015-02, file 4/4; Letter, W.G. Workman, Chief, Laboratory of Biologics Control, U.S. Department of Health Education and Welfare, to Defries, July 17, 1953, CA, 83-015-05, file 1/7.

Letters: Defries to Gibbard, August 7, 1953; Gibbard to Defries, August 24, 1953; Defries to Gibbard, August 27, 1953, NAC, RG29, Accession 83-84/119, Vol. 30, file 355-P-4, pt. 4.

<sup>24</sup> The NFIP's significantly higher virus fluid requirements forced an even more organized approach to production at Connaught and led to Defries setting up a formal "Polio Vaccine Committee" in mid-September 1953. This Committee met weekly and involved all the principal members of the polio research group, as well as a financial representative to deal with the NFIP, and another to see that all the required structural and equipment modifications were expedited; Minutes, Meetings of Polio Vaccine Committee, September 18, 1953, October 3, 1953, CA, 83-015-01.

This process was not always smooth since space at the Spadina Division, where the "Polio Project" was based, was limited. By October, however, plans were initiated to allocate parts of the Polio Program to free space in the new Blood Fractionation Building that was about to go ahead at the Dufferin Division for gamma globulin production.

Production Schedule, CA, 83-015-02, file 2/3; Letters: H.E. Van Riper, Medical Director, NFIP, to Defries, September 13, 1953; Defries to Van Riper, September 21, 1953, CA, 83-015-05, file 1/7. The political situation surrounding Weaver's aggressive assumption of authority over the trial came to a head in late August and led to his resignation on September 1, 1953; Smith, Patenting the Sun, p. 197-99.

By this time Parke, Davis and Company of Detroit had entered into a similarly unusual agreement to receive virus fluids from CMRL for inactivation, a deal that upset Salk. Other American firms, particularly Eli Lilly and Company of Indianapolis, were interested in making the vaccine for the trial, and saw an opportunity to expand their facilities into the new area of tissue culture production. The problem was that Parke Davis and Eli Lilly, and all such companies, were used to working in secret. They had little patience for Salk's precise inactivation specifications and frequently disregarded and modified them without Salk's consent. These firms were interested in putting the best available vaccine onto the market as fast and as cheaply as possible, but not necessarily the best possible vaccine, which Salk believed he was developing. As Rivers later noted, "The first automobile was a far cry from today's cars." But people did not keep walking while they waited for the modern car. "So why let children continue to run the risk of polio when we have what might be the Model T of polio vaccines ready?" This attitude to his work was upsetting to Salk, as his vaccine was not designed to be just better than nothing. He intended it to be better than anything.<sup>26</sup>

Salk's relationship with Connaught grew much closer and he visited Toronto a number of times while Connaught staff visited Pittsburgh to learn his inactivation techniques.<sup>27</sup> Despite only supplying bulk virus fluids for the NFIP, Defries was anxious for his team to learn all aspects of vaccine production. He wanted to be able to supply a finished vaccine to Salk if an emergency ever arose during the trial, and subsequently, be in a position to supply the provinces with waccine.<sup>28</sup> Such a close relationship with Salk limited the flexibility of Connaught's staff to modify their production methods. In particular, Franklin had found a way to simplify medium 199

<sup>26</sup> Smith, *Ibid.*, p. 216-20.

<sup>27</sup> Letter, Defries to Salk, September 15, 1953, CA, 83-015-05, file 2/7; Minutes, Meeting of Polio Vaccine Committee, October 16, 1953, CA, 83-015-01.

<sup>28</sup> Letter, Defries to Salk, October 27, 1953, CA, 83-015-05, file 2/7.

that would save money and production time, but Defries rejected "any change which could in any way be linked with failure of the finished vaccine."<sup>29</sup>

Salk's difficulties with Parke Davis not strictly following his inactivation requirements intensified in the fall of 1953. Salk suspected a subtle form of sabotage was going on by the company in an attempt to discredit his formalin inactivation methods in favour of using ultraviolet light, for which it had a patent. At the same time, other pharmaceutical companies were being courted by O'Connor to make the vaccine from beginning to end in order that an adequate supply was ready when it was licensed by Washington. In November, O'Connor gambled on the value of the vaccine and offered to buy enough to inoculate 9,000,000 American children.<sup>30</sup> In the meantime, despite Parke Davis' exclusive deal with the NFIP, Lilly was actively pressuring Salk to be allowed to join the trial project.<sup>31</sup> Yet Salk was increasingly worried that there would not be enough vaccine that met his specifications in time for February when the trial was scheduled to begin.<sup>32</sup> There was also an ongoing debate over the design and control of the trial, especially over the question of whether it should be placebo-controlled. Both Salk and O'Connor favoured a simpler, observed-controlled design, but the NFIP's Vaccine Advisory Committee and Washington insisted upon placebo controls in order to insure a meaningful result.<sup>33</sup>

Amidst this turmoil, Salk grew anxious for Connaught to learn his inactivation methods. For Defries, progress was complicated by the controversies surrounding the trial plans, which left him hanging for months, not knowing whether he needed to expedite full vaccine production or not.<sup>34</sup> It was not until mid-January 1954 that

<sup>&</sup>lt;sup>29</sup> Minutes, Meeting of Polio Virus Committee, January 12, 1954, CA, 83-015-01.

<sup>30</sup> Smith, Patenting the Sun, p. 219-23; (Associated Press), "Polio Foundation Gambles Buys \$9,000,000 in Vaccine," Globe and Mail, (Oct. 20, 1953).

<sup>31</sup> Smith, *Ibid.*, p. 217-18.

<sup>32</sup> *Ibid.*, p. 224-26.

<sup>33</sup> *Ibid.*, p. 197-206.

<sup>&</sup>lt;sup>34</sup> Letter, Salk to Defries, November 30, 1953, CA, 83-015-05, file 1/7; Minutes, Meetings of Polio Virus Committee, December 18, 1953, December 23, 1953, CA, 83-015-01.

Defries was officially authorized by the NFIP to proceed with inactivation.<sup>35</sup> But the situation quickly changed again a few weeks later when the final manufacturing and trial design plans were settled. Parke Davis' vaccine monopoly was broken and CMRL remained the exclusive bulk poliovirus fluid supplier for the NFIP trial.<sup>36</sup>

Defries faced other challenges during the fall that complicated his production plans. The first major problem emerged after discovering tuberculosis among some of the monkeys that were delivered in early November. Connaught was able to use its experience with TB testing to detect the infected monkeys before they were sacrificed, <sup>37</sup> but this situation raised serious questions. Were the culture fluids contaminated? How could such tubercular contamination be filtered out without affecting the virus concentration of the fluids? Such a high infection rate forced the NFIP's monkey farm to X-ray each animal before shipment.<sup>38</sup>

In the meantime bulk virus fluids were finally being delivered. Each week a refrigerated truck, or station wagon, was sent from Park Davis in Detroi to Toronto to pick up the bottled poliovirus fluids.<sup>39</sup> Despite such progress, in light of the various production problems, a number of research projects were proposed through the Federal Public Health Research Grants. One focused on improving the current methods of poliovirus cultivation, while another looked forward to developing attenuated

<sup>35</sup> Minutes, Meeting of Polio Virus Committee, January 22, 1954, *Ibid.*. Defries was confident enough with inactivation to suggest to a British medical supply firm, who thought Connaught had developed a polio vaccine, that "work is going forward in regard to the inactivation of virus and other steps connected with the preparation of a vaccine," authough general distribution would have to wait until after "adequate clinical trials;" Letters: F.S. Gorrill, Production Director, Evans Medical Supplies Ltd., Liverpool, UK, to Defries, January 19, 1954; Defries to Gorrill, January 25, 1954, CA, 83-002-07, file 6/8.

<sup>&</sup>lt;sup>36</sup> Smith, *Patenting the Sun*, p. 226-29, 246-47.

<sup>&</sup>lt;sup>37</sup> Minutes, Meeting of Polio Vaccine Committee, October 30, 1953, CA, 83-015-01.

<sup>38</sup> Letter, Defries to Salk, November 13, 1953, CA, 83-015-05, file 2/7; Minutes, Meeting of Polio Virus Committee, November 20, 1953, CA, 83-015-01; Letter, Salk to Defries, January 28, 1954, CA, 83-015-05, file 1/7.

<sup>39</sup> Minutes, Meetings of Polio Vaccine Committee, November 6, 1953, November 27, 1953, CA, 83-015-01.

strains of the poliovirus for a live vaccine.<sup>40</sup> Defries, like Parke Davis, and others, wanted to experiment with ultraviolet radiation as a simpler alternative to formalin to inactivate the poliovirus.<sup>41</sup>

Other research laboratories also experienced problems trying to duplicate Salk's inactivation results. These difficulties were brought before the Annual Meeting of the American Public Health Association in New York City in mid-November 1953. This meeting was attended by the Deputy Minister of National Health, Dr. D.G.W. Cameron, and his counterpart from Ontario, Dr. J.T. Phair. Phair was particularly concerned about recent newspaper reports which stressed a Chicago laboratory's inability to completely inactivate the poliovirus, thus raising the spectre of the illfated 1935 vaccine trials.<sup>42</sup>

Another Canadian was also at the meeting, Dr. Richard Gill, who was currently Chief Health Officer of Alabama and also Chairman of a Committee of State Health Officers organized to supervise the continuing trials of gamma globulin and the proposed vaccine trial. Gill filled Cameron in on the vaccine trial plans and Connaught's involvement in supplying the bulk virus. He also offered to serve as a source of information on both trials for Cameron's department.<sup>43</sup> The NFIP also used this meeting to announce their plans to begin a national field trial of the Salk vaccine on February 8. In reporting on this news, the widely syndicated American science writer, Alton Blakeslee of the Associated Press, pointed out Connaught's role and the particular contributions of Rhodes to the development of quantity virus production

<sup>40</sup> R.D. Defries, Application for a Public Health Research Grant, "Cultivation of poliomyelitis virus in tissue culture," November 30, 1953, CA, 83-005-06, Box 10, file 3/6; J.F. Crawley, Application for a Public Health Research Grant, "A study of poliomyelitis viruses," November 27, 1953, CA, 83-005-06, Box 9, file 5/9.

<sup>&</sup>lt;sup>41</sup> Letters: Defries to S.O. Levinson, Michael Reese Research Foundation, Chicago, January 8, 1954; Defries to H.J. Shaughnessy, Div. of Laboratories, Department of Public Health, Chicago, January 13, 1954; Shaughnessy to Defries, January 21, 1954, CA, 83-002-07, file 6/8.

W.L. Laurence, "Anti-Polio Vaccine Defended as Safe: Foundation Doctor Insists Substance Has Been Tested for More Than Year," New York Times, (Nov. 11, 1953); Memo, Cameron to File, November 16, 1953, NAC, RG29, Vol. 200, file 311-P11-10, part 4.

<sup>&</sup>lt;sup>43</sup> Memo, Cameron to File, November 16, 1953, NAC, RG29, Vol. 200, file 311-P11-10, part 4.

methods.<sup>44</sup> Canadian press coverage stressed that the trial would not be conducted in Canada, but should it prove useful, Connaught's close involvement meant that "it can be produced quickly and in quantity in Canada."<sup>45</sup>

While a few in his Department were aware of it, Paul Martin first found out about the NFIP vaccine trial, and Connaught's and Canada's major role in it, by reading about it in the newspapers.<sup>46</sup> It is possible that the federal election, which occurred on August 10, 1953, in the midst of Canada's worst polio epidemics, played a role in keeping Martin in the dark.<sup>47</sup> Martin's early awareness might have created a difficult election issue and further inflamed public demands for the vaccine that were even more impossible to meet than was the case with gamma globulin.

As Cameron explained to Martin, Connaught's involvement with the NFIP's trial plans had been kept secret. This substantial involvement was a concern for Cameron, but he did not feel that a Canadian trial should be attempted until after the American experiment. A concurrent Canadian trial "might have some political appeal," but he felt it could not be justified on any other grounds. Moreover, as Cameron stressed to the Minister, Canada was "in an advantageous position since the most difficult part of vaccine production is actually going on in Canada and we can secure supplies for local use as soon as a sound production is established."<sup>48</sup> Martin argued that because Connaught's activities with polio had also been financed by the federal government, "it seems to me we ought to make some arrangement at once to have some of it made available to us."<sup>49</sup> Cameron disagreed. Since the vaccine was untest-

<sup>44</sup> A.L. Blakeslee, (Associated Press), "Hope-Laden Polio Vaccine For Million U.S. Children," Ottawa Journal, (Nov. 17, 1953).

<sup>45 (</sup>Canadian Press), "1,000,000 To Test U.S. Polio Vaccine," *Winnipeg Free Press*, (Nov. 18, 1953).

<sup>&</sup>lt;sup>46</sup> Memos: Martin to Cameron, November 19, 1953; November 24, 1953, attached to the newspaper clippings noted immediately above, NAC, RG29, Vol. 200, file 311-P11-10, part 4.

<sup>&</sup>lt;sup>47</sup> On the 1953 election see Paul Martin, A Very Public Life, Volume II: So Many Worlds, (Toronto: Deneau Publishers, 1985), p. 68-71, 129-36, 225-26.

<sup>&</sup>lt;sup>48</sup> Memo, Cameron to Martin, November 23, 1953, NAC, RG29, Vol. 200, file 311-P11-10, part 4.

<sup>&</sup>lt;sup>49</sup> Memo, Martin to Cameron, December 1, 1953, *Ibid.* 

ed and its safety not adequately established, he advised his Minister to watch the American scheme with interest for "They will provide the answers and we can benefit from them as quickly, if not more quickly, than any place else in the world."<sup>50</sup> This advice was reinforced by others in the Department, including Cameron's secretary, who contributed a "female point of view." She felt that the Americans should go ahead if they wanted, but if she were a mother, she would not want her children involved in the first trial. "If we have to have further trials, Canada won't be running the same risk if in on them." But she also had "a feeling [that] there might be quite a few repercussions from the first trial."<sup>51</sup>

Once the NFIP had announced field trial plans that involved such a prominent role for Connaught, Defries felt growing pressure from many at the University of Toronto about the wisdom of rushing into a trial. What was the University's liability should something go wrong? These concerns were reinforced by rising American debate about the basis of Salk's vaccine and what seemed to be a premature trial. Concerns within the American Academy of Pediatrics were the most serious and involved a widely circulated critique of the vaccine and trial.<sup>52</sup> Salk received one of these letters and suggested "this was not a simple inquiry... but a concerted plot by an

<sup>&</sup>lt;sup>50</sup> Memo, Cameron to Martin, December 8, 1953, *Ibid.*.

<sup>51</sup> Memo from "B." attached to *Ibid.*.

For an analysis of parental attitudes towards the NFIP field trial in a Virgina county in the Washington, D.C. suburbs, see J. Clausen, M. Seidenfeld and L. Deasy, "Parent Attitudes Toward Participation of their Children in Polio Vaccine Trials," in E.G. Jace (ed.), *Patients, Physicians and Illness: Sourcebook in Behavorial Science and Medicine* (New York City: The Free Press, 1958), p. 119-29, and AJPH, 44 (Dec. 1954): 1526-36. In this county 2/3 of the eligible children participated (2nd grade children in five schools), which was "an exceedingly favorable response in view of the withdrawl of other suburban areas which were to have been involved." Those parents that did not consent declined mainly because of health reasons which they or their doctor thought were cogent. "Indeed, the overwhelming desire of parents interviewed was to do what would be best for their children." Those who consented were better informed about the trials through literature and meetings, were more likely to have taken precautions in the past to protect their children from polio, and any differences in attitude and orientation among consenting parents were linked to often considerable differences in education level and general socio-economic status (p. 128).

<sup>52</sup> Benison, Tom Rivers, p. 517-22.

antivaccination clique."<sup>53</sup> At Connaught, van Rooyen, and probably Rhodes, also received copies of the letter. Van Rooyen was sympathetic enough with the concerns to forward a copy to the President of the University, Sidney Smith.<sup>54</sup>

Van Rooyen and Rhodes' worries about the hastiness of the trial were intensified by the presence of a potentially deadly monkey virus in the poliovirus fluids, known as "virus B."<sup>55</sup> Virus B was a recognized occupational hazard of polio research that could be transmitted by a monkey bite, the chances of which were multiplying along with monkey-based vaccine production. This was an endemic and latent type of monkey virus that did not seem to affect them, but was 100% fatal to rabbits and almost 100% fatal in the rare human cases that have occurred. Three cases occurred at CMRL among monkey handlers, two of which were immediately fatal, while another was fatal to the Laboratory of Hygiene's Veterinary Officer in 1957.<sup>56</sup> However, worries over virus B at Connaught were not sparked so much by cases occurring in the lab, although this threat was a serious concern. While its potential

<sup>53</sup> Smith, Patenting the Sun, p. 243-45.

<sup>54</sup> Letter, Dr. A.C. McGuinness, Chairman, American Academy of Pediatrics, to C.E. Van Rooyen, (undated, but likely about December 1, 1953), attached to Letter, C.H. Kempe, Department of Pediatrics, University of California Hospital, San Francisco, November 27, 1953, UTA, A76-0044, Box 094, file 32.

Virus B was transmitted by monkey bites. Such bites were usually not too serious, but in 1932 a Canadian investigator, William Brebner, was bitten by a monkey while working in W.H. Park's New York City laboratory on polio research. It did not seem serious at first, but within ten days "he noticed his hand was becoming weak, and soon after it became paralyzed. Within a few days the paralysis spread to his respiratory center and brain and he died." Albert Sabin, who had been working with Brebner, was later able to isolate a virus from part of Brebner's brain. Another team also isolated a virus from another sample, but felt it was a herpes simplex virus. Sabin, however felt it was a totally new virus and after "a first-class hassle" over this question, Sabin won out and named this agent "B virus" after Brebner; Benison, Tom Rivers, p. 234-35. See also W. Wood and F.T. Shimada, "Isolation of Strains of Virus B from Tissue Cultures of Cynomolgus and Rhesus Kidney," CJPH, 45 (Dec. 1954): 509-18; W.L. Davison and K. Hummeler, "B Virus Infection in Man," Annals of the New York Academy of Sciences, 85 (May 20, 1960): 970-79.

<sup>Davison and Hummeler, Ibid.; Interview #2 with Frank Shimada, August 10, 1993; Department of National Health and Welfare, Annual Report, 1958 (to March 31, 1958) (Ottawa: 1958), p. 60; "Bitten By Monkey At Connaught Lab Worker, 40, Dead," Toronto Star, (Mar. 20, 1958).</sup> 

presence was anticipated, controversy was generated after six strains of virus B were isolated from the poliovirus fluids between December 1953 and February 1954.<sup>57</sup>

The problem was whether or not the inactivation process would "take care of it."<sup>58</sup> Defries was satisfied that Connaught could reliably test for virus B in the poliovirus fluids, and, like the NFIP's vaccine committee, was convinced that it was sufficiently inactivated along with the poliovirus not to pose a problem.<sup>59</sup> However, van Rooyen and Rhodes remained uneasy, their concerns reflecting that of many virologists uncomfortable with both the reliability of Salk's inactivation science, and the mad rush towards a polio vaccine trial.<sup>60</sup> The fact that such polio authorities as Rhodes were uneasy about the situation also generated questions within the University of Toronto administration about its liability should something go wrong with the vacc-

Letter, Defries to Salk, December 31, 1953, CA, 83-015-05, file 2/7; Wood and Shimada, "Isolation of Strains of Virus B from Tissue Cultures of Cynomolgus and Rhesus Kidney:" Letters: Defries to Salk, February 18, 1954; February 22, 1954; Salk to Defries, January 28, 1954, CA, 83-015-05, file 2/7; Letter and Report, Defries to Van Riper, February 8, 1954, CA, 83-015-05, file 1/7.

<sup>58</sup> Letters: Defries to Van Riper, February 8, 1954; Defries to Salk, December 31, 1953, CA, 83-015-05, file 1/7.

<sup>&</sup>lt;sup>59</sup> Letters: (Smith) to Van Riper, January 18, 1954, UTA, A76-0044, Box 094, file 32; Defries to Tory, February 2, 1954, UTA, A68-0007, Box 111, file 03; Defries to Van Riper, CA, 83-015-05, file 1/7; C.E. van Rooyen, Minutes, Meeting with NFIP, February 10, 1954, attached to Letter, van Rooyen to Dr. MacFarlane, Dean of Medicine, University of Toronto, February 15, 1954; Letter, T.M. Rivers, NFIP Vaccination Advisory Committee, to Editor, JAMA, February 4, 1954, UTA, A76-0044, Box 094, file 032; Defries, Minutes, Meeting with NFIP, February 10, 1954, CA, 83-015-02, file 2/3; Benison, Tom Rivers, p. 525-26.

<sup>60</sup> Interview #2 with Frank Shimada, August 10, 1993; Letters: Defries to Van Riper, CA, 83-015-05, file 1/7; Defries to Sidney Smith, President, University of Toronto, January 2, 1954, UTA, A68-0007, Box 111, file 03; Van Rooyen, Minutes, February 10, 1954, UTA, A76-0044, Box 094, file 032. Shimada became closely involved in developing an inactivated virus B vaccine for monkeys; D.R.E. MacLeod, F.T. Shimada and M.J. Walcroft, "Experimental Immunization Against B Virus," Annals of the New York Academy of Sciences, 85 (May 12, 1960): 980-89.

ine with which Connaught was so heavily involved.<sup>61</sup> The NFIP assured Defries that it would assume any such liabilities.<sup>62</sup>

In the midst of this controversy, the vaccine's minimum standards were agreed to, as was the trial's placebo-controlled structure to be evaluated and directed independently by Dr. Thomas Francis at the University of Michigan.<sup>63</sup> Meanwhile, the NFIP requested as much virus as could be produced over the next month, as a last push was on in February to prepare enough vaccine for the trial. The final supplies of virus fluids were directed primarily to Eli Lilly in Indianapolis.<sup>64</sup> Defries took advantage of Connaught's virus production capacity and supplied many other polio researchers with standardized poliovirus fluids. As the trial began these fluids were needed primarily for neutralization tests for assessing the immunity levels generated by the vaccine. Defries also planned research projects to improve production methods. This was also motivated by Defries' need to retain a core group of trained techni-

<sup>61</sup> Meeting notes by S. Smith, January 4, 1954; Letter, J.S.D. Tory, Chairman, University of Toronto Connaught Committee, to O'Connor, February 17, 1954. Smith and Tory supported Defries, but the issue created personal tensions among what was otherwise a close-knit group. Tory's support was partly due to the fact that his family had "already been touched by this disease;" Letter, Tory to Smith, February 18, 1954, UTA, A68-0007, Box 111, file 03; "Connaught Keeps its Lead in Vaccines," *Canadian Chemical Processing*, (Feb. 1963): 39.

<sup>62</sup> Defries, Minutes, February 10, 1954, CA, 83-015-02, file 2/3; Letter, O'Connor to Tory, February 11, 1954, UTA, A68-0007, Box 111, file 03.

<sup>63</sup> R.D. Defries, Minutes of Vaccine Manufacturers, New York City, February 1, 1954, CA, 83-015-02, file 2/3; Smith, *Patenting the Sun*, p. 226-29, 246.

<sup>&</sup>lt;sup>64</sup> Minutes, Meeting of Polio Virus Committee, January 29, 1954, CA, 83-015-01. Eli Lilly directly copied the Toronto method for their own production, "and did so in faithful detail, although multiplied severalfold;" L.N. Farrell, "Outline of Proposed Writing Programme," November 15, 1969, CA, 83-003-03, file 2/2.

See also L.N. Farrell, W. Wood, H.G. Macmorine, F.T. Shimada and D.G. Graham, "Preparation of Poliomyelitis Virus for Production of Vaccine for the 1954 Field Trial," *CJPH*, 45 (July 1955): 265-72. According to this report, in the end Connaught produced 5,521 litres of poliovirus fluids, 4,450 litres of which met all standards. 3,280 litres were used to make vaccine for the NFIP trial. An average of 280 monkeys were received each week for a total of 7,055. Of these 28 had TB and 37 others were rejected due to other diseases and 416 had abnormal kidneys. A total of 6,100 monkeys were used in production, although 7 virus pools were rejected due to virus B, and 76 litres were unused due to the presence of other viruses. In the year between when Leone Farrell first established the rocking bottle method in the spring of 1953, and April 1954, a total of 12,309 litres of poliovirus fluids were produced, 11,357 litres of which made over the previous six months; CMRL, *Annual Report*, *1953-54* (Toronto: 1954), p. 15.

cians for the Canadian vaccine production he anticipated.<sup>65</sup> As Cameron stressed to the press, "Canada is on the ground floor in the vaccine's production," but it would be at least a year before it could be used in Canada.<sup>66</sup>

Meeting the Canadian demand for the vaccine was high on Defries' agenda and he focused on the Laboratory of Hygiene's preparations to test it, and for Ottawa to develop a policy for its Canadian use. Poliovirus production had just been stepped up, requiring 260 monkeys a week. As Cameron highlighted in a confidential memo, "The cost is fantastic." There was a serious shortage of vaccine for the NFIP's late winter deadline to start the trial, with only a fraction of the originally planned amount available. It also appeared to Cameron that "the powers that be in the States are using the manufacturers as the goats and heaping the blame for the delay on them."<sup>67</sup> The Chief of Laboratory of Hygiene was especially worried about distributing the vaccine in Canada, and hoped testing would not be necessary until the new Laboratory building was complete. However, with the "possibility of the matter arising more quickly," medical consultants from the Virus Laboratories, were sent to Washington to discuss quality controls,<sup>68</sup> and to Connaught since it was obvious Ottawa would need considerable advice.<sup>69</sup> One consultant, Dr. Stuart F. Kitchen was surprised to find that Connaught's "set up and productivity rivals the 'assembly-line'

<sup>65</sup> Letter, Defries to H.W. Kumm, Director of Research, NFIP, February 22, 1954; R.D. Defries, Application for a NFIP Grant, "To improve the procedures used in growing poliomyelitis virus in quantity and to furnish the NFIP with such amounts of culture fluids as may be required for studies by investigators working under direction of the Foundation for other purposes," February 22, 1954, CA, 83-005-06, Box 10, file 3/6. See also Letter, T. Francis Jr., Director, Poliomyelitis Vaccine Evaluation Centre, University of Michigan, Ann Arbor, to Defries, May 25, 1954, attached to list of laboratories, CA, 83-015-05, file 5/7.

<sup>66 (</sup>Canadian Press), "Hope Held Vaccine May Eventually Beat Polio: Canada on Ground Floor," Globe and Mail, (Feb. 2, 1954).

<sup>67</sup> Memo, Cameron to File, "Conversation with Dr. Defries on Polio Vaccine," February 22, 1954, NAC, RG29, Accession 83-84/119, Box 30, file 355-P-4, part 4.

<sup>68</sup> Memo, F.P. Nagler, Medical Consultant, Virus Laboratories, Ottawa, to J. Gibbard, Director, Laboratory of Hygiene, April 20, 1954, *Ibid.*. Nagler visited the National Institutes of Health in Washington and Salk's laboratory in Pittsburgh.

<sup>69</sup> Letter, Gibbard, to Defries, March 5, 1954, Ibid..

methods of present day motor car manufacturers!"<sup>70</sup> Similar accolades from American laboratories were being directed to Defries and others at Connaught at this time, stressing that it had "done a magnificent job," and deserved "great credit" for its contributions towards making the field trials possible.<sup>71</sup>

A further delay in the trial's start date emerged in late March after Salk was ordered by Workman to conduct a small preliminary trial for safety. Meanwhile a "journalistic blitz" intensified around Salk, the trial, and, in the Canadian media, around Connaught's role in it.<sup>72</sup> Cameron received numerous calls from the press gallery in Ottawa, asking questions about a parallel Canadian vaccine trial. He had to refer reporters to Defries, but "hope[d] that the results of this [were] not embarrassing" to him.<sup>73</sup> The Globe and Mail was particularly laudatory of Connaught's efforts and "impressive reputation" in an editorial and photo story in early April.<sup>74</sup>

Repeating the 1952-53 gamma globulin experience, Ottawa's challenge was how to expedite vaccine distribution in Canada. Should it be distributed on an experimental basis or in the ordinary way? Cameron was worried Defries would find himself "with a large production plant and a terminated contract with the Polio Foundation." Ottawa needed to avoid letting Connaught's facilities "wither away." Also, who would decide, and how, that the Salk vaccine was "good enough to go on with, even though it may not be judged to be perfect?" Perfection was not necessary and therefore there should be no delay in making the vaccine available. The simplest policy

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<sup>&</sup>lt;sup>70</sup> Letter, S.F. Kitchen, Medical Consultant, Virus Laboratories, Ottawa, to Kumm, March 23, 1954, *Ibid.*.

<sup>&</sup>lt;sup>71</sup> Letters: Levinson to Defries, March 23, 1954, CA, 83-002-07, file 6/8; A.E. Hook, Park Davis, Detroit, to Farrell, March 27, 1954, CA, 83-015-02, file 3/3.

<sup>&</sup>lt;sup>72</sup> See for example Time, (Mar. 29, 1954), which featured Salk on the cover. See also: Smith, Patenting the Sun, p. 255; K.W. MacTaggart, "All Virus for U.S. Polio Inoculations Made in Connaught Laboratories," and "Toronto Scientists in Front Line of Polio War," Globe and Mail, (Apr. 5, 1954); J. Moore, "Polio Weapon," Weekend Magazine, (Apr. 17, 1954): 26.

<sup>73</sup> Memos: Cameron to B.D.B. Layton, Principal Health Officer, Department of National Health and Welfare, March 23, 1954; Letter, Cameron to Defries, April 1, 1954, NAC, RG29, Vol. 1201, file 311-P11-26, part 1.

Feditorial, "New Achievement at Connaught," Globe and Mail, (April 6, 1954); MacTaggart,
 "All Virus for U.S. Polio Inoculations Made in Connaught Laboratories."

was to have Defries make the vaccine for sale in the normal way, supported through Health Grants to the Provinces. However, if Defries saw the need for it, Cameron's mind was "certainly not closed to the possibility of something special."<sup>75</sup>

In early April the publicity surrounding the NFIP trial reached a peak, but was overshadowed by an outburst of severe criticism of the vaccine and its alleged dangers. Indeed, it became "open season for settling old scores." Sabin was highly critical of the NFIP, while the American Medical Association saw the prospect of mass vaccination clinics as "a step closer to the dreaded spectre of socialized medicine." Another spectre also reappeared just as the trial was about to start. Paul de Kruif, the NFIP's first medical advisor, and O'Connor's old nemesis, planted rumors "through the biomedical grapevine" that the Salk vaccine was lethal. He also told a prominent radio and newspaper columnist, Walter Winchell, about his suspicions regarding the deadly problems with the vaccine. On April 4, 1954 Winchell opened his weekly radio show with the warning that the new polio vaccine "may be a killer!"<sup>76</sup>

This broadcast came as a major shock to the NFIP, Salk, and Defries, who happened to be with Salk in Michigan at the time. Salk took it calmly, while the NFIP decided to use the controversy to explain why vaccination plans were being revised.<sup>77</sup> Some states threatened to pull out of the trial in the wake of the new controversy. Yet the public grew furious at the idea they might be denied their chance to participate and most hesitating states "asked to be reinstated because of the public pressure." In Washington, despite the Winchell scare, the NFIP's Vaccination Advisory Committee decided to go ahead with the trial, that would officially start on April 26. O'Connor undercut any remaining doubts by reminding the Committee "of how many children would be paralyzed for each year that they postponed their decision."

<sup>75</sup> Letter, Cameron to Defries, April 1, 1954, NAC, RG29, Vol. 1201, file 311-P11-26, part 1.

<sup>76</sup> Smith, Patenting the Sun, p. 255-58.

R.D. Defries, Notes "En Route to Ann Arbor, Dr. Salk told me," April 4-6, 1954, dictated April 7, 1954, CA, 83-015-05, file 1/7.

Moreover, further delay would not provide any useful new information about the real safety of the vaccine.<sup>78</sup>

8.2) Ottawa, the Provinces and the Salk Vaccine, 1954-1955

The launching of the NFIP field trial unleashed an army of more than 200,000 volunteers who began vaccinating close to half a million "Polio Pioneers" across the United States. In Canada, political pressure for some kind of action in Ottawa reached a peak. On the eve of the trial, CBC-TV broadcast a documentary on Connaught's poliovirus production, entitled "Victory Over Polio?," further emphasizing the need for Canadian governments to do something about the vaccine.<sup>79</sup> Cameron recommended to Martin that Connaught go ahead with full vaccine production for use in Canada "before the results are in from the big experiment in the U.S.." This might be a gamble, but preliminary results suggested there was a measurable antibody boost from the vaccine. On this basis building up a stock of vaccine for Canadian use was warranted and would allow immunizations to begin "with the least possible delay."<sup>80</sup> Salk was happy with the trial so far. He told Defries that there had been satisfactory immune responses and no reports of problems; "virtually 100% of your efforts.... [were] being put to good use."<sup>81</sup>

Based on such encouraging reports, Defries canvassed the provincial deputy ministers of health in mid-May to see if they would commit themselves to buying vaccine. He estimated it could be prepared at a cost of 75¢ per 1 c.c. dose. Defries needed to know by July 1 how much they each needed, as well as obtain a firm comm-

<sup>80</sup> Memo, Cameron to Martin, April 28, 1954, NAC, RG29, Vol. 198, file 311-P11-6, part 2.

<sup>78</sup> Smith, Patenting the Sun, p. 258-60.

<sup>79</sup> Carter, The Gentle Legions, p. 133; Letter, Defries to G. Rugheimer, Manager, CBC National TV News, April 29, 1954, CA, 83-002-06, file 10/29. This 20 minute film has been transferred to video tape and is in the Connaught Archives.

<sup>81</sup> Letter, Salk to Defries, May 4, 1954, CA, 83-015-05, file 2/7.

itment that each province would pay for the vaccine even if the NFIP trial proved the vaccine was useless.<sup>82</sup>

This situation was complicated by a sudden offer from the University of Montreal's Institut de Microbiologie et d'Hygiène to also supply the Salk vaccine in Canada at only a slightly higher price than Connaught. On March 31, Martin had toured the Montreal Institute with its Director, Dr. Armand Frappier. The Institute had received a number of Public Health Research Grants for polio research and were working with small scale tissue cultivation of the poliovirus. The Quebec government was also financing a \$300,000 expansion for large scale polio vaccine production. Frappier suggested he could begin large scale vaccine production immediately, but only if Ottawa advanced him \$391,237. He suggested the Institute could supply enough vaccine for Eastern Canada, and if possible, also for "some less advanced countries in this field."<sup>83</sup> Such estimates of the Institute's capacity were quite dubious and were part of an obvious political move from Frappier and the Quebec government. The Montreal Institute was nowhere near ready to begin production of virus fluids in any amount, and would not be able to produce a usable vaccine for at least another two years.<sup>84</sup> Nevertheless, Martin needed to politically balance "these two national institutions," and each time he mentioned Connaught's efforts he went out of his way to note how the Montreal Institute would be supplying at least some polio vaccine.85

A more unexpected complication emerged on May 15, 1954, when the NFIP suddenly offered Canada 50,000 doses of surplus vaccine and invited Ottawa to participate

Letter, Defries to J. Gregoire, Deputy Minister of Health and Social Welfare, Quebec (and to all provincial Deputy Ministers of Health), May 17, 1954, CA, 83-002-05, file 1/1.

<sup>83</sup> Letters: A. Frappier, Director, Institut de Microbiologie et d'Hygiène, University of Montreal, to Martin, May 21, 1954; Frappier to Cameron, May 21, 1954, NAC, RG29, Vol. 198, file 311-P11-6, part 2. Frappier suggested he could supply at least 500,000 doses at a cost of 78.3¢ per dose.

<sup>84</sup> See, for example, Memo, Layton, to J.B. Bundock, National Health Grants, April 12, 1957, NAC, RG29, Vol. 1203, file 311-P11-26, part 6.

<sup>85</sup> P. Martin, "Future Plans for Canada's Salk Vaccine Program," July 30, 1955, NAC, RG29, Accession 77-78/198, Vol. 32, file R597/100-1/100.

in the ongoing NFIP trial. This surplus was created when delays in the NFIP trial had pushed the start date past the traditional beginning of polio season in many Southern States. Thus, to maintain the planned size of the trial and its statistical significance, a total of forty-six local health districts in Canada, and two small areas in Finland were added.<sup>86</sup> This offer was made directly to Defries, who passed it on to Cameron, who in turn passed it on to the provinces. The lateness of this overture made it impossible for the federal government to act on behalf of the NFIP, but Cameron suggested it might be practical for NFIP people to "cross into Canada and assist any provinces who decide to participate." Most provinces, however, agreed with Cameron. In order to conduct the kind of placebo-controlled trial the NFIP had designed, there was "very little time for any hope of getting a decent job done" before polio season started. Some provinces found it more difficult to reject this offer so quickly as "a nuisance," as Cameron had, especially in light of Defries' larger plans.<sup>87</sup> Alberta immediately accepted the invitation, as did the City of Halifax.<sup>88</sup> For Mani<sup>+</sup>oba, however, the decision was more complicated.

Manitoba's Polio Advisory Committee initially recommended declining the offer. They argued that the limited amount of vaccine being offered would have little protective effect if an epidemic occurred. It would also have minimal statistical effect on the overall trial results, while the late date would require inoculations into at least mid-July, after the closing of schools and in the middle of polio season. Another factor was Minnesota's abstention from the trial because of allegedly insufficient safety precautions. Despite this recommendation, a final decision was deferred in

<sup>86</sup> Smith, Patenting the Sun, p. 254.

<sup>&</sup>lt;sup>87</sup> Telegram, Cameron to all Provincial Deputy Ministers of Health, March 15, 1954; Memos: Cameron to Martin, May 17, 1954, NAC, RG29, Vol. 1201, file 311-P11-26, part 1.

<sup>&</sup>lt;sup>88</sup> Telegrams: R.D. Stuart, Director, Provincial Laboratory, Alberta, to Cameron, May 21, 1954; G.G. Simms, Deputy Minister of Health, Nova Scotia, to Cameron, May 22, 1954, *Ibid.*.

Manitoba, pending the outcome of a Dominion Council of Health meeting, which Manitoba's Deputy Minister of Health, M.R. Elliott, was attending in Ottawa.<sup>89</sup>

During these meetings Defries gave a well received address to the Joint Voluntary Health Committee of the Senate and House of Commons on the subject of polio and his plans for vaccine production.<sup>90</sup> He also revealed the origin of the NFIP vaccine offer. It was made to him while in New York, "purely as an afterthought and as a gesture of friendship to Dr. Defries because of his assistance in preparing the virus cultures." It was also evident that Alberta and Halifax's desire to participate was "purely a question of political expediency... and this in spite of medical advice in both cases." Elliott, thus agreed with the Advisory Committee's initial recommendation to decline the offer.<sup>91</sup>

Despite all this advice, political expediency forced the Manitoba Minister of Health, F.C. Bell, to accept the NFIP offer.<sup>92</sup> Bell too was flying in the face of his advisors, but this was glossed over in the official report of the Manitoba trial. The report suggested that Bell had been advised to accept the offer since, "in view of the severity of the epidemics which had beset the Province in 1952 and 1953, the people of Manitoba would wish to play their part in this great project." In Manitoba a placebocontrolled trial was held, involving 11,081 children in 17 local health units, with one notable exception. The City of Winnipeg pulled out of the trial because of the occurrence of a few polio cases in the city, and the inability to guarantee that most child-

<sup>&</sup>lt;sup>89</sup> Memo, C.R. Donovan, Acting Deputy Minister of Health, Manitoba, to F.C. Bell, Minister of Health and Public Welfare, May 26, 1954, MA, G157, B64, file H-4-9-2a.

<sup>&</sup>lt;sup>90</sup> Letter, Gibbard to Defries, May 31, 1954, RG29, Acc. 83-84/119, Vol. 30, file 355-P-4, pt 4.

<sup>91</sup> Letters: M.R. Elliott, Deputy Minister of Health, Manitoba, to Donovan, May 27, 1954, MA, G157, B64, file H-4-9-2a; Gibbard to Defries, May 31, 1954, NAC, RG29, Accession 83-84/119, Vol. 30, file 355-P-4, part 4.

<sup>92</sup> Letter, Donovan to T.D. Dublin, Medical Consultant, NFIP, June 3, 1954, MA, G157, B64, file H-4-9-2a.

ren involved in the trial received the full three doses. These were both stipulations imposed by the Vaccine Evaluation Center at the University of Michigan.<sup>93</sup>

In Alberta, 37,406 children were involved in 28 areas, including Edmonton and Calgary, while in Halifax, 5,559 children received either the vaccine or a placebo, which was pure medium 199.<sup>94</sup> In Halifax the trial started off well, but an American newspaper story about a child who apparently developed polio after two doses of vaccine, "upset our whole programme, as many parents who had previously consented, then changed their mind."<sup>95</sup> Despite the "headaches" these small Canadian trials caused, the NFIP seemed "very pleased with the way things have gone in Canada."<sup>96</sup>

In Ottawa, Defries estimated Connaught could have enough vaccine ready by January 1, 1955 to fully immunize between 400,000 and 500,000 children with the recommended three doses. This would cost the provinces at least \$750,000. This worked out to 62¢ a dose (1 c.c.), or \$1.87 for the recommended three doses. It was less than the original 75¢ per dose estimate, and considerably less than asked for by American commercial vaccine manufacturers. The cost of the vaccine was covered as a provincial project under the Federal Health Grants in the same manner as gamma globulin had been.<sup>97</sup> Connaught's price was reduced further to 50¢ per dose in early June,<sup>98</sup> by which time over 300,000 American children had received at least one dose of vaccine during the NFIP trial, "with singularly little evidence of reaction." Thus the first serious test of harmlessness had passed and Defries felt justified in "taking a

<sup>93</sup> C.C. Wright, "Poliomyelitis Field Trial in Manitoba," CJPH, 46 (Mar. 1955): 100-03; Letter, Dublin to Donovan, June 10, 1957, *Ibid.*.

<sup>94</sup> Wright, "Poliomyelitis Field Trial in Manitoba."

<sup>95</sup> Letter, A.R. Morton, Commissioner of Health and Welfare, Halifax, to E.H. Lossing, Chief, Epidemiology Division, Department of National Health and Welfare, June 23, 1954, NAC, RG29, Accession 85-86/248, Box 33, file 311-P11-1.

<sup>96</sup> Letters: Elliott to Donovan, May 27, 1954, MA, G157, B64, file H-4-9-2a; R.F. Korns, Deputy Director, Poliomyelitis Vaccine Evaluation Center, University of Michigan, to Lossing, June 30, 1954, NAC, RG29, Vol. 198, file 311-P11-6, part 2.

<sup>&</sup>lt;sup>97</sup> Letter, Elliott to Donovan, May (29), 1954, MA, G157, B64, file H-4-9-2a; Minutes, Meeting of the Dominion Council of Health, May 26-27, 1954, p. 3-4, AO, RG10-05-17, Box 4.

<sup>98</sup> Letter, Defries to All Provincial Deputy Ministers of Health, June 18, 1954, CA, 83-002-05, file 1/1.

chance" on the vaccine's effectiveness in order to get on with producing and testing a substantial supply before the 1955 polio season began.<sup>99</sup>

The DCH voted unanimously to proceed with Defries' plan, "fully recognizing that it is a gamble." As Elliott stressed, if production did not start immediately and the vaccine proved OK, "then we would be in an extremely unfavorable position if there were further delays before we could have it." As he saw it, "we have no alternative."<sup>100</sup> In 1953-54 polio treatment and hospitalization cost the Manitoba government \$345,000, and investing in the vaccine would surely reduce such costs in the future. Saskatchewan agreed since the 1952 and 1953 epidemics cost the province at least \$250,000 each year. The same was true in Ontario where close to \$400,000 was spent in 1954, and in Alberta which had a 1953-54 polio bill of \$900,000 per year that did not decline significantly until 1958-59.<sup>101</sup> As a British Columbia study had estimated, the hospitalization and medical care costs in 1953 averaged at least \$1,110 per case.<sup>102</sup> To Saskatchewan's Deputy Minister of Health, it seemed obvious "that the provision of this service on a free basis would be a sound proposition economically, to say nothing of its social appeal."<sup>103</sup>

In early June the economic side of the equation became easier for the provinces when the federal government offered to cover 50% of the vaccine's cost for each province if they agreed to Defries' proposal.<sup>104</sup> Defries' plan, however, left Gibbard

<sup>&</sup>lt;sup>99</sup> Memo, Cameron to Martin, May 17, 1954, NAC, RG29, Vol. 1201, file 311-P11-26, part 1.

<sup>100</sup> Letter, Elliott to Donovan, May (29), 1954, MA, H-4-9-2a.

<sup>101</sup> Manitoba Department of Health and Public Welfare, Annual Report, 1954 (Winnipeg: 1955), p. 74; Report, Saskatchewan Department of Public Health, "Services for Poliomyelitis in Saskatchewan," May 1954, SA, R11, file 14-87; Listing, "(Ontario) Provincial Government Grants for Poliomyelitis Patients for the Calendar Year 1954," AO, RG10-106, file 249.2; Letter, A. Sommervile, Deputy Minister of Health, Alberta, to Senator F.A. McGrand, June 13, 1960, AA, 73-42, Box 3, file 94.

<sup>&</sup>lt;sup>102</sup> British Columbia Department of Health and Welfare, Annual Report, 1955 (Victoria: 1956), p. N-99.

<sup>&</sup>lt;sup>103</sup> Memo, F.B. Roth, Deputy Minister of Public Health, Saskatchewan, to T.J Bentley, Minister of Public Health, June 17, 1954, SA, R11, file 14-87.

Letter, Cameron to All Provincial Deputy Ministers of Health, June 11, 1954, MA, G157, B64, H-4-9-2a.

at the Laboratory of Hygiene concerned with the problem of testing each lot of vaccine that Connaught produced. He wanted to be kept closely informed and sent his senior virus experts to Connaught as soon as production began. He also needed to make immediate plans for the necessary testing supplies, particularly the monkeys that were required.<sup>105</sup>

By his July 1 deadline Defries had heard favorably from all provinces and moved quickly to full vaccine production. He soon found himself with a larger production and research program than originally anticipated, and had difficulties securing the large staff that was necessary.<sup>106</sup> But by early August full virus fluid production began, followed by the inactivation process in late September.<sup>107</sup> For Defries, such a large scale inactivation program was a major new endeavor for Connaught. As he confessed to one of Salk's associates, he was "full of fears as to the progress which we will make. We have never attempted anything that we did right the first time and it may well be that I will be immediately calling on you for help."<sup>108</sup>

Defries did not have to wait long to find himself asking for help from Salk's laboratory. In November, Salk discovered that some of the vaccine left over from the field trial had lost its potency due to the use of a preservative. Mold and bacterial contamination of the vaccine was a problem. However, unlike the American producers, it was decided that Connaught's vaccine would contain no preservatives and was filled immediately into sealed ampoules, at least until a more stable method of preservation was found.<sup>109</sup> This change forced Defries to scrap all the vaccine made prior

<sup>105</sup> Letter, Gibbard to Defries, May 31, 1954, NAC, RG29, Accession 83-84/119, Vol. 30, file 355-P-4, part 4.

<sup>106</sup> Letter, Defries to Farrell, July 7, 1954, CA, 83-002-06, file 7.'29.

<sup>&</sup>lt;sup>107</sup> Letter, MacLeod to Defries, August 1, 1954, CA, 83-015-05, file 1/7.

<sup>108</sup> Letter, Defries to P.L. Bazeley, Virus Research Laboratory, Municipal Hospital, Pittsburgh, September 24, 1954, CA, 83-015-05, file 2/7.

<sup>109</sup> Minutes, Meeting of Poliomyelitis Virus Committee, November 4, 1954, CA, 83-015-01. See also Benison, Tom Rivers, p. 546-47; Smith, Patenting the Sun, p. 292-97.

to mid-November and had to start fresh batches.<sup>110</sup> New batches had to be expedited, which threatened the entire Canadian vaccine program by pushing its potential start date into March or April. This once again raised fears of inoculating children at the start of polio season.<sup>111</sup> A similar situation developed in the U.S., delaying the announcement of the NFIP trial results and any potential commercial licensing of the vaccine until March or April. Connaught was in a fortunate position and averted a serious crisis by tapping into a stored stock of standard poliovirus fluids that had built up earlier in the year. This supply was otherwise being shipped to a large number of American laboratories under NFIP auspices for use in evaluating the trial, and for general polio research.<sup>112</sup>

Defries was confident of Connaught's ability to meet the needs of the provinces without their turning to American commercial sources of vaccine. His original plan also assumed that, despite Ottawa's direct financial involvement, the vaccine would be distributed by the provincial health departments like most other biologicals, and then to physicians for free distribution. Yet the vaccine would still be classified as an experimental product pending release of the results of the NFIP trial.<sup>113</sup> In October, the DCH decided that some uniformity was needed in who received the vaccine. Priority should be given to the most susceptible five to six year-old age group. Still, neither a formal control system of administering a placebo, nor the measuring of the antibody response were thought necessary.<sup>114</sup>

CMRL. Annual Report, 1954-55 (Toronto: 1955), p. 9; Memo, L. Greenberg, Chief Biologics Control Laboratories, Ottawa, to Layton, November 16, 1954, NAC, RG29, Vol. 62, Accession 83-84/119, Vol. 62, file 358-C-1D, part 1.

<sup>111</sup> Memo, Greenberg to File, "Inspection of Connaught Medical Research Laboratories," November 19, 1954, NAC, RG29, Accession 83-84/119, Vol. 60, file 358-C-1, part 2; Notes of Telephone Conversation between Defries and Nagler, January 11, 1954 (actually 1955), NAC, RG29, Accession 83-84/119, Vol. 62, file 358-C-1D, part 1.

<sup>&</sup>lt;sup>112</sup> Letter, Defries to Kumm, January 25, 1955, CA, 83-015-05, file 4/7.

<sup>&</sup>lt;sup>113</sup> Letters: R.G. Cadham, Deputy MOH, Winnipeg, to Defries, September 9, 1954; Defries to Cadham, September 17, 1954.

<sup>&</sup>lt;sup>114</sup> Minutes, Dominion Council of Health, October 6-8, 1954, p. 4-5, AO, RG10-05-17, Box 4.

The NFIP's plans for the vaccine after the trial generated considerable publicity in November. According to a Gallup poll conducted soon after the trial started. more Americans knew about the polio field trials than knew the name of their country's president.<sup>115</sup> The Foundation planned to give free inoculations to some 9,000. 000 children in schools across America.<sup>116</sup> Such extraordinary plans generated new pressures in Canada over the distribution issue. In Manitoba, serious questions were being raised. The perception developed that since the NFIP had detailed distribution plans, "there should be some Canadian pronouncement on the subject to indicate to the people that we have done at least as much preliminary planning and work as they have across the line." Demands were already building in Manitoba for an official provincial policy announcement, but Elliott hoped Ottawa would move first.<sup>117</sup> This uncomfortable situation also put Ottawa in a difficult position as it grew apparent that it was going to "be impossible to hold up the immunizations until the results of the trial are out." This forced a decision as to whether the vaccine should be given on an experimental basis or not. It was also obvious that once the safety of the vaccine had been proven it was going to be "very difficult to withhold the vaccine."<sup>118</sup>

The Chief of Ottawa's Epidemiology Division, Dr. E.H. Lossing, had been giving considerable thought to these questions. In November, he drafted a standardized plan designed to use the vaccine on a more rigorously controlled experimental and national basis, but without using placebo injections. To ensure that meaningful information emerged in such a trial, Lossing recommended that five and six year-olds would get the vaccine, while seven year-olds would act as unvaccinated controls within the same schools as those who received the vaccine. This plan required the provinces to

<sup>&</sup>lt;sup>115</sup> Carter, *The Gentle Legions*, p. 133. The poll was conducted on May 31, 1954.

<sup>&</sup>lt;sup>116</sup> See for example *Time*, (Nov. 1, 1954), (Apr. 25, 1955).

<sup>&</sup>lt;sup>117</sup> Letter, Elliott to Layton, November 9, 1954, NAC, RG29, Vol. 1201, file 311-P11-26, part 1.

<sup>118</sup> Letter, Lossing to A.F. Chaisson, Director, Communicable Diseases Control, New Brunswick Department of Health and Social Services, November 19, 1954, NAC, RG29, Vol. 198, file 311-P11-6, part 2.

closely follow each child involved and report whether or not they contracted paralytic polio over a period of time. Each province would have to administer such a trial through local public schools, while Ottawa coordinated the project to ensure some uniformity in methods.<sup>119</sup> Lossing's plan would effectively bring the use of the vaccine under strict government control with Ottawa attempting to set national distribution and evaluative standards. From Ottawa's perspective at least, it was clear that the polio vaccine could not be managed "in the normal way."

The provinces, where such responsibilites traditionally belonged, generally agreed with Lossing's plan, but there were worries about the extra work involved in setting up a stricter trial and tracking each child involved. Reflecting Quebec's traditional suspicions of Ottawa, its Deputy Minster of Health, Jean Gregoire, pointed out the differing conditions in each province and the inappropriateness of setting a national policy. Moreover, his government remained tight-lipped about its plans for the vaccine until after April 12, 1955.<sup>120</sup> The Ontario government was also hesitant about an overly controlled trial. Deputy Minister Phair felt the DCH's original policy was sufficient and the vaccine should be generously used.<sup>121</sup> Prince Edward Island suggested a uniform policy would also be difficult, not so much because of politics, but because of the "differing amounts of pressure which will be placed on the different governments." The province was particularly sensitive at the end of 1954 as it had just gone through its worst polio epidemic since 1946. The Deputy Minister of Health could thus relate to the political situation generated by the vaccine out west,

<sup>119</sup> E.H. Lossing, "Draft Outline of Proposed Study for the Evaluation of Poliomyelitis Vaccine," November 22, 1954, attached to Memos: Lossing to Layton, November 23, 1954; Layton to Cameron, November 30, 1954, NAC, RG29, Vol. 1201, file 311-P11-26, part 1. An editorial, likely by Defries, discussed the original Canadian trial plans, which seemed to Lossing to be inadequate and had sparked his interest that was reinforced by the attitude of Elliott in Manitoba; Editorial, "Poliomyelitis Virus Vaccines," CJPH, 45 (Oct. 1954): 440-41.

<sup>Letter, Gregoire to Layton, December 2, 1954, NAC, RG29, Vol. 1201, file 311-P11-26. part
1; R. Duffy, "Duplessis Ready For Salk Vaccine, Yet Skeptical,"</sup> *Globe and Mail*, (Apr. 15, 1955).

<sup>121</sup> Letter, Phair to Layton, December 8, 1954, NAC, RG29, Vol. 1201, file 311-P11-26. part 1.

where "the provincial government would not dare refuse to use the vaccine on limited groups in view of the number of cases of the disease which occurred during the past few months."<sup>122</sup> Another serious concern was the issue of publicity. Many provinces felt information had to be released to the public well in advance of the proposed start of the vaccination program.<sup>123</sup> This was a delicate issue since no one knew much about the vaccine or its value. Provincial governments also needed

to avoid the use of the term "experimental" and, without making claims for the vaccination as a tried and proven immunization measure, nevertheless present it as a procedure thought likely to have merit by competent medical authority, in the present sense of our knowledge.<sup>124</sup>

Beyond Connaught's role in producing the vaccine, a Canadian trial depended upon the Laboratory of Hygiene's capacity to test and approve each batch before it could be used and ultimately licensed commercially. Since 1947, Cameron and Martin had pushed hard to expand the federal laboratory in order to be prepared for just such a polio vaccine. Money had been allocated fairly early, but numerous delays prevented the start of a new building. When actual prospects for a polio vaccine emerged in the midst of Canada's worst polio epidemic in 1953, construction of the new Virus Research Laboratory finally began. This was a \$1,500,000 three-story building that was officially opened by Martin on December 16, 1954.<sup>125</sup> A large part of the new laboratory was devoted to housing the 500 monkeys necessary for safety and potency tests of the Connaught vaccine. The preliminary lots of vaccine arrived

<sup>122</sup> Letter, O.H. Curtis, Deputy Minister of Health, Department of Health and Welfare, P.E.I., to Layton, December 3, 1954, *Ibid.*; Prince Edward Island Department of Health and Welfare, Annual Report, 1955 (to March 31, 1955) (Charlottetown: 1955), p. 16-18, 24, 127-28. The province reported 83 polio cases and 4 deaths in 1954 at a case rate of 82.2 per 100,000.

<sup>123</sup> Letters: Elliott to Layton, December 3, 1954; J.A. Melonson, Chief Medical Officer, New Brunswick Department of Health and Social Services, December 15, 1954, NAC, RG29, Vol. 1201, file 311-P11-26, part 1.

<sup>124</sup> Letter, Chaisson to Lossing, January 28, 1955, Ibid..

<sup>125 &</sup>quot;New 'Lab' Will Help In Fight Against Disease," Ottawa Citizen, (Dec. 16, 1954); Department of National Health and Welfare, Annual Report, 1955 (to March 31, 1955) (Ottawa: 1955), p. 10, 75.

in mid-November, before the building was fully complete.<sup>126</sup> The licensing of the vaccine presented exceptional problems for the new laboratory and the Federal Food and Drug Directorate, although it was assumed that the vaccine could be handled just like all new drugs under the Food and Drugs Act.<sup>127</sup> One of the most significant of these problems was that Defries could not supply the Directorate with detailed information about the specific claims of the vaccine, nor any "data to substantiate these claims," before the NFIP trial results were announced.<sup>128</sup>

During January and February 1955, Defries kept in close contact with provincial deputy health ministers to prepare for the March or April start date of the Canadian trial.<sup>129</sup> During these months increasing publicity raised the question of whether or not commercial vaccine from the U.S. would be available for physicians to give to patients outside the priority group. Under increasing public and parental pressure, local health departments and private physicians asked Defries numerous times if Connaught was going to be marketing any of the vaccine.<sup>130</sup> Connaught was not selling its vaccine to individual doctors, and until it was licensed in the U.S., no commercial vaccine would be available in Canada. If imported directly from the U.S., or sold through Canadian subsidiaries, commercial vaccine required a license from

<sup>126</sup> Letter, W.P. Gerald, Secretary, CMRL, to C.A. Morrell, Director, Food and Drug Division, Department of National Health and Welfare, December 3, 1954, NAC, RG29, Accession 83-84/ 119, Vol. 60, file 358-C-1, part 2.

<sup>127</sup> Letter, Morrell to Gerald, December 9, 1954, Ibid..

<sup>128</sup> Letter, J.R. MacDougal, Chief Medical Officer, Food and Drug Directorate, Department of National Health and Welfare, to Defries, February 24, 1955, CA, 83-002-06, file 1/29.

<sup>129</sup> Letters: Cameron to Defries, December 20, 1954, NAC, RG29, Vol. 1201, file 311-P11-26, part 1; Defries to All Provincial Deputy Ministers of Health, December 30, 1954, CA, 83-002-05; Agenda, "Conference on Poliomyelitis Vaccine," January 19, 1955, CA, 83-015-02, file 2/3; Letter, Defries to Gregoire (and All Provincial Deputy Ministers of Health), February 21, 1955, attached to flyer, "Information Relating to Poliomyelitis Vaccine," February 1955, CA, 83-015-05, file 6/7.

<sup>130</sup> Letters: Cadham to Defries, February 16, 1955; Cadham to Defries, March 2, 1955; Dr. H.G. Miller, Preston, Ontario, to CMRL, March 2, 1955; Dr. W.H. Bennett, Bala, Ontario, to CMRL, March 14, 1955, CA, 83-002-07, file 6/8.

Ottawa before it could be distributed to physicians. Moreover, Defries was confident any commercial vaccine would "probably be a relatively expensive product."<sup>131</sup>

Connaught's initial 1.5 million doses of vaccine were approved for use by the Laboratory of Hygiene on March 2, 1955, and were ready to be shipped to each province. But Defries still needed to know when the provincial governments wanted to receive their initial allotment of vaccine designed to cover the first two doses.<sup>132</sup> Each province was free to begin their vaccination programmes whenever they were ready, although most chose to wait until after the "Francis Report" on the NFIP trial was tabled. Early in March this announcement was scheduled for the week of April 15. When he told the provinces of this, Defries predicted that "The report when issued will receive widespread attention."<sup>133</sup>

The public's growing anticipation generated considerable activity among commercial manufacturers who wanted to sell the vaccine in Canada. Some were reported to be pushing the vaccine through "detail men," especially in Ontario. This situation greatly worried the provincial governments. But as Cameron stressed to his provincial counterparts, Ottawa had no power to stop these companies from marketing their product. It was up to each province to decide if they were going to make the vaccine available as a free biological and if so where they were going to buy it.<sup>134</sup> But the circumstances soon forced Cameron to change his attitude. Under pressure from the provinces, he finally recognized that a favorable report from the NFIP "would create an enormous demand from parents for the vaccination of as many children as possible." Provincial governments would be pressured to procure as much vaccine as possible on top of what they were allotted from Connaught. Under

<sup>131</sup> Letters: Defries to Cadham, March 3, 1955; Defries to Bennett, March 16, 1955, Ibid..

<sup>132</sup> F.P. Nagler, Certification of delivery, March 2, 1954, NAC, RG29, Vol. 1198, file 311-P11-6, part 3; Letter, Defries to Gregoire (and All Provincial Deputy Ministers of Health), March 9, 1954, CA, 83-002-05.

<sup>133</sup> Letter, Defries to Gregoire, March 2, 1955, Ibid..

Letter, Cameron to G.F. Amyot, Deputy Minister of Health, British Columbia, March 17, 1955, NAC, RG29, Vol. 1201, file 311-P11-26, part 1.

these circumstances, would Ottawa extend its financial support to the provinces to buy more vaccine from either Connaught or commercial sources? As the vaccine represented "a new extension" of provincial health services, Cameron advised Martin that it would be "sound policy" for the federal government to continue the current assistance program. It covered 50% of the vaccine's cost, if the provinces paid the other half, at least for the 1955-56 fiscal year.<sup>135</sup> Defries also needed a commitment from the provinces so he could begin vaccine production for 1956. He was confident it could be done at the lowest possible price and under the assumption that the vaccine would be distributed normally on the so called "free list."<sup>136</sup>

The day after Cameron decided on a continued direct financial support for the Salk vaccine, he received advance word that the trial had been a success. This strictly confidential information was passed on to the provinces, although Cameron emphasized \*hat "these remarks are based on rumor and informed supposition."<sup>137</sup> A tew days earlier the NFIP had announced that the "Francis Report" would be delivered from Ann Arbor, Michigan on April 12. The announcement would be broadcast to the medical profession on a closed circuit television network set up by Eli Lilly throughout the U.S. and in Toronto, Montreal, Quebec City and Ottawa. Defries and Cameron planned to hear the report in person in Ann Arbor, while Connaught's senior staff watch the broadcast at the King Edward Hotel in Toronto between 6:00 and 7:00 PM.<sup>138</sup>

<sup>135</sup> Memo, Cameron to Martin, March 23, 1955, RG29, Vol. 1104, file 502-12.6.

<sup>136</sup> Letter, Defries to Gregoire (and all Provincial Deputy Ministers of Health), March 14, 1955, CA, 83-002-05.

Letter, Cameron to All Provincial Deputy Ministers of Health, March 24, 1955, NAC, RG29, Vol. 1201, file 311-P11-26, part 1.

<sup>138</sup> NFIP, Invitation, "Progress Report to Physicians on Immunization Against Poliomyelitis," CA, 83-020; K.W. MacTaggart, "Doctors Wait - and World Hopes - For TV Story of Polio Verdict," Globe and Mail, (Apr. 12, 1955).

## 8.3) Triumph, Tragedy and Canadian Lessons

On April 12, 1955, the tenth anniversary of Franklin Roosevelt's death. according to Carneron, despite the "great fan-fare" of the "big show at Ann Arbor," Thomas Francis, "in a restrained and decent way,"<sup>139</sup> announced to the world that the Salk vaccine was 60 to 80% effective against polio; 60% against Type I and 80% against Types II and III.<sup>140</sup> The NFIP trial involved final study populations of 1.829.916 children in 44 American states, and 43,567 in limited areas of Canada and Finland. In the U.S. the trial was divided into two major groups, placebo areas (749,236 children) and observed areas (1,080,680). A group of 422,743 children received three doses of the vaccine (96.3% of those who had received the first dose), while 201,229 received the medium 199 placebo and 221, 998 were observed. In the Canadian trials, 12,456 received three doses of the vaccine and 12,320 were given the placebo, while a group of 14,976 was not inoculated. In the Helsinki area of Finland, 9,482 children received the full three doses of the vaccine and 9,309 had the placebo. Some children in the original groups only received one or two doses for a variety of personal or medical reasons.<sup>141</sup>

Francis and Salk tried to stress that the vaccine was good, but it was not perfect. However, high expectations and the unprecedented media coverage of the announcement generated the popular perception that the vaccine was completely successful and that the war against polio was finally over. This attitude was particularly

<sup>139</sup> Letter, Cameron to Ferguson, June 1, 1964, CA, Uncatalogued Binder, "National Technical Advisory Committee on Live Poliovirus Vaccines."

 <sup>&</sup>lt;sup>140</sup> "Vaccine 'Triumph' Ends Polio Threat," Toronto Telegram, (Apr. 12, 1955); "Polio Vaccine Is 90 P.C. Effective," Toronto Star, (Apr. 12, 1955); "Salk Polio Vaccine Success," Globe and Mail, (Apr. 13, 1955).

<sup>141</sup> T. Francis (et al.), Evaluation of the 1954 Field Trial of Poliomyelitis Vaccine: Final Report, (Ann Arbor: NFIP, 1957), p. 37, 327-31. See also: Editorials: "The 1954 Trial of Poliomyelitis Vaccine (Salk)," CJPH, 46 (Apr. 1954): 161-63; "Poliomyelitis Vaccine in 1955," CMAJ, 72 (May 1, 1955): 702-03; Clausen, Seidenfeld and Deasy, "Parent Attitudes Toward Participation of Their Children in Polio Vaccine Trials."

strong in the American press and it worried Defries.<sup>142</sup> Cameron, who, with Defries, sat well toward the back of the room in Ann Arbor, was more worried that "throughout the performance there was no recognition of what the Connaught had done." He later remembered "being furious but Bob [Defries], of course, was philosophical." Cameron's feelings were not unique to Canadians, normally used to American ambivalence towards their northern neighbour. "Many Americans who knew the story felt as I did..."<sup>143</sup> A more immediate concern for Defries and Canadian health authorities about to start the Canadian vaccine trial, was 'alk's new recommendations for scheduling the third dose. Originally, all three doses were given over a three month period. On April 12 he announced that the third dose should not be given prior to seven months after the second, complicating full immunization plans in Canada and the U.S. In Canada this change allowed close to 900,000 children to receive at least two doses by the end of June 1955.<sup>144</sup>

Much has been written about the American introduction of the Salk vaccine after April 12. The situation grew from a distribution mess to a tragedy and political crisis.<sup>145</sup> The late date of the Francis Report placed enormous pressure on the NFIP to begin its massive vaccination program. It also forced the immediate licensing of the vaccine by the U.S. Secretary of Heath Education and Welfare, Olvetta Culp Hobby. The NFIP had originally bought enough commercial vaccine to freely vaccinate 9,000,000 first and second graders. The later third dose schedule reduced this amount by a third, which was then added to the general commercial supply that was to be

<sup>142</sup> Defries was Editor of the CJPH, and wrote the Editorial, Ibid.. See also "IT Works," Time, (Apr. 25, 1955), which gives a good summary and perspective of the event, and "P.s. Salk, Francis, Gregg Report on a Victory Over Polio, April 12, 1955" in Edward R. Murrow and Fred W. Friendly (eds.), See It Now (New York City: Simon and Shuster, 1955), p. 150-61.

<sup>143</sup> Letter, Cameron to Ferguson, June 1, 1964, CA, Uncatalogued Binder, "National Technical Advisory Committee on Live Poliovirus Vaccines."

<sup>H. Hickey, "Hope 1,000,000 Children To Get Serum in Canada," Globe and Mail, (Apr. 13, 1954); CMRL, Annual Report, 1954-55, p. 9.</sup> 

<sup>&</sup>lt;sup>145</sup> Smith, *Patenting the Sun*, p. 313-58, is the most recent and one of the best accounts. See the notes in this chapter's introduction for others.

346

sold. However, the American vaccine supply was to be distributed on a voluntary priority basis drawn up only after April 12, and not seriously organized with Washington's input until late April. Those not in the NFIP program were expected to pay \$2.00 a dose for the vaccine, plus physician's fees.<sup>146</sup> In the meantime, public, medical and political confusion escalated. Washington was "reluctant to get involved in a rigid system of controls" and relied on manufacturers to prevent a black market by allocating the vaccine directly to doctors.<sup>147</sup> Such an effort failed. Parental pressure on doctors was heavy and many sought out whatever sources they could find.<sup>148</sup>

The situation in Canada was considerably more orderly. Beyond a similar fascination with Salk himself prevalent in the American media, the Canadian press coverage focused on the major role played by Connaught in this unfolding medical drama.<sup>149</sup> Media reports further stressed the strong role of Canadian governments in planning and paying for the use of the vaccine. For example, an April 13 editorial in the *Globe and Mail* felt Canadians could "take great satisfaction from the fact that they are not dependent upon another country for their vaccine supply." It also predicted that "Governments, it would seem, will be playing the major part in the fight against poliomyelitis from now on; since they alone can assure universal protection." Connaught provided Canadian governments with such a means of protection and the Canadian public should now realize, "if it did not before, the truly vital contribution this institution makes to the national life."<sup>150</sup> A few writers in the American press also singled out Connaught's scientific contributions to the vaccine. In

 <sup>146 &</sup>quot;Who Will Get the Vaccine," Time, (Apr. 25, 1955); U.S. Department of Health Education and Welfare, Press Releases, April 22, 1955, April 23, 1955, CA, 83-015-02, file 2/3.

<sup>&</sup>lt;sup>147</sup> "Who Will Get the Vaccine," *Time*, (Apr. 25, 1955).

 <sup>&</sup>quot;Where Is the Vaccine?" Time, (May 2, 1955); "U.S. Fears Stampede For Short Supply of Polio Vaccine," and Mark Harrison, "Polio Vaccine Clamor By Parents May Bring Bootlegging - U.S. Dor.or," Toronto Star, (Apr. 12, 1955).

<sup>149 &</sup>quot;Canadian Research Team Vital in Polio Triumph," Globe and Mail, (Apr. 13, 1955); "Connaught Lab Played Key Role In Polio Vaccine," Toronto Telegram, (Apr. 12, 1955); "Salk Polio Vaccine Greatest Medical Find in 25 Years," Toronto Star, (Apr. 12, 1955).

<sup>150</sup> Editorials: "Magnificent Achievement," "In the Hands of Government," Globe and Mail, (Apr. 13, 1955).

particular, one syndicated columnist focused on the importance of Morgan's Medium 199, after interviewing him in Ottawa.<sup>151</sup>

Despite this widespread celebration, which for polio survivors was somewhat bitter-sweet,<sup>152</sup> the intense publicity over the vaccine threatened to create a black market in Canada. After April 12, the provinces came under increasing pressure for more vaccine from commercial sources, if such sources were in fact available in Canada. In Manitoba, the CCF's Lloyd Stinson was particularly vocal about the perception that the "big drug companies" were in control of the vaccine. He argued it was up to government to step in and carry through "a broad program of immunization against polio as a public health measure."<sup>153</sup> The Saskatchewan government was more concerned about the costs of a broad vaccination program as it was "dubious" of continuing federal participation. Nevertheless, experience with polio had demonstrated "Once again... that prevention is cheaper than cure."<sup>154</sup>

In the House of Commons in Ottawa, Martin faced similar questions. Should the federal government take control of the vaccine's distribution in light of the commercial vaccine that would be entering the country? Martin stressed that Canada had in place the best controls for this vaccine. He had anticipated worries over a black market, which he was confident the provinces could handle. Martin was also asked if any child would be compelled to take the vaccine if their parents did not believe in its use. No one "would be forced to do anything which a Liberal government would not agree to," he replied. The "crux" of the issue in Parliament was whether Connaught's vaccine would be free to the people of Canada. After outlining the 50-50 arran-

<sup>&</sup>lt;sup>151</sup> G. Waring, "Canada's Role in Polio Research," Philadelphia Evening Bulletin, (Apr 23, 1955).

<sup>&</sup>lt;sup>152</sup> "By Frank Tumpane: Joy and Sadness," *Globe and Mail*, (Apr. 13, 1955). This columnist had reported on many polio epidemics and stressed that this profound sense of relief was tempered by "a feeling of sadness and regret that for many the discovery comes too late" since "all of us know someone at whom the disease has struck."

<sup>153</sup> Letter, L. Stinson, CCF Leader, Manitoba, to R.W. Bend, Minister of Health and Public Welfare, Manitoba, April 25, 1955, MA, G157, B64, file H-4-9-2a.

<sup>&</sup>lt;sup>154</sup> Memo, Roth to Bentley, April 21, 1955, SA, R11, file 14-87.
gement Ottawa had with the provinces to buy the vaccine, Martin stressed that the answer was "basically 'yes"."<sup>155</sup>

Although Connaught's vaccine may have been free, lailor groups, such as the Ontario Federation of Labor argued that no commercial vaccine should be allowed into the country at all. It should be restricted at least until the needs of the most vulnerable children had been met, and then only through public health departments. The OFL pointed to the American situation, where press reports put the vaccine's cost at up to \$4.00 per dose. In Canada, "As long as polio remains a threat to public health, its prevention must not carry a price tag, nor should individuals be given special access to the vaccine simply because they can afford to pay for it."<sup>156</sup> Actually, Parke Davis and Eli Lidy had only been able to ship "a very small amount" of vaccine into Canada after the American licensing, and until July 1, this amount would remain "negligible."<sup>157</sup>

For Defries, the success of the Salk vaccine was particularly memorable and a "vindication" of the NFIP's, and his own confidence in Salk's work.<sup>158</sup> However, he could not relax to enjoy this victory for very long. To handle the increasing demand for the vaccine, he needed to plan for a new "Polio Building" at the Dufferin Division.<sup>159</sup> More immediately, he faced serious and almost catastrophic threats to the entire /accine program. In March 1955, an embargo of monkeys from India had been imposed after over 400 died on their way to the U.S for vaccine production. Under pressure from a religious sect to whom the monkey was sacred, the Indian govern-

<sup>155</sup> Canada, House of Commons Debates, April 20, 1955, p. 2994-96.

<sup>&</sup>lt;sup>156</sup> "Keep Price Tag Off Polio Shots Labor Demands," Toronto Star, (Apr. 14, 1955).

<sup>&</sup>lt;sup>157</sup> Minutes, Meeting, Dominion Council of Health, April 25-27, 1955, AO, RG10-05-17, Box 4.

<sup>158</sup> Letter, Defries to R.H. Barrows, Executive Director, NFIP, April 13, 1955, CA, 83-015-05, file 4/7.

<sup>159</sup> Memo, Defries to MacLeod, Farrell, Taylor and Franklin, and Macmorine, Graham and. Shimada, "Meeting re Jolio Building at Dufferin Division," April 14, 1955, CA, 83-002-06, file 1/29; Letter, R.S. Morris, Marani & Morris Architects, Toronto, to Col. A.D. LePan, Superintendent, University of Toronto, May 16, 1955, UTA, A68-0007, Box 121, file 10.

ment refused to airlift any more monkeys "for the slaughter."<sup>160</sup> Maintaining a consistent supply of monkeys had become an increasing problem as production and testing of the vaccine expanded rapidly during 1954 and 1955. Although high level meetings between Martin and the Indian High Commissioner negotiated a Canadian arrangement,<sup>161</sup> the monkey shortage and uncertainty about a future supply forced production to shut down for several months at Connaught and in the U.S. Testing of the vaccine in Ottawa was also slowed until June.<sup>162</sup>

A much more serious and dramatic threat to the entire future of the Salk vaccine itself emerged on April 25, 1955. Six cases of polio were reported in Chicago and in parts of California in children who had been vaccinated eleven days earlier with vaccine made by Cutter Laboratories of Berkeley, California. This was the beginning of the "Cutter Crisis" which shattered the hopes of parents, raised high by the intense publicity since April 12. The very vaccine that was supposed to prevent paralytic polio was causing the disease. More tragic reports came in from Idaho, California and other Western states, including some secondary cases among parents of children who received the Cutter vaccine. On April 27 all the Cutter vaccine was ordered withdrawn from the market by the U.S. Surgeon General, Dr. Leonard Scheele.<sup>163</sup>

The next day HEW Secretary Hobby called together a group of polio experts to discuss the situation, although there was an obvious effort to downplay publicly the mounting crisis.<sup>164</sup> Scheele was unsure what to do, and felt a reluctant need to clear

<sup>160</sup> A. Burke, "India Forbids Export of Monkeys After 400 Die at Airport," Toronto Star, (Apr. (5?), 1955).

<sup>161</sup> Memo, C.W.J. Armstrong, CMRL, to Defries, April 11, 1955, CA, 83-002-06, file 1/29; Letter, Defries to Barrows, NFIP, April 13, 1955, CA, 83-015-05. file 4/7; "Canada to Get Monkeys For Vaccine - India Envoy," Toronto Star, (Apr. 14, 1955).

<sup>162</sup> CMRL, Annual Report, 1954-55, p. 11. See also, A.M. Fisher, CMRL, "Memorandum re Monkeys for Poliomyelitis," May 18, 1955, CA, 83-015-05, file 1/7; "Monkey Supply Gord, Laboratories Push Production of Vaccine," Globe and Mail, (May 19, 1955); "Malton Receives 1,000 India Rhesus Monkeys," Toronto Star, (May 30, 1955); Memo, Fisher, "Report on Supply of Monkeys," June 9, 1955, CA, 83-015-02, file 3/3.

<sup>&</sup>lt;sup>163</sup> See for example, Smith, Patenting the Sun, p. 359-64.

<sup>&</sup>lt;sup>164</sup> Press Releases: U.S. Department of Health Education and Welfare, April 28, 1955; April 29, 1955, CA, 83-015-05, file 6/7; Etheridge, Sentine: for Health, p. 76.

any plan with O'Connor and the NFIP. After hesitating briefly, but faced with a room full of reporters, Scheele took the advice of one of his public affairs officers and authorized the immediate establishment of a national polio surveillance program. Such a program of "epidemic intelligence" had been planned during the previous month by the Communicable Diseases Center (CDC) in Atlanta, but only hours earlier had been rejected by Scheele. The CDC's efforts during the crisis played a major role in establishing its reputation for the study and control of epidemics.<sup>165</sup>

In the meantime, state and local health officials across America began "A grim, 24-hour-a-day hunt for 'every vial' of Salk vaccine" shipped to their area from Cutter Laboratories.<sup>166</sup> During the next week the American government showed it-self "at its confused worst," as all the problems surrounding the distribution of the vaccine became the focus of sharp media and political attention.<sup>167</sup> There were efforts in Congress for federal control of the vaccine and news conferences by Hobby and President Dwight Eisenhower that were described as "miracles of confusion." Or. May 7, the mounting tragedy finally forced Scheele to postpone all vaccination programs across the country. The next day he went further and placed a national ban on all polio vaccine from all manufacturers, pending a federal investigation. This order included an embargo on all vaccine exports. By this time there were 44 reported cases of polio directly linked to the Cutter vaccine.<sup>168</sup>

In Canada there were no reports of vaccine-associated polio cases, and little sense of alarm. Martin was quick to emphasize these points in a public statement he

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<sup>165</sup> Etheridge, Sentinel for Health, p. 73-6; Smith, Patenting the Sun, p. 369; Benison, Tom Rivers, p. 554-55.

<sup>166</sup> See for example, (Associated Press), "U.S. Halts 1 Firm's Vaccine; Hunt Every Vial Sold Here," New York Daily News, (Apr. 28, 1955); E. O'Neill and T. Wilson, "City Hunts Every Vial of Vaccine Sold Here," New York Daily News, (Apr. 28, 1955).

<sup>167 &</sup>quot;Halt!" Time, (May 16, 1955).

 <sup>168</sup> Ibid.; Press Release, U.S. Department of Health, Education, and Welfare, May 8, 1955, CA, 83-015-05, file 1/7; H.R. Rusk, (New York Times Service), "U.S. Vaccine Delay Brings Confusion but Not Alarm," Globe and Mail, (May 10, 1955).

released on April 28.<sup>169</sup> The Canadian press seemed more interested in detailing faults in how the Americans were handling the crisis than in expressing serious concerns about the Canadian supply. A *Globe and Mail* editorial highlighted that American abuses with the Salk vaccine were "a result of letting 'free enterprise' run riot."<sup>170</sup> The Canadian supply seemed secure and little evidence that a black market existed, although there were unsubstantiated rumours in British Columbia that some Cutter vaccine somehow entered Canada.<sup>171</sup> Defries received reports of some children becoming ill around the time they were vaccinated, which was not unusual with any vaccine given to children. There was no evident link to the polio vaccine. Defries recognized an unrealistic public perception that the vaccine was essentially perfect in preventing polio. He stressed this point when asked by the Ontario Department of Health to prepare a statement for the press, published on May 3. There was "great promise" in the Salk vaccine, and while not perfect, "there is every reason to expect, as does Dr. Salk, that it will be improved."<sup>172</sup>

Scheele's May 7 suspension of the entire American vaccine program led Martin to send Defries to Washington to see what was going wrong and advise on what to do about it in Canada. Defries was given detailed information about the cases associated with Cutter Laboratories, as well as other suspicious ones, particularly from Eli Lilly vaccine.<sup>173</sup> Meanwhile, Martin and Cameron consulted with the provinces and found no problems to report.<sup>174</sup>

P. Martin, Statement, April 28, 1955, "Appendix 1" in D.B.D. Layton, "Polio Vaccine," July 29, 1955, NAC, RG29, Vol 1203, file 311-P11-26, part 6; Memo, Cameron to Martin, April 29, 1955, NAC, MG32, B12, Vol. 32, file "Salk Vaccine - General."

<sup>&</sup>lt;sup>170</sup> Editorial, "Chaos in U.S. Salk Treatments," *Globe and Mail*, (May 3, 1955).

Telegram, P.A. Faguy, Food and Drug Directorate, Ottawa, to W.H. Hill, Regional Director, Vancouver, May 9, 1955; Memo, Hill to Faguy, May 11, 1955, NAC, RG29, Accession 83-84/ 119, Vol. 65, file 358-C-2, part 1.

Letter and Memo, Defries to Gregoire (and All Provincial Deputy Ministers of Health), May 3, 1955, CA, 83-002-05; Editorial, "Administration of Poliomyelitis Vaccine (Salk), CJPH, 46 (May 1955): 212-14.

 <sup>173</sup> R. Crighton, "How Canada Handled The Salk Vaccine," *The Reporter*, (July 14, 1955), reprinted in *Nova Scotia Medical Bulletin*, 34 (Nov. 1955): 424-25; R.D. Defries, "Notes Made in Conference Washington With Dr. Workman on Polio News of Cases in Vaccinated," (May 8,

Martin had a difficult decision to make and agonized over it while he and his wife were visiting friends. After hearing from the provinces and other experts, he went for a long walk, alone, on the afternoon of May 7 to make up his mind.<sup>175</sup> That evening he announced the problem-free situation in each province.<sup>176</sup> After hearing from Defries on the next day, Martin announced in a national radio and TV broadcast that the Canadian program would continue.<sup>177</sup> He never took this issue to the Cabinet since he thought this was not a matter for them to decide. Nevertheless, he immediately received a call from an alarmed Prime Minister St. Laurent who wondered why he was continuing with the vaccinations. If he had gone to Cabinet, Martin knew other Ministers would likely have echoed the Prime Minister's fears and voted to cancel the program.<sup>178</sup> Martin had implicit confidence in Connaught and Defries' advice and saw no reason it should be questioned. Indeed there was no one in the provinces, or in his Department, advising him to stop the program.

For Martin this decision was one of his biggest political gambles. Even if he and his close advisors had full confidence in the Connaught vaccine, others, such as St. Laurent, did not necessarily know enough to fully understand Martin's position. On May 9, this confidence was shaken when Martin found out that a child in Toronto, who had recently been vaccinated, had developed bulbar polio. Martin's executive

<sup>1955),</sup> CA, 83-015-02, file 4/4; (New York Times Service), "U.S. to Extend Ban On Salk Polio Shots," *Globe and Mail*, (May 9, 1955).

 <sup>174</sup> Letter, Martin to Bend, (and other Provincial Ministers of Health), May 16, 1955, MA, G157, B64, file H-4-9-2a; K.W. MacTaggart, "Canadian Supply Checked Closely," *Globe and Mail*, (May 9, 1955).

<sup>175</sup> Interview with Mrs. Nell Martin, September 21, 1993, conducted for CBC-TV Prime Time News Documentary, "Conquering the Crippler," broadcast December 7, 1993.

<sup>176 &</sup>quot;Salk Shots For Schools Made In Toronto, Checked Twice Found Safe - Martin," Toronto Star, (May 7, 1955); Martin, Statement, May 7, 1955, "Appendiz: 2" in Layton, "Polio Vaccine," July 29, 1955, p. 16, NAC, RG29, Vol. 1203, file 311-P11-26, part 6.

<sup>177</sup> Layton, "Polio Vaccine," July 29, 1955, *Ibid.*; Crighton, "How Canada Handled the Salk Vaccine," p. 424.

<sup>&</sup>lt;sup>178</sup> Interviews with Paul Martin, by Norah Storey, 1969-70, Tape 10, Side 1, Transcript in NAC, MG32, B12, Vol. 352; and with Bill Young for Martin's A Very Public Life autobiography, Session 9, Tape 3, Side 1, (March 1983), transcript courtesy of Bill Young. See also Paul Martin, A Very Public Life, II: So Many Worlds, (Toronto: Deneau, 1985), p. 73-75.

assistant, George Carty, had read about this in the *Toronto Star*, and he immediately wondered if this was the start of a Canadian panic. Fortunately, it was quickly learned the boy had already contracted the disease four days before getting the vaccine.<sup>179</sup> Subsequently, the Canadian Salk vaccine record remained unblemished.

During the week leading up to Martin's decision, the differences between the vaccine experiences on both sides of the border became clearer. Martin knew every batch of Connaught's vaccine was double checked, both by Connaught, and by the Laboratory of Hygiene, which in the process had discovered a number of bad batches.<sup>180</sup> In the U.S., each manufacturer was responsible for checking every batch, but Washington only checked batches randomly, and relied on company protocols. This commercial production system was sharply different from the triple testing arrangement used during the NFIF trial. In anticipation of high public demand after licensing, this relaxation of American testing procedures was designed to expedite vaccine production. Also the federal laboratory did not have the capacity, or time, to fully test each batch from all five vaccine producers.<sup>181</sup> By mid-May it was discovered there were at least four suspect lots of Cutter vaccine that had not been specifically tested by Washington. It was suspected the mixing procedure during inactivation was not thorough enough and left this delicate process incomplete. Scheele ordered the National Institutes of Health and a team of polio experts to thoroughly investigate each manufacturer's records. However, as Laboratory of Hygiene officials from Ottawa learned while in Washington, this was "more or less a formality which they felt obliged to do."182

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<sup>179</sup> Crichton, "How Canada Handled the Salk Vaccine," p. 424-25.

<sup>180</sup> See, for example: Memo, Nagler to Greenberg, March 10, 1955; Letter, Greenberg to D.R.E. MacLeod, CMRL, March 11, 1955; Memo, Nagler to Greenberg, March 29, 1955; Letter, MacLeod to E.T. Bryce, Chief, Bacteriological Laboratory Services, Laboratory of Hygiene, April 7, 1955, NAC, RG29, Accession 83-83/119, Vol. 62, file 358-C-1A, part 1.

<sup>&</sup>lt;sup>181</sup> "Vaccine Evidence," *Time*, (May 25, 1955).

<sup>182</sup> Letter, Layton to Cameron, May 12, 1955, NAC, RG29, Vol. 203, file 311-P11-28, part 1.

By the end of May, and after a total of 114 vaccine-associated cases of polio, 79 of which were traced to Cutter's vaccine, a Technical Committee appointed by Scheele drew up new stricter regulations for the testing of the vaccine. Additional safety tests by the manufacturers and the government were required, as was the use of a less virulent Type I strain than had been implicated in the bad vaccine batches.<sup>183</sup> By November, an extra filtration procedure was imposed to prevent clumping of the virus, which seemed to shield some virus particles from the formalin. These new production and testing standards were also adopted by Connaught and the Laboratory of Hygiene.<sup>184</sup> By July all the American manufacturers' vaccine but Cutters was cleared, but it was too late to give more than one dose to 6.5 million American children in 1955. In August, in the wake of the crisis, the U.S. Congress voted \$30,000,000 to buy and distribute the Salk vaccine to children who had not already received it, either through public agencies, or local health departments, and through normal drug channels to private physicians.<sup>185</sup>

The Cutter Crisis also prompted more provincial enthusiasm for Lossing's earlier national vaccine evaluation plan. The controversy surrounding the vaccine prompted a unique meeting of all the federal and provincial epidemiologists and communicable disease contro<sup>1</sup> directors. In addressing the meeting, Martin stressed the need for national uniformicy in the reporting and control of communicable diseases. During the conference Lossing's original evaluation plan was formalized and implemented nationally.<sup>186</sup> The incidence of polio in Canada was unusually low in

<sup>183</sup> L.H. Scheele, "Public Health Implications in a Program of Vaccinations Against Poliomyelitis" JAMA, 158 (Aug. 6, 1955): 1249-58; Minutes, Polio Committee Meeting, May 30, 1955, CA, 83-015-01.

<sup>184</sup> Smith, Patenting the Sun, p. 366.

<sup>185</sup> H.E. Van Riper, "Progress in the Control of Paralytic Poliomyelitis through Vaccination," CJPH, 46 (Nov. 1955): 433, address read at Annual Meeting of Canadian Public Health Association, Edmonton, September 6-8, 1955; "Canadian Polio Work Said Second to None," Globe and Mail, (Sept. 8, 1955).

<sup>186</sup> Minutes, Proceedings of Conference, May 18-20, 1955, attached to Minutes, Meeting of Dominion Council of Health, October 4-5, 1955, Appendix C, AO, RG10-05-17, Box 4.

1955, with only 551 paralytic cases and 36 deaths reported nationally (2.3 per 100,000 paralytic case rate).<sup>187</sup> Lossing concluded "a protective effect from the vaccine might be inferred in areas where the 1955 incidence was low, as was demonstrated where the 1955 incidence more nearly approached the 5 year average." More statistically significant, a case rate of 0.54 per 100,000 was reported among those vaccinated in all provinces (599,798 children between 5 and 10 years of age), while a rate of 5.76 was observed in the non-vaccinated control group (885,070). These results were reported to the House of Commons in early February 1956,<sup>188</sup> and were given to the CDC in Atlanta, and to the NFIP. Lossing's "extraordinarily interesting report" was of 'tremendous interest" in Atlanta as they had no comparable national figures for 1955. The NFIP also celebrated these valuable results in their newsletter with the headline "Canada Reports Shots Safe, 85% Effective."<sup>189</sup>

Soon after Martin's announcement that Canada would be proceeding, indeed intensifying, its vaccine program, while the Americans cancelled theirs, American politicians and the media focused their attention on Canada to an extraordinary degree. As a *Toronto Star* editorial noted, the vaccine, "a product of the United States, has become an advertisement for Canada." There had been nothing Canada had done in recent years which had "evoked such widespread American praise as our government's handling of the polio vaccine."<sup>190</sup> Martin did not anticipate such a situation,

<sup>187</sup> The total national case rate for all forms of polio in 1955 was 6.5 per 100,000. Those provinces with the highest incidence in 1955 were British Columbia (16.7 cases per 100,000), Alberta (19.7), and Nova Scotia (16.8); see Table 1.

E.H. Lossing, "Evaluation of Canadian Poliomyelitis Vaccination Program, 1955," CJPH, 47 (Mar. 1956): 104-10; Letter, Cameron to Defries, February 7, 1956, CA, 83-015-05, file 1/7; J.A. Taylor, G.R.F. Elliott and A.J. Nelson, "Poliomyelitis Vaccination Program in British Columbia," CJPH, 47 (Feb. 1956): 49-54; World Health Organization, "Experience of Poliomyelitis Vaccination in Eight Countries," CMAJ, 74 (Jan. 1, 1956): 80-1.

<sup>189</sup> Letter, A.D. Langmuir, Communicable Disease Centre, U.S. Public Health Service, Atlanta, to Layton, February 15, 1956, NAC, RG29, Vol. 1205, file 311-P11-30, part 2; "Canada Reports Shots Safe, 85% Effective," National Foundation News, 15 (Mar. 1956).

<sup>190</sup> Editorial, "The U.S. Vaccine Mess," Toronto Star, (May 25, 1955).

but drew strong political and personal satisfaction from it.<sup>191</sup> He and the Canadian press, however, stressed the need for sympathy over self-satisfaction. Of particular interest to the Americans was the early planning for the vaccine's procurement by the federal and provincial governments, a full and consistent double checking testing system, and the control Canadian governments exercised in the vaccine's "strict and orderly" national distribution. Also stressed was the fact that Canadian vaccine cost only \$1.50 for the 3 doses, which was fully paid for by the federal and provincial governments.<sup>192</sup>

The American debate sparked by the Canadian vaccine experience began when a Democratic Senator, R.L. Neuberger of Oregon, who was a frequent visitor to Canada, charged that the Eisenhower Administration "could learn a lot from our neighbours in Canada" about how to run a polio vaccine program. He told the Senate on May 19 that the Canadian program "command[ed] the confidence of Canadian parents" and stood "in sharp contrast to chaotic confusion which has developed in the United States."<sup>193</sup> Beyond the technical differences between the two countries, much of the American criticism stressed the differences in underlying political philosophies between Canada and the U.S. with respect to the government's role in health care. Many of the technical and organization problems were the inevitable result of different conditions in the U.S.. Canada had a single non-profit vaccine source and a much smaller population, which made testing and control easier than in the competitive American commercial environment. However, most inexcusable for many crit-

<sup>191</sup> Letter, P. Correy, Labour Attache, Canadian Embassy, Washington, to Martin, June 1, 1955: Summary of Pess Articles, "How Canada Handled the Salk Vaccine," (Aug. 1955 ?), NAC, MG32, B12, Vol. 32, file "Salk Vaccine."

<sup>192</sup> See, for example: "How 'Shots' Are Going in Canada: In 6 Weeks, Vaccination Cause No Paralysis," U.S. News and World Report, (June 3, 1955): 32; (Associated Press), "Canada Wins Gamble on Salk Vaccine," Los Angeles Times, (Aug. 15, 1955); R. Dwyer and S. Mirkin, "Salk a Big Success in Canada, Denmark," Denver Daily News, (Nov. 17, 1955).

<sup>193 (</sup>Associated Press), "The Canadian Vaccine Story: No Snarls, No Doubts, No Delays As Government Runs the Program," New York Post, (May 20, 1955); "Our Salk Plan Lesson to U.S. Says Senator," Toronto Telegram, (May 20, 1955). These comments were noticed in the House of Commons; see Canada, House of Commons Debates, May 24, 1955, p. 4049.

ics of the American program was the almost total lack of interest, support, planning and responsibility assumed on the part of Washington during the entire polio vaccine story.

One prominent American critic, whose article, "Polio Vaccine and Public Policy," was circulated in Ottawa, was columnist Walter Lippmann. Lippmann sharply criticized the "dramatic buildup, the theatrical suspense and the spectacular publicity" surrounding the announcement of the NFIP trial results. This seemed "more like announcing the results of an election than the results of a scientific inquiry."<sup>194</sup> Under such circumstances, Lippmann and others wondered why the American government did not initially recognize the need for some control, as the Canadian government had. Public health was clearly a high priority item for the provincial and federal governments in Canada. Martin's Health and Welfare Ministry had the second highest portion of the federal budget, while in the U.S., Hobby's HEW department ranked sixth.<sup>195</sup> With respect to the vaccine, Hobby believed that her responsibilities ended with its licensing.<sup>196</sup> The differences across the border were thus explained by divergent attitudes to the government's role in the nation's health. The United States was reliant on the democratic principles of free enterprise and voluntary cooperation in health care, which, according to Lippmann, under normal conditions, were "beneficent and widely applicable."<sup>197</sup>

But Washington should have recognized, as Ottawa had, "not all public principles in this work-a-day world can be applicable at all times and under all circumstances." There were some borderline cases where either voluntary or state control were applicable, but the Salk vaccine case "was not a borderline question." The vaccine

W. Lippmann, "Today and Tomorrow: Polio Vaccine and Public Policy," Washington Post and Times Herald, (May 10, 1955); M. Gayn, "Polio: Canada's Way, Government Held the Reins," The Nation, (June 4, 1955); 478.

<sup>195</sup> E. Ubell, "How Canadians Solved 1'olio Vaccine Problem," New York Herald Tribune, (June 19, 1955).

<sup>196</sup> Smith, Patenting the Sun, p. 355.

<sup>197</sup> Lippmann, "Polio Vaccine and Public Policy."

was bound to be in short supply and "its proper use touched the vital interests of the families of the Nation."<sup>198</sup> The essential failure of the American program was thus due less to bungling "than to a political philosophy that would protect private enterprise even to the detriment of public welfare."<sup>199</sup> One of the most detailed American comparative critiques, entitled "How Canada Handled the Salk Vaccine," concluded that "The introduction of anything so important as a new polio vaccine amounts to a national emergency and calls for some form of government control."<sup>200</sup> Canada proved the value of such government control with a widely recognized vaccine program which was "fairer, faster, safer and much less expensive than the U.S. one."<sup>201</sup>

In Canada, despite Martin's brave political efforts during the Cutter Crisis,<sup>202</sup> the man most responsible for the Canadian vaccine success story was Robert D. Defries. Both Defries and Connaught, an institution he had largely built, received high praise for the polio vaccine effort in Canada and internationally.<sup>203</sup> For Jonas Salk, in particular, the Canadian polio vaccine effort and Defries' leading role represented a rare "source of great pleasure," during a time of serious personal stress and scientific uncertainty over his vaccine.<sup>204</sup> The Salk vaccine introduction was also Defries' swan song. He retired from his dual position of Director of the School of Hygiene and Connaught on September 30, 1955.<sup>205</sup> Based on his leadership with the vacc-

<sup>198</sup> Ibid..

<sup>199</sup> Gayn, "Polio: Canada's Way," magazine introduction, "The Shape of Things."

<sup>200</sup> Crighton, "How Canada Handled the Salk Vaccine," p. 430; Letter, Under Secretary of State for External Affairs, Ottawa, to Canadian Consulate General, New York, July 14, 1955, NAC, MG32, B12, Vol. 32, file "Salk Vaccine - Clippings."

<sup>&</sup>lt;sup>201</sup> "How Canada Avoided Salk Mess," Toronto Star, (June 11, 1955).

<sup>202</sup> K.W. MacTaggart, "Salk Vaccine, Health Insurance Highlights of Year," Globe and Mail, (Dec. 29, 1955); Interview with Bill Young, September 20, 1993, for CBC-TV Prime Time News Documentary, "Conquering the Crippler," broadcast December 7, 1993.

<sup>203</sup> See, for example: Letters: A.D. Kelly, General Secretary, Canadian Medical Association, to Defries, July 6, 1955; W. Wood, Glaxo Laboratories, Bucks, U.K., to Defries, September 15, 1955, CA, 83-002-07, file 7/8. For more general Canadian praise, focusing on Dr. F.P. Nagler of the Laboratory of Hygiene, see Letter, A.M.-M. Payne, Chief, Section of Endemoepidemic Diseases, World Health Organization, Geneva, to Nagler, October 7, 1955, NAC, RG29, Accession 83-84/119, Vol. 51, file 357-2-11.

<sup>204</sup> Letter, Salk to Defries, August 19, 1955, CA, 83-015-05, file 2/7.

<sup>205</sup> Editorial, "Dr. R.D. Defries Retires," CMAJ, 73 (Aug. 15, 1955): 300-01.

ine, among other public health efforts, and in an American led "effort to make up for the ommission at Ann Arbor," Defries was the 1955 recipient of the prestigious Albert Lasker Award from the American Public Health Association, presented to him by former U.S. President Harry S. Truman on October 17, 1955.<sup>206</sup> Defries remained as an active consultant and worked closely with his successor at Connaught, Dr. J.K.W. Ferguson, particularly with the challenge of continuing, expanding, improving and exporting the Salk vaccine. But as Defries would be the first to admit, the Salk vaccine was not perfect and not the final answer to the international control of polio. During the next few years this became clearer as continuing polio outbreaks reinforced scientific attention toward developing a live attenuated vaccine. Connaught's leadership and national and international public health connections would play an important role in the expanding use of the Salk vaccine and the introduction of the Sabin, as the final chapter in this study highlights.

<sup>206</sup> Letter, Cameron to Ferguson, June 1, 1964, CA, Uncatalogued Binder, "National Technical Advisory Committee on Live Poliovirus Vaccines;" Program, Albert Lasker Awards, 1955, Presented at 83rd Annual Meeting of American Public Health Association, Kansas City, November 114-18, 1955, R.D. Defries, Biographical File, CA; "Dr. Defries to Receive Public Health Award," Globe and Mail, (Oct. 31, 1955).

## **EPILOGUE:**

### From Salk to Sabin, 1955-1962

Did the Salk vaccine represent the final victory over polio and the end of its epidemic threat to Canadians? It would be a serious mistake to assume polio was beaten in 1955. This terrifying disease received a crippling blow from the Salk vaccine,<sup>1</sup> but there were many obstacles to overcome to ensure its wide use. A final wave of severe polio outbreaks in Canada, especially between 1958 and 1960, and their high costs, demonstrated the limits of the Salk vaccine and the need for something more: a live vaccine, and in particular, one developed by Albert Sabin.<sup>2</sup> A similar pattern of rising enthusiasm over this new polic weapon convergent with the major epidemics of 1959-60 forced the issue among Canadian governments and Connaught Laboratories. While Dr. Defries remained involved, his successor as Director of Connaught, Dr. J.K.W. Ferguson, took a strong leadership role in the rapid development of the Sabin vaccine in Canada. Also prominent were Dr. Cameron, the Deputy Minister of National Health, and Dr, Rhodes, who had assumed the Directorship of the School of Hygiene in 1956 and in 1959 chaired a hasitly established National Technical Advisory Committee on Live Poliovirus Vaccines.

Canada experienced the most success with the introduction of the Salk vaccine (or related types) in 1955. Denmark was the most advanced country in Europe with uninterrupted use, while France maintained a small scale program. Great Britain, Sweden, West Germany and South Africa had all prepared an inactivated vaccine, but

A.J. Nelson, "Influence of Vaccination Upon Age Distribution of Poliomyelitis," CJPH, 48 (Aug. 1957): 313-16; E.H. Lossing, "Vaccination and the Decline in Paralytic Poliomyelitis," CJPH, 48 (Nov. 1957): 449-52; W.G. Brown, G.K. Martin, B. Hannah, A.J. Rhodes and N.A. Labzoffsky, "Three Years Experience with Poliomyelitis Vaccine: Ontario, 1955-57," CMAJ, 79 (Aug. 1, 1958): 155-61.

On the Sabin vaccine see: Paul, History of Poliomyelitis, 441-56; Saul Benison, "International Medical Cooperation: Dr. Albert Sabin, Live Poliovirus Vaccine and the Soviets," Bulletin of the History of Medicine, 56 (1982): 460-83; Albert B. Sabin, "Oral Poliovirus Vaccine: History of its Development and Use and Current Challenge to Eliminate Poliomyelitis from the World," Journal of Infectious Diseases, 151 (Mar. 1985): 420-36; J.K.W. Ferguson, "The Story of Poliomyelitis Vaccines," CJPH, 55 (May 1964): 183-90.

the Cutter crisis forced the cancellation of their vaccine programs.<sup>3</sup> Connaught's success also attracted the attention of the Soviet Union, which had yet to prepare a vaccine. In March 1956, a Soviet delegation visited Canada for a week of inspections.<sup>4</sup>

The well-publicized success of the Canadian Salk vaccine program created a sensitive situation in the United States. Any hint of trouble with Connaught's vaccine was used as an excuse to question the Salk vaccine's safety and continued American use. New minimum standards and safety tests instituted after the Cutter crisis created production difficulties for Connaught during the summer of 1955 and forced the deferral of the Canadian vaccine program planned for January 1956.<sup>5</sup> Even stricter standards established in November did not ease the situation for CMRL, or for American manufacturers.<sup>6</sup> News of these troubles generated further anxiety among Salk vaccine critics, many of whom wondered whether it could ever be safe.<sup>7</sup>

Ferguson, found himself frequently answering letters from critics of the vaccine looking for information on the Canadian troubles. Ferguson admitted the problems, but stressed that the press reports were "badly distorted."<sup>8</sup> Defries faced these questions too.<sup>9</sup> Also problematic were monkey infections, contaminated virus

<sup>&</sup>lt;sup>3</sup> World Health Organization, "Experience of Poliomyelitis Vaccination in Eight Countries," JAMA, 74 (Jan. 1, 1956): 80-81: World Health Organization, "Meeting on Poliomyelitis Vaccination," November 21-25, 1955, Stockholm, NAC, RG29, Accession 83-84/119, Vol. 51, file 357-2-11.

<sup>&</sup>lt;sup>4</sup> "Canada Salk Plan Attracts Soviet MDs," *Toronto Star*, (Mar. 8, 1956). The Soviet delgation also visited the University of Montreal.

<sup>&</sup>lt;sup>5</sup> Connaught Medical Research Laboratories, Annual Report, 1955-56 (Toronto: 1956), p. 6; S. Klaw, "Salk Vaccine: The Business Gamble," Fortune, (Sept. 1955): 124-26, 166-67, 171-76.

<sup>6</sup> CMRL, Annual Report, 1955-56, p. 6; Letters: H.E. Van Riper, NFIP, to Defries, January 4, 1956; Ferguson to Van Riper, January 10, 1956, CA. 83-015-05, file 4/7.

<sup>&</sup>lt;sup>7</sup> Letters: H.K. Faber, Department of Pediatrics, Stanford University, to Ferguson, November 1, 1955: J.G. Irving, Medical Director, Aetna Life Insurance Co., Hartford, to Ferguson, December 13, 1955, CA, 83-003-03; B.D.B. Layton, "Summary of Discussions... during Meeting of State and Territorial Health Officers, Washington, (November 7-12, 1955), November 29, 1955, p. 7, attached to Memo, Layton to Gibbard, November 29, 1955, NAC, RG29, Accession 83-84/1A, Vol. 47, file 356-V-3.

<sup>8</sup> Letters: Ferguson to Faber, November 4, 1955; Ferguson to Irving, December 16, 1955, CA, 83-003-03.

<sup>9</sup> R.D. Defries, "Practical Experience with Poliomyelitis Vaccine," Meeting, American Public Health Association, Kansas City, November 17, 1955, CA, 83-015-02, file 2/3.

fluids, inconsistent inactivation, complex safety tests, staff shortages, and an urgent need for a new laboratory where monkey infections could be controlled.<sup>10</sup> During early 1956, these problems were largely overcome and Connaught delivered 2.3 million doses by mid-June.<sup>11</sup> This was enough to bring the total population of vaccinated children (under ten years of age) to 1,800,000 before the 1956 polio season began. Of this group, 90% had received at least two doses.<sup>12</sup> In the U.S., a more positive attitude also emerged regarding the vaccine in early 1956.<sup>13</sup>

Other major concerns surrounding the Salk vaccine, beyond its safety, were the time and expense of producing and testing it, and the practical costs of giving the required three doses. One of the greatest costs was large numbers of monkeys, the hazards and supply of which were problematic.<sup>14</sup> Cheaper alternatives to monkeys were studied at Connaught starting in 1957. Work focused on isolating monkey kidney cells that would grow and multiply continuously, yet still propagate the poliovirus without cell malignancy.<sup>15</sup> To improve the management of the administrative

While monkey supplies stabilized through the late 1950s and 1960s, it took further world-wide shortages and improved technology before a continuous cell-line based Salk vaccine production was established in the early 1970s; Mc J, R.J. Wilson, Director, CMRL,

<sup>&</sup>lt;sup>10</sup> R.D. Defries, Notes, "Chief Production Problems," written while at APHA meeting, Kansas City, November 1955, CA, 83-015-02, file 3/3.

<sup>11</sup> CMRL, Annual Report, 1955-56, p. 6. Despite the controversies the University of Toronto financed a \$1,250,000 Polio Building, officially opened by Paul Martin in June 1956; Letters: Defries to Lt. Col. W.E. Phillips, Chairman, Board of Governors, University of Toronto, July 4, 1955, July 8, 1955, CA., 83-015-05, file 1/7; Special Article, "New Poliomyelitis Building, Connaught Medical Research Laboratories," CJPH, 47 (Aug. 1956): 354-58; "Connaught to Build \$1,000,000 Salk Plant," Globe and Mail, (July 17, 1955).

Canada, Department of National Health and Welfare, Annual Report, 1956-57 (to March 31, 1957), (Ottawa: 1957), p. 62; E.H. Lossing, "Vaccination and the Decline ir Juralytic Poliomyelitis," p. 449.

<sup>13</sup> Letter, Cameron to J. Charles, Chief Health Officer, Ministry of Health, England, February 7, 1956, NAC, RG29, Vol. 1205, file 311-P11-30, part 2.

<sup>14</sup> Interviews #2 and #3 with Frank Shimada, August 10, 1993 and August 31, 1993. There was also the humanitarian aspect of relying so heavily on such an animal as the monkey, althou-3h there is little evidence of antivivisectionist concerns.

Press Release, attached to Letter, D.R. Preston, Director of Scientific Information, NFIP, to Director of Publicity, University of Toronto, December 4, 1956, CA, 83-015-05, file 4/7. These studies were initiated by Dr. Angus F. Graham with an NFIP grant of \$14,600. See also R.D. Defries, Discussion of paper by J. Salk: "Control of Poliomyelitis With a Non-Infectious Vaccine," January 7, 1957, CA, 83-015-04, file 2/2; R.D. Defries, "Present Status of Poliomyelitis Vaccination," CMAJ, 77 (Oct. 1, 1957): 663-70.

challenges of the vaccine's three doses on top of existing immunization programs, Connaught began studies in 1956 to combine the Salk vaccine with diphtheria antitoxin, pertussis vaccine and tetanus toxoid. Connaught was a world leader in the development of combined vaccines,<sup>16</sup> and by 1958 had conducted several clinical trials. In January 1959 the DPT-Polio vaccine was licensed for young children, followed by DT-Polio vaccine for school children, and Tetanus-Polio vaccine for adults.<sup>17</sup> The initial use of these combined antigens, particularly the Tetanus-Polio, was disappointing and they were not used widely in 1959. The importance of expanding polio vaccinations to adults pressured Ottawa to continue its shared financing policy for these new combined vaccines.<sup>18</sup>

The Canadian vaccine program was widely supported and represented the "best modern example of a crash preventive programme." Such an effort "could not have been carried out through the private physicians' offices as efficiently."<sup>19</sup> Nevertheless, the medical profession often felt left out of the picture. Their involvement with the provincial programs remained limited since there was negligible commercial supply available in Canada for general use. Many physicians thus grew increasingly sensitive to how the polio vaccine issue, with its "emotional appeal... [was]

<sup>&</sup>quot;Connaught History Outline," attached to Memo, Wilson to W.A. Cochrane, CEO, CMRL, August 19, 1983, CA, 83-012-03.

Minutes, Meeting of Poliomyelitis Committee, January 19, 1956, January 26, 1956, CA, 83-015-01. Connaught's work with combined vaccines began with the first diphtheria toxoid-pertussis vaccine (DP) released Canadian in 1943. Other combined vaccines were developed over the next decade, such as DP-tetanus toxoid (DPT), diphtheria-tetanus (DT) in 1948, and diphtheria toxoid added to a typhoid-paratyphoid and tetanus toxoid combination (TABTD) in 1951; R.J. Wilson, Seminar. "Connaught's Contributions to Communicable Disease Control," January 9, 1967, CA, 83-012-03; Defries, First Forty Years, p. 235.

J.K.W. Ferguson, "Vaccination Against Poliomyelitis With Combined Antigens," CJPH, 50 (Sept. 1959): 385-89; R.J. Wilson, G.W.O. Moss, F.C. Potter and D.R.E. MacLeod, "Diphtheria and Tetanus Toxoids Combined with Pertussis ans Poliomyelitis Vaccines: Clinical Trial of a Quadruple Antigen," CMAJ. 81 (Sept. 15, 1959): 450-53; CMR!, Annual Report, 1958 59 (Toronto: 1959), p. 3-4.

 <sup>18</sup> Minutes, Meeting of Dominion Council of Health, October 22-24, 1958, p. 7-8, AO, RG10-05-17, Box 4; Notes by G.K.M. ("for Dr. Brown's use"), "Poliomyelitis Vaccine," (Ontario Department of Health), February 16, 1960, A<sup>o</sup>, RG10-6, Box 59, file 613.

<sup>19</sup> Notes by G.K.N., "Poliomyelitis Vaccine," Ibid..

seized by the politicians and the administration taken over by them."<sup>20</sup> The Salk vaccine was an unusual, politically volatile agent and Canada's promunent contributions to its evaluation "had occasioned considerable favorable public comment." This had "not been unnoticed by the Minister" and mony in Ottawa wished to continue national vaccine evaluation studies.<sup>21</sup> For Martin, as long as the supply remained limited and a susceptible population waited for the free vaccine, he would continue the unusual federal-provincial arrangement indefinitely.<sup>22</sup> To consure federal control of the supply, Martin kept American commercial vaccine out of the country as much as possible to give every advantage to Connaught's and Montreal's vaccine.<sup>23</sup>

By 1957 Connaught was able to provide a consistent supply of Salk vaccine,<sup>24</sup> and pressure built for its addition to the normal free list of biologicals each province provided to physicians. But if a province decided to add the polio vaccine, its costs became their full responsibility, with no federal assistance. If provinces proceeded with this, but also maintained their provincial vaccine program for defined age groups, they remained eligible for federal assistance.<sup>25</sup> In other words, there was a strong incentive to maintain the provincial programs, especially when adults moved into the defined age group. This effectively minimized the demand for private physicians to administer the vaccine. It was a subtle tactic that opened up the vaccine to

<sup>20</sup> C.E. Snelling, "The Salk Vaccine Program," Ontario Medical Review, 23 (Apr. 1956): 275-76.

Memos: Layton to Cameron, February 29, 1956; Lossing to Layton, March 1, 1956, NAC, RG29, Vol. 1205, file 311-P11-30, part 2; E.H. Lossing, "Evaluation of Polionyelitis Vaccine," Dominion Council of Health, April 16-18, 1956, NAC, RG29, Vol. 1151, file 308-7-3. Between 1955 and 1961 the federal contribution to the Salk vaccine program was \$6,225, 000; J.W. Monteith, Press Relearse, March 6, 1962, AO, RG10-106, file 259.5; J.K.W. Ferguson, "Live Poliovirus Vaccine for Oral Use," CJPH, 53 (Apr. 1962): 135-42.

<sup>22</sup> Minutes: Dominion Council of Health, April 16-18, 1956, p. 8-9; DCH, November 7-9, 1956, AO, RG10-05-16, Box 4; P. Martin, "Statement for Minister re Provision of Polio Vaccine for Medical Profession," April 3, 1957, NAC, RG29, Vol. 1203, file 311-P11-26, part 6.

B.D.B. Layton, "Polio Vaccine," July 29, 1955, p. 16, NAC, RG29, Vol 1203, file 311-P11-26, part 6. This was a detailed federal report of the vaccine program between 1954 and 1955.

<sup>24</sup> CMRL. Annual Report, 1956-57 (Toronto: 1957), p. 5

<sup>25</sup> Letter, Cameron to All Provincial Deputy Ministers of Health, April 11, 1957, NAC, RG29, Vol. 1203, file 311-P11-26, part 6; Minutes, Meeting of Dominion Council of Health, May 22-24, 1957, p. 3-5, AO, RG10-05-16, Box 4.

the physician somewhat, but also ensured only Connaught vaccine was used (as long as they could provide a surplus). Thus, as the defined age group expanded, federal control was maintained, encouraging universal national standards.

But as the incidence of polio sharply declined between 1955 and 1957, there was an alarming drop in public interest in getting vaccinated, even if it was free. By May 1957 a total of about 4 million children had received at least one dose. Polio seemed to be beaten and thus there was little incentive to go through the trouble of getting the vaccine, especially among adults. Saskatchewan had vaccinated 65% of its 20-40 age group in public health clinics. Manitoba had arranged a commercial supply for this age group where the government paid physicians to give the vaccine while patients paid for the vaccine. In other provinces, however, adult immunization programs were very limited.<sup>26</sup>

Defries advocated a national campaign to raise public awareness for the necessity of everyone being immunized.<sup>27</sup> Dr. Cameron, the Deputy Minister of National Health, recognized that with varying provincial circumstances, "this might create an embarrassing situation in the case of some provinces, which might jeopardize the planned progress of the local program."<sup>28</sup> Cameron strongly felt that such an education program was a provincial responsibility and was most worrier out Quebec, which had been slow in broadening its use of the vaccine.<sup>29</sup> Moreover, a national publicity campaign might draw too much attention to the disease, which seemed to be under control, and to the weaknesses in provincial vaccination efforts.<sup>30</sup>

<sup>26</sup> DCH meeting, Ibid.; W.R. Simon, for Chief, Epidemiology Division, Department of National Health and Welfare, to K.W. Ferguson, Department of National Defense, RCAF, February 6, 1956, NAC, RG29, Vol. 198, file 311-P11-6, part 3.

<sup>27</sup> Meeting, DCH, Ibid., p. 5.

<sup>28</sup> Letter, Cameron to A. Sommerville (and All Provincial Deputy Ministers of Health), July 5, 1957, AA, 70.127, Box 3, file 105.

Minutes: Dominion Council of Health, November 6-8, 1957, p. 2-6; DCH, April 28-29, 1958, p. 20-21, AO, RG10-05-16, Box 4.

<sup>&</sup>lt;sup>30</sup> E.H. Lossing, "Vaccination and the Decline in Paralytic Poliomyelitis," p. 449-53; D. Kubryk, "Paralytic Poliomyeltis Trends, 1957," *CJPH*, 50 (June 1959): 223-27.

In early 1957, as Connaught's Salk vaccine supply improved, the questions of export and American imports became difficult issues for Ottawa. All commercial vaccine imports were restricted and subject to the same tests as Connaught's, which was given top priority. Despite pressure from American companies anxious to sell their vaccine to Canadian physicians, the Laboratory of Hygiene simply could not handle the extra work load and expense of testing commercial vaccine on top of Connaugh-t's, and eventually Montreal's.<sup>31</sup> A further factor behind this policy was Canada's well respected reputation in the testing of the vaccine. There were concerns that American manufacturers, by having Ottawa test for the Canadian market, were in reality testing for the foreign market.<sup>32</sup>

In March 1957, a shortage of American vaccine complicated this situation, prompting Connaught to fill all outstanding Canadian orders.<sup>33</sup> Connaught's consistent and high quality supply raised the question of whether it was necessary for Ottawa to continue full duplicate tests on every lot of their vaccine since this was not normally required. These facilities could be better used in otner areas, such as testing a live polio vaccine.<sup>34</sup> Little was done until a monkey shortage and their rising price forced Martin's Conservative successor, J.W. Monteith, to quietly change this

<sup>31</sup> Letter, Cameron to All Provincial Deputy Ministers of Health, August 1, 1956, NAC, RG29, Accession 85-86/248, Vol. 33, file 311-P11-1; Memo, Greenberg to Gibbard, August 2, 1956, NAC, RG29, Accession 83-84/119, Vol. 47, file 356-V-3.

<sup>32</sup> Memos: Gibbard to K.C. Charron, Director, Health Services, Department of National Health and Welfare, February 13, 1957, attached to Memo, Charron to Cameron, February 15, 1957, NAC, RG29, Accession 83-84/119, Vol. 48, file 356-V-3, part 2. Polio vaccine testing involved most of the employees in the Laboratory of Hygiene's Virus Division. In order to test a standard batch, an average of 36 monkeys were used, in addition to "exhausting tissue culture tests," at a total cost of at least \$5,000 per lot. The Laboratory's maximum capacity was two lots per week, one of which was submitted by Connaught.

<sup>33</sup> CMRL, Annual Report, 1956-57, p. 5; Memo, Layton to Cameron, April 1, 1957, NAC, RG29, Accession 85-86/248, file 311-P11-33.

<sup>34</sup> Memos: Greenberg and Nagler to Gibbard, January 14, 1957, attached to Memo, Gibbard to C.A. Morrell, Director, Food and Drug Directorate, January 14, 1957; Gibbard to Charron, January 30, 1957, NAC, RG29, Accession 83-84/119, Vol. 48, file 356-V-3, part 2.

policy. With "public interest in poliomyelitis vaccine... not as high as it was two years ago," he could afford to make this move.<sup>35</sup>

A more vexatious question was the issue of Connaught exporting its surplus vaccine. As his supplies improved in 1957, Ferguson saw "no reason why the ban on export should be continued." Many countries were interested in the Connaught vaccine specifically, but potential foreign orders were filled in the U.S. due to the Canadian ban, despite the 1.3 million doses available for export.<sup>36</sup> As Cameron stressed to Martin, such export presented "an excellent opportunity to enhance our good relations, not only with the Commonwealth countries, but also those in the Arab Bloc."<sup>37</sup>

Vaccine export was a significant international issue, with "keen competition involving companies in the United States to provide vaccine for the foreign market." No Canadian law prevented Connaught from exporting polio vaccine if it wanted; only federal interest complicate.' the issue.<sup>38</sup> Martin insisted that Canadian needs had priority over economic interests.<sup>39</sup> The provinces had little problem with export, as long as Connaught's vaccine was available commercially.<sup>40</sup> But if export was allowed and publicized, controversy was likely when parents of children not eligible for the provincial programs complained. The vaccine had a limited shelf life and with such a large surplus Ferguson risked the vaccine spoiling before it could be used. This would also be difficult to explain.<sup>41</sup> But as Cameron stressed to Martin, Connaught was "not exporting because you have requested them not to."<sup>42</sup> The imp-

<sup>35</sup> Memos: Gibbard to File, October 18, 1957; Gibbard to Charron, October 22, 1957; Cameron to J.W. Montieu, Minister of National Health and Welfare, October 28, 1957; Cameron to Charron, November 20, 1957 attached to Charron to Gibbard, November 20, 1957, NAC, RG29, Accession 83-84/119, Vol. 48, file 356-V-3, part 2.

<sup>36</sup> Memo, Cameron to Martin, January 21, 1957, NAC, RG29, Accession 85-86/248, Vol. 34, file 311-P11-33.

<sup>37</sup> Memo, Cameron to Martin, March 1, 1957, Ibid..

<sup>38</sup> Memo, Layton to Cameron, March 5, 1957, Ibid.

<sup>&</sup>lt;sup>39</sup> Memo, Martin to Cameron, March 11, 1957, *Ibia*..

<sup>40</sup> Letter, Martin 5 All Provincial Deputy Ministers of Health, March 14, 1957; Memo, Layton to Cameron, March 26, 1957, Ibid..

<sup>41</sup> Memos: Cameron to Martin, March 28, 1957: Martin to Cameron, April 1, \_ 357, Ibid...

<sup>42</sup> Memo, Cameron to Martin, April 9, 1957, Ibid.

lication was that if the vaccine spoiled, Martin would be politically responsible for the financial losses Connaught and the University of Toronto would incur, and the resultant controversy.

By April 1957, Ferguson was finally allowed to export Connaught vaccine on the condition that every Canadian order be met, a reserve supply kept, and the vaccine must be offered to druggists for sale.<sup>43</sup> Connaught's vaccine was "a Canadian prestige item,"<sup>44</sup> and by June 1958 more than 5.5 million doses had been exported to Great Britain, while additional vaccine was shipped to a total of 44 other countries. This helped reduce the price charged to the governments on three occasions.<sup>45</sup> Meanwhile, Connaught supplied 27.8% of Canadian vaccine needs, 8.5% came from the Institute of Microbiology, while 3.7% was imported. Nationally, by June 1958, out of 5.2 million individuals vaccinated to date, only 8% of 20-39 age group had been given at least one dose, while 80% of the 5-19 age group, and 60% of the 0-4 population had been vaccinated.<sup>46</sup> One year later 6.8 million had received at least one dose. Of those who had received the full three doses (5.1 million), the adult group's national status improved to 20%, while the other two groups were 75% and 45% of the population respectively. This meant that 55% of the total Canadian population who were at particular risk from polio had received at least one dose. Only 45% were fully vaccinated.47

Despite this widening use of the Salk vaccine, between 1958 and 1960 a final wave of serious polio epidemics hit Canada to a degree not seen since 1953. Hardest

<sup>43</sup> F. Poland, "Move Follows Big Increase In Production: Lab Meets Domestic Neeus, Fears Spo"age In Summer," *Montreal Gazette*, (May 8, 1957); Editorial, "Politics and Polio," *Globe and Mail*, (May 15, 1957).

Letter, T.O. Hecht, Continental Pharma Ltd (CMRL distributors of Salk vaccine), to Cameron, August 14, 1957, NAC, RG29, Accession 85-86/248, Vol. 34, file 311-P11-33.

<sup>45</sup> CMRL, Annual Peport, 1957-58, p. 6.

<sup>46</sup> P. Martin, "Order (7 the House of Commons: Votes and Proceedings No. 8," June 5, 1958, NAC, RG29, Vol. 1202, file 311-P11-26, part 7; Kubryk, "Paralytic Poliomyelitis Trends, 1957." p. 227.

<sup>&</sup>lt;sup>47</sup> Kubryk, "Paralytic Poliomyelitis Trends, Canada, 1958," p. 231.

hit were Manitoba in 1958, Quebec and Newfoundland in 1959, and British Columbia, Alberta, New Brunswick and Newfoundland in 1960.<sup>48</sup> The 1958 Manitoba epidemic was focused in the Winnipeg area, as well as the north and involved 148 cases (107 paralytic) and 11 deaths. This epidemic accounted for almost half of the national total of paralytic polio cases (Tables 1 and 2).<sup>49</sup> This epidemic was particularly severation more than half of the paralytic cases, especially since 40% of the cases were over 20 years of age. Only 19% of the province's population in this age group had received the full three doses of Salk vaccine before the epidemic. The highest incidence was in the 0-4 population, and only 50% of this general age group had been given the full three doses.<sup>50</sup>

A far more serious situation developed in 1959, especially in Quebec and Newfoundland. There was a national total of 1,886 paralytic cases and 182 deaths. In Quebec, 1,171 paralytic cases and 106 deaths were reported, especially in the Montreal area, where "mass hysteria" developed as the epidemic escalated through August. The Quebec Chapter of the Canadian March of Dimes organized "monster vaccination clinics" complicated by the stealing of 75,000 shots. The Chapter had some reserves, but the local health departments were left with none until the stolen vaccine was recovered.<sup>51</sup> Most dramatic were the emergency military flights of 44 iron lungs to Montreal from Edmonton, Winnipeg and Toronto. They were also rushed to St. John's Newfoundland. Of these respirators, 22 remained in Montreal and 20 were flown on

<sup>Editorial, "Poliomyelitis: A Continuing Menace," CJPH, 49 (Nov. 1958): 489-90; D. Kubryk,</sup> "Paralytic Poliomyelitis Trends, Canada, 1958," CMAJ, 81 (Aug. 15, 1959): 228-31; D. Kubryk, "Paralytic Poliomyelitis in Canada, 1959," CJPH, 51 (Oct. 1960): 389-99; D. Kubryk, "Paralytic Poliomyelitis in Canada, 1960," CMAJ, 86 (June 16, 1962): 1099-1106.

<sup>&</sup>lt;sup>49</sup> In order to simplify and standardize national reporting of polio, only paralytic cases were officially reported to Otrawa beginning in 1957.

<sup>50</sup> J.C. Wilt, R.M. Creighton, A.J.W. Alcock, W. Stackiw and L. Nagel, "Poliomyelitis in Manitoba - 1958," CMAJ, 81 (July 1, 1959): 1-5; R.G. Cadham and J.E. Davies, "Poliomyelitis in Winnipeg - 1958: Epidemiological Study, Including the Evaluation of Artificial Immunization," CMAJ, 80 (Mar. 15, 1959): 436-39; Manitoba Department of Health and Public Welfare, Annual Report, 1958 (Winnipeg: 1959), p. 83.

<sup>51</sup> Lational Executive Secretary's Report, Annual Meeting of the Canadian Foundation for Poliomyelitis and Rehabilitation (March of Dimes), June 17-19, 1960, Grand Tracadie, P.E.I., NAC, RG29, Accession 85-86/248, Vol. 34, file 311-P11-21, part 2.

to Newfoundland, where 139 paralytic cases and 12 deaths occurred, particularly among young children under 6 years-of-age. Quebec's epidemic followed a more traditional pre-Salk era incidence pattern.<sup>52</sup>

These, and smaller, though serious, outbreaks elsewhere in the country sparked new federal bealth grants to buy \$27,800 worth of iron lungs and other new respirator equipment for Quebec, Manitoba, Alberta, British Columbia and Prince Edward Island.<sup>53</sup> They also generated **www public enthulyiasm** for getting vaccinated, which, despite further outbreaks in a nuller of provinces in 1<sup>on(1)</sup>, was relicately short lived. After getting the first shots, only 75% returned is the second, and only half of these received a third. According to the Canadian March of Dimes, this was "a sad commentary on the innate stupidity of human beings, who react to fear and panic, and not to the reasonable instinct of self-protection." Still, by June 1960, 8.6 million Canadian had been fully immunized. This accounted for 45% of the adult (20-39) population, 90% of children (5-19) and 75% of the youngest ages (0-4). Despite these post-Salk epidemics, the effectiveness of the vaccine after three doses was estimated to be 95.6% in Canada in 1959 and 1960.<sup>54</sup>

But, despite this effectiveness and slow but growing immunization levels, the Salk vaccine had demonstrated its limits. Particularly disturbing were the 193 cases that occurred in those that had received the full three dose course of Salk vaccine by

<sup>52</sup> *Ibid.*; Listing, "Respirators Transferred in 1959," attached to Letter, J. Gregoire, Deputy Minister of Health, Quebec, to E.V.R. Best, Chief, Epidemiology Division, Department of National Health and Vielfare, November 27, 1959, NAC, RG29, Accession & 5-86/248, Vol. 34, file 311-P11-27; Kubryk, "Paralytic Poliomyelitis in Canada, 1959;" R.L. Ozere and K.R. Rozee, "A Survey of Poliovirus Neutralizing Antibody in Newfoundland, 1959-60," *CMAJ*, 85 (July 8, 1961): 63-7.

<sup>53</sup> Listing, "Poliomyelitis Equipment Approved Under the National Health Grants, 1959-60," up to February 1960, attached to Memo, J. St. Louis, Admistrative Officer, to Best, March 7, 1960, NAC, RG29, Accession 85-86/248, Vol. 34, file 311-P11-27.

<sup>Report, Annual Meeting of the Canadian Foundation for Poliomyelitis and Rehabilitation,</sup> June 17-19, 1960, NAC, RG29, Accession 85-86/248, Vol. 34, file 311-P11-21, part 2; E.S.O. Smith, "A Review of the Effectiveness of Salk Vaccine in Alberta With Special Reference to the Outbreak of Poliomyelitis in 1960," CJPH, 52 (Nov. 1961): 467-73; Letter, G.F. Amyot, Deputy Minister of Health, B.C., to Cameron, March 22, 1960, NAC, RG29, Vol. 1207, file 311-P11-44, part 2; Kubryk, "Paralytic Poliomyelitis in Canada, 1959," p. 397-9; Kubryk, "Paralytic Poliomyelitis in Canada, 1960," p. 1105.

1959 and 1960. These vaccine failures were "unexplained and serve as a challenge to the practical immunologist to devise a better Salk vaccine or to perfect a live vaccine." The coincidence of these major epidemics with rising enthusiasm for a live polio vaccine pushed Canadian efforts strongly in this new direction. There was also the larger problem of providing the Salk vaccine to less developed countries where large-scale epidemics continued while the vaccine remained out of practical and financial reach. This national and international situation led to an intense Canadian effort to develop, test and mass produce Sabin's attenuated vaccine.<sup>55</sup>

The history of the Sabin oral vaccine was considerably quieter than Salk's, although an attenuated type was the preferred choice for most polio researchers. Yet progress was slow until all the various strains of the poliovirus had been sorted out and precise tissue culturing techniques .ad matured. A live vaccine had theoretical advantages because it multiplied in the digestive tract in the same way as the wild poliovirus, and spread like the natural infection. Thus, mass vaccinations could slow down an epidemic by spreading the attenuated virus through the community to displace the wild virus. With an oral vaccine, administration was also cheap and easy, because only one dose was necessary and immunity developed quickly.

But the risks of a live vaccine were significant. Its value depended upon the precise selection and cultivation of attenuated strains that could induce a mild immunizing infection without causing the paralytic disease. If an attenuated strain reverted to a virulent state while multiplying in the digestive tract, it could directly cause primary and secondary cases of the disease. Thus, like the inactivated vaccine, an effective live poliovirus vaccine flirted with the fine line dividing avirulency from virulency. Salk trusted the immune system and its ability to be tricked into reacting to an inactivated virus, while Sabin relied on taming the virus itself to induce a natural immune response.

<sup>55</sup> A.J. Rhodes, "Public Health Aspects of Live Poliovirus Vaccines With Particular Reference to Car ada," CJPH, 52 (Feb. 1961): 45-54.

During the 1950s there were several polio researchers, working independently and competitively, who sought to select and cultivate suitable strains for an attenuated vaccine. In 1953, when the NFIP had decided to back Salk's vaccine, Sabin announced the he had isolated avirulent strains in monkey kidney tissue, and by 1955 had given the three types of attenuated virus to 80 volunteers. Others had also conducted small trials, which grew increasingly large in many parts of the world. This climaxed in 1958-59 with mass trials of Sabin's vaccine in the Soviet Union. These Russian trials were so successful, at least to the Russians, that they quickly offered the Sabin vaccine to their entire population. In many of these trials there were disturbing examples of poliovirus reversions to virulence. There were also differing standards that were not rationalized until 1959 through the co-ordinating efforts of the World Health Organization.<sup>56</sup> By June 1960, Sabin's vaccine had been given to over 50 million people in the Soviet Union, China, Czechoslovakia, other European countries, the U.S., Mexico, Singapore, Africa and the United Kingdom. Rival live vaccines developed by Hilary Koprowski, as well as by Herald Cox at Lederle Laboratories, had also been used widely. Some 7 million people had received Koprowski's vaccine in Africa, Poland and the U.S., while 2 million had been fed the Cox-Lederle type in Latin America, Europe and the U.S.<sup>57</sup>

At Connaught, small-scale efforts were launched into the area of a live vaccine between 1956 and 1958.<sup>58</sup> In July 1959, Sabin provided a "seed pool" of his strains to

Paul, History of Poliomyelitis, p. 441-56; CMRL. Annual Report, 1959-60 (Toronto: 1960), p. 3-6; D.R.E. MacLeod, "Vaccination Against Poliomyelitis with Attenuated Live Virus," CMAJ, 80 (June 15, 1959): 99-1001.

On the Soviet vaccine trials see: Benison, "International Medical Cooperation: Dr. Albert Sabin, Live Poliovirus Vaccine and the Soviets:" Albert B. Sabin, "Role of My Cooperation with Soviet Scientists in the Elimination of Polio: Possible Lessons for Relations Between the USA and USSR," *Perspectives in Biology and Medicine*, 31 (1987): 57-64; Dorothy M. Horstmann, "The Sabin Live Poliovirus Vaccination Trials in the USSR, 1959," *Yale Journal of Biology and Medicine*, 64 (1991): 499-512.

<sup>57</sup> Rhodes, "Public Health Aspects of Live Poliovirus Vaccine with Particular Reference to Canada," p. 48.

<sup>&</sup>lt;sup>58</sup> Letter, Ferguson to Kumm, June 12, 1956, JA, 83-015-05, file 4/7; CMRL, Annual Report, 1959-60, p. 6; Letters: Ferguson to A.B. Sabin, Children's Hospital, Cincinnati, March 4,

Connaught.<sup>59</sup> During the fall, despite "formidable" difficulties, Connaught aggressively pushed forward its production of the Sabin vaccine.<sup>60</sup> Such difficulties were unlike those associated with the Salk vaccine. The methods were not as complex or expensive, but involved more painstaking work with tissue culturing, requiring highly sterile conditions and constant testing of the genetic stability of the attenuated strains.<sup>61</sup> Connaught's approach focused on a trivalent vaccine, while other manufacturers prepared separate monovalent vaccines. A live vaccine also required a totally different system of testing, which governments, particularly in the U.S., were hesitant to establish, especially after investing so much in the complex testing process necessary for the Salk vaccine. More North American trials were clearly needed before government approval could be given to this new vaccine.<sup>62</sup>

As with the Salk vaccine, there were "strong political overtones and some international rivalry" over the testing and use of the Sabin vaccine. An important factor was that under American law, no vaccine made there could be exported without a federal license. It had to first meet domestic standards, and in the U.S. there were none, nor did Washington have the capacity for their quick establishment. In Canada an export license was not required. Connaught had to only meet the requirements of the importing country.<sup>63</sup>

In October 1959 a National Technical Advisory Committee on Live Poliomyelitis Vaccines was established in Ottawa under the direction of Dr. A.J. Rhodes. He felt Canada could again play a significant role in the development of this new polio vaccine. He also recognized "commercial benefits might be expected to accrue through

1958; Sabin to Ferguson, April 7, 1958, CA, 83-015-05, file 3/7; Minutes, Meeting of Dominion Council of Health, October 22-24, 1958, p. 8-9, AO, RG10-05-17, Box 4.

<sup>59</sup> Letters: Ferguson to Sabin, July 3, 1959; Sabin to Ferguson, July 27, 1959, CA, 83-015-05, file 3/7.

<sup>60</sup> CMRL, Annual Report, 1959-60, p. 6.

<sup>61</sup> Interview #3 with Frank Shimada, August 31, 1993.

<sup>62</sup> Minutes, DCH, October 14-16, 1959, p. 3-5, AO, RG10-05-17, Box 4.

<sup>63</sup> *Ibid.*, p. 3-7.

the export of the Canadian product." Since there were as yet no standards, the provinces were free to use the vaccine on an experimental basis, as long as Ottawa was kept informed.<sup>64</sup> The establishment of this Committee was sparked by the 1959 Canadian polio epidemics, the severity of which added "a considerable sense of urgency" to their mission.<sup>65</sup>

An early concern of Rhodes' was that provincial trials of the Sabin vaccine could only be carried out where adequate virus laboratory facilities existed. This was an important element for any live virus trials since in order to distinguish avirulent from virulent strains complicated tests were needed to identify "markers." This required extensive tissue culture work and monkey inoculations to test for "neurovirulence" of the attenuated virus. This was Sabin's crucial test and it required detailed examinations of the brain and spinal cord. A centre for the study of live polio vaccines was set up at the School of Hygiene. It served as an independent laboratory separate from both Connaught and the University of Montreal, which was also involved in vaccine production and in a Quebec trial.<sup>66</sup>

These trials needed to be precisely controlled since delicate measurements were required to track closely the attenuated strains as they moved through a welldefined community. Such communities involved in Sabin trials included small orphanages in Montreal and Quebec City, and such towns as Wedgeport, Nova Scotia, and Prince Albert, Saskatchewan.<sup>67</sup> Prince Albert was the site of a unique community-

374

<sup>64</sup> Ibid., p. 5-7. See also A.J. Rhodes, "Poliomyelitis - Past, Present and Future," Nova Scotia Medical Review, 38 (Nov. 1959): 417-24; Rhodes, "Public Health Aspects of Live Poliovirus Vaccines With Particular Reference to Canada;" C.E. van Rooyen and R.L. Ozere, "The Present Status of Oral Vaccination Against Poliomyleitis and Future Problems," CMAJ, 82 (Apr. 9, 1960): 758-66.

Kubryk, "Paralytic Poliomyelitis in Canada, 1959," p. 389-99; Letter, A.J. Rhodes, Director, School of Hygiene, University of Toronto, to D. Kubryk, Division of Epidemiology, Department of National Health and Welfare, October 23, 1959, NAC, RG29, Vol. 1207, file 311-P11-44, part 1.

Letter, Rhodes to Cameron, January 22, 1960, NAC, RG29, Vol. 1207, file 311-P11-44, part
2; Minutes, Meeting of National Technical Advisory Committee on Live Poliomyelitis Vaccines, November 5, 1539, NAC, RG29, Vol. 1210, file 311-P11-45.

<sup>67</sup> H.E. Robertson, M.S. Hacker, H.O. Dillenberg, R. Woodrow, R.J. Wilson, W.K. Ing and D.R.E. MacLeod, "Community-Wide Use of a 'Balanced' Trivalent Oral Poliovirus Vaccine (Sabin),"

wide field trial held over eight days in late February and early March 1961, when 95% of the community, or 23,711 people, received a single trivalent dose of Connaught's Sabin vaccine. This trial represented a major organizational public education challenge, but "clearly demonstrated the convenience and practicability of administering an oral vaccine to a large population in a short period of time."<sup>68</sup> However. in the Ouebec orphanage trials, more careful and quiet public relations were necessary. $^{69}$  These Quebec trials were conducted with the "superb cooperation" of the Ouebec Department of Health "under closed conditions" and were designed to study the genetic stability of the vaccine by closely studying the multiple passage of the attenuated virus through a small community of children in an isolated and controlled environment. As such, the hope was "to keep this out of the newspapers as long as possible." Connaught directed the experiment at La Crèche St. Vincent de Paul in Quebec City, while the University of Montreal's Institute of Microbiology and Hygiene conducted the trial at the Crèche de la Réparation in Montreal. These were original and complex experiments and Canada's most significant contribution to the evaluation of the Sabin vaccine.<sup>70</sup>

In the wake of the major 1959 epidemics, a number of provinces pressured the Committee to allow the emergency use of the live vaccine from any source in the event of another major epidemic. What if an American live vaccine was licensed in

CJPH, 53 (May 1962): 179-91; C.E. van Rooyen, V.K. Rideout, R.L. Ozere, R.S. Faulkner, C.B. Stewart and H.B. Colford, "Oral Vaccination Against Poliomyelitis: Report of a Field Trial at Wedgeport, Nova Scotia," CMAJ, 86 (June 30, 1962): 1185-91.

<sup>68</sup> Robertson (*et al.*), *Ibid*, p. 191; C. Smith, "Oral Vaccine: A Successful Community Experiment," *Canada's Health and Welfare*, (Department of National Health and Welfare), (May 1962): 2-3; H.O. Dillenberg, M.S. Acker, and J.D. Ramsay, "Incidence of Symptoms Following Feeding of Oral Poliovirus Vaccine and a Placebo," *CJPH*, 54 (June 1963): 246-48; C. Smith, Report, "The Role of Health Education in the Prince Albert Oral Live Polio Vaccine Demonstration, 1961," March 10, 1961, SA, R1342, R88-327, file 1.5.24b.

<sup>69</sup> Letters: Cameron to Rhodes, November 25, 1959; Rhodes to Best, February 12, 1960; Best to Rhodes, February 16, 1960, NAC, RG29, Vol. 1207, file 311-P11-44, part 2.

<sup>&</sup>lt;sup>70</sup> Letter, Ferguson to Arthur Kelly, Toronto, February 26, 1960, CA, Uncatalogued Binder, "National Technical Advisory Committee on Live Poliovirus Vaccines:" Minutes, Dominion Council of Health, April 6-8, 1960, p. 8-12; Minutes, DCH, October 26-28, 1960, Appendix G., AO, RG10-05-18, Box 4.

the absence of a licensed Canadian supply?<sup>71</sup> Provincial governments did not want to be denied a proven vaccine from outside Canada, just because a Canadian vaccine was not fully developed. The variety of live vaccines and large international field trials made it difficult for the provinces to remain patient knowing that other countries, particularly the Russians, had access to the new vaccine.

By the summer of 1960 the Soviet vaccine program was creating a difficult international predicament, especially when they offered to give its live vaccine away free to any country that wanted it. Connaught felt pressure to supply other "less fortunate countries" with the live vaccine, especially in the West, as it was the only western manufacturer able to export. Ferguson felt that Canada should be willing to counter the Soviet offer.<sup>72</sup> Complicating the situation was that both vaccines contained a monkey virus known as SV40, which was apparently harmless to monkeys and humans, but caused tumors in hamsters.<sup>73</sup> This agent was also discovered in the Salk vaccine and was more difficult to remove, causing an international shortage in 1961-62.<sup>74</sup> This problem was more easily solved with the Sabin vaccine but the experience proved embarrassing for Connaught, particularly since the U.S. was the only country seriously concerned about the live vaccine being free of SV40.<sup>75</sup> The Americans had grown interested in Connaught's vaccine<sup>76</sup> after "disturbing reports" emerged following mass trials of the Cox-Lederle vaccine in Florida and West Berlin. An "undue number" of secondary cases had occurred, raising suspicions of a

<sup>71</sup> *Ibid.*, p. 14-15.

Memo, Layton to Charron, August 10, 1960, NAC, RG29, Accession 85-86/248, Vol. 34, file 311-P11-33; B.H. Sweet and M.R. Hilleman, "The Vacuolating Virus, S.V.40," *PSEBM*, 105 (1960): 420-27.

<sup>73</sup> CMRL, Annual Report, 1960-61 (Toronto: 1961), p. 4: Minutes, Dominica Council of Health, October 26-28, 1960, p. 28.

<sup>74</sup> Letter, Ferguson to Cameron, January 17, 1962, CA, Uncatalogued Binder, "National Technical Advisory Committee on Live Poliovirus Vaccines;" CMRL, Annual Report, 1961-62 (Toronto: 1962), p. 6-7.

<sup>75</sup> CMRL, Annual Report, 1960-61, p. 4-5.

<sup>76</sup> Memo, Layton to Charron, August 10, 1960, NAC, RG29, Accession 85-86/248, Vol. 34, file 311-P11-33.

reversion to virulence. This set-back significantly reduced enthusiasm for the safety of the live vaccines.<sup>77</sup>

By the summer of 1961 Connaught was the leading international producer of the Sabin vaccine, next to the Soviet Union, whose vaccine was of questionable value.<sup>78</sup> Connaught's considerable supply was not needed in Canada, but in the summer of 1961 a serious polio epidemic in Japan developed and only Connaught and the Russians had significant stocks available for immediate use.<sup>79</sup> The results of the vaccine were quite spectacular prompting the Japanese government to order more vaccinc. This involved a competition between the Russians, three European producers, and Connaught. Connaught' trivalent vaccine won the contract,<sup>80</sup> largely due to its quality and Canada's neutral political position between the Russians and Americans.<sup>81</sup>

In November 1961 Connaught applied for a Canadian license for its Sabin vaccine. By this time the British had licensed monovalent live vaccines for each strain, while in the U.S. only Type I and II monovalent vaccines were licensed.<sup>82</sup> On March 6, 1962, Connaught's trivalent vaccine was licensed in Canada; the first such type to be licensed internationally. Initial Canadian use of the vaccine was in large-scale community immunization programs, distributed through the same federal-provincial arrangement used for the Salk vaccine. During 1962 some four million doses of Sabin vaccine were given in eight provinces with no apparent problems.<sup>83</sup> Most notable among its provincial use was an unprecedented province-wide program in Saskatch-

<sup>77</sup> CMRL, Annual Report, 1960-61, p. 4.

<sup>&</sup>lt;sup>78</sup> "Connaught Keeps its Lead in Vaccines," Canadian Chemical Processing, (Feb. 1962): 35-41.

<sup>79</sup> CMRL, Annual Report, 1961-62, p. 3-4.

<sup>&</sup>lt;sup>80</sup> *Ibid.*, p. 3-4; Letters: Sabin to Ferguson, July 20, 1961; Ferguson to Sabin, July 24, 1961, CA, 83-015-05, file 3/7.

CMRL, Annual Report, 1961-62, 5-7; Letters: Ferguson to Sabin, Setember 12, 1961;
Ferguson to Sabin,October 30, 1961; Sabin to Ferguson, October 26, 1961, CA, 83-015-05,
file 3/7; Interview #3 with Frank Shimada, August 31, 1993.

<sup>&</sup>lt;sup>82</sup> Minutes, Dominion Council of Health, November 8-10, 1961, p. 34-35.

<sup>83</sup> S.L. Skoll and P.L. Kotyk, "The Acceptance of Sabin Polio Vaccine: Motivation at the Regional and Local Levels of a Primarily Rural Population," *CJPH*, 54 (May 1963): 213-20; A.R.J. Boyd and W. Mosley, "The Use of Poliovirus Vaccine Live, Oral (Sabin), Trivalent, in Metropolitan Toronto, 1962," *CJPH*, 54 (Aug. 1962): 326-29.

ewan that vaccinated 82% of the population, or 735,786 individuals. This was a major public health challenge that involved intensive publicity, the logistics of which were complicated by the province's largely rural population, and a sudden last minute curtailment because the shipment of vaccine was delayed.<sup>84</sup> Similar, though more urban focused mass vaccination efforts occurred in Manitoba and Ontario. But in September, echoing the beginnings of the Cutter crisis, four cases of paralytic polio in vaccinated individuals were reported. This forced Monteith to curtail and investigate the program until November, when most provinces resumed vaccinations.<sup>85</sup> By the end of 1962 a total of 3,771,681 Canadians had received the Sabin vaccine. For many people, this was in addition to the Salk vaccine, which in 1961 approximately 70% of the Canadian population under 40 years of age had received at least three doses.<sup>86</sup> This vaccine program had a significant impact on the incidence of paralytic polio in the country, reducing it to a case rate of 0.5 per 100, 000 in 1962, 0.1 in 1964, and effectively to zero thereafter (Table 1).<sup>87</sup>

What is most striking about the years between the licensing of the Salk and Sabin vaccines is how the problem of polio and its control moved rapidly into the international arena and the prominent role Canada played in this process. The two types of polio vaccines have brought this disease under control, particularly in Canada and in other industrialized countries since the early 1960s. However, polio epidemics have continued in many parts of the world where epidemiological, public health and demographic conditions have favoured a shift of the poliovirus from a uniform and subclinical endemic circulation, to uneven epidemic infections while

<sup>84</sup> Skoll and Kotyk, Ibid: Saskatchewan Department of Public Health, Annual Report, 1962-63 (Regina: 1963), p. 21-2.

<sup>85</sup> CMRL, Annual Report, 1962-63, (Toronto: 1963), p. 7-9: Boyd and Mosley, "The Use of Poliovirus Vaccine Live, Oral (Sabin), Trivalent, in Metropolitan Toronto, 1962;" F.P. Nagler, "Recent Experience with Oral Poliovirus Vaccine (Sabin) in Canada," CJPH, 54 (Nov. 1963): 509-14.

<sup>86</sup> Nagler, Ibid.,

<sup>87</sup> Ferguson, "The Story of Poliomyelitis Vaccines:" P.V. Varughese (et al.), "Eradication of Indigenous Poliomyelitis in Canada: Impact of Immunization Strategies," CJPH, 80 (Sept/Oct. 1989): 363-68.

both vaccines have been unevenly available. Today, this process continues amidst a major effort on the part of the World Health Organization to eradicate polio by the year 2005 and which is dependent upon the use of both types of polio vaccines.<sup>88</sup>

On a more personal level, the effects of polio echo for its survivors with the recent emergence of post-polio syndrome (PPS). This debilitating, though often medically controversial syndrome, first gained public prominence during the 1980s, sparked by an NBC-TV program entitled "Whatever Happened to the 300,000 Polios?" Some polio survivors interviewed "described increasing difficulties and distress at being abandoned and forgotten some 30 plus years or more after the onset of their disability." This show generated great interest among the polio survivor community in North America, stimulated further medic attention, and, beginning in 1981, a series of international conferences. The Ontario March of Dimes established Canada's first post-polio program in 1983 after conducting a survey of polio survivors. This effort has grown and led to local PPS clinics, other provincial PPS programs, and a series of Canadian post-polio conferences.<sup>89</sup>

The symptoms of PPS are characteristic of the original onset of polio, and include weakness, paralysis and severe pain and fatigue. Over time the healthy nerve cells that had compensated for the motor neuron damage of the original polio infection, weaken prematurely under the extra stress of maintaining as "normal" a

<sup>88</sup> Harry F. Hull (et al.), "Paralytic Poliomyelitis: Seasoned Strategies, Disappearing Disease," The Lancet, 343 (May 28, 1994): 1331-37.

See for example: Don A. Olsen and Ely Henig (eds.), Whatever Happened to the Polio Patient: Proceedings of an International Symposium, October 1981, Chicago (Chicago: Rehabilitation Institute of Chicago, 1982); Ontario March of Dimes, Post-Polio Workship Proceedings, April 22, 1983. Toronto (Toronto: Ontario March of Dimes, 1983); Audrey King, "The Ontario Scene" in Ontario March of Dimes, Proceedings of the Ontario March of Dimes Roosevelt Post-Polio Seminar, June 1, 1985, Toronto (Toronto: OMD 1985); Shirley Teolis, "The History, Achievements and Future Plans of the Ontario March of Dimes Conference: Polio - A Second Challenge, November 1-2, 1986, Toronto (Toronto: OMD, 1987); Ontario March of Dimes, Proceedings of National Conference on the Late Effects of Polio, November 3-5, 1988, Toronto (Toronto: OMD, 1989); Ontario March of Dimes, Proceedings of Ontario March of Dimes Conference: Destination '92 - Well Being for Polio Survivors, June 13-14, 1992, Toronto (Toronto: CMD, 1993).

lifestyle as possible and leave nothing but damaged cells to carry the load.<sup>90</sup> In light of the large population of polio survivors, an estimated 1.6 million in the United States, 500,000 of whom are experiencing PPS symptoms, this problem revisits most of the frustrating medical management and rehabilitation frustrations and challenges of the epidemic era. This will only grow in Canada, especially as the survivors of the fourth and greatest epidemic wave age into the twenty-first century and an estimated half of whom develop PPS. Echoing organized efforts to generate research and government action during the epidemic era, the PPS challenge over the last decade has generated a national network of local and provincial support groups in Canada and elsewhere, and a concerted struggle to educate the medical profession all over again about the particular needs of polio survivors.<sup>91</sup> This study is an important part of such an effort, from which this author has been very much inspired and assisted.

<sup>90</sup> See for example, Neil R. Cashman, "Neurology of Post-Poliomyelitis Syndrome," in Proceedings of Ontario March of Dimes Conference: Destination '92 - Well Being for Polio Survivors, p. 31-51.

<sup>91</sup> G.M. Torrance and J.M. Kaufert, Profile of Post-Polio Networks and Self-Help Groups in Canada, Report to Disabled Persons Unit, Health and Welfare Canada, (Ottawa: 1991); Lauro S. Halstead, "The Lessons and Legacy of Polio," in LS. Halstead and G. Grimby, Post-Polio Syndrome (Hanley & Belfus, in press), draft of chapter provided by Ontario March of Dimes.

# CONCLUSIONS:

The Meaning, Lessons and Legacy of Polio in Canada

In assessing the Canadian polio story two questions dominate: How can polio's extraordinary dramatic impact be explained? What factors shaped the particular Canadian polio experience? As stressed in this study, despite polio's relatively minor statistical impact compared to other infectious diseases and chronic killers -- a total of 50,000 cases and 4,240 deaths in Canada between 1927 and 1962 -- as epidemics worsened this frightening crippler generated an escalating response from Canadian governments that established new precedents in the free and unconditional provision of public health care services. No other single infectious disease had provoked such a broad public response in Canada. While the range of specific medical and hospitalization services available to polio victims varied provincially, in an era before universal public health insurance, there was a clear national trend towards their unconditional expansion. Moreover, despite a tradition of provincial jurisdiction over health matters, the alarming rise in polio incidence after World War II led to increased federal intervention and the imposition of national public financing, control and evaluative standards with gamma globulin and both polio vaccines. Such federal intervention circumvented traditional federal-provincial rivalries and was strongly encouraged, if not expected, by the provinces, the medical community, the media, and the Canadian public.

This strong state-led response to polio was the clearest feature distinguishing the Canadian polio experience from the American. Furthermore, and of particular significance, the nature of this response was closely tied to evolving national public health traditions and the scientific contributions Canada made to the larger polio vaccine story. Thus, on a number of levels, polio had an important historical impact on Canada, while Canada had a major impact on the international history of this disease. Such a situation is rare in Canadian medical history. The story of insulin in

### Conclusions

the 1920s was similarly dramatic for Canadian medical science – Connaught Laboratories and the University of Toronto especially -- and the history of diabetes.<sup>1</sup>

This international perspective is important historically for a number of reasons, particularly in light of the current post-polio syndrome challenge and the international polio eradication effort, since the existing historiography of polio has characterized this disease, and especially the Salk vaccine story, almost exclusively in American terms. This view has overlooked other national polio experiences, which, as was true in Canada, were often more intense and managed quite differently than in the U.S.; although, on many levels, the Canadian polio experience was strongly influenced from south of the border. The issue of how this American influence was felt and reshaped in order to maintain and define a distinctive Canadian response to polio has been of particular interest here. More specifically, the prevailing historical view has minimized or neglected a variety of significant scientific and political contributions other countries have made to the management and final control of polio's paralytic threat. A comprehensive understanding of the Canadian polio story is thus of historical value on both sides of the border, especially since Canada has been traditionally been percieved as America's friendly northern neighbour and generally taken for granted. Indeed, as we have seen, there were important cross border dynamics during the polio epidemic era, and in both directions.

A variety of factors emerge from this dissertation that explain the particular shape of the Canadian response to polio. Three main elements dominated. First was the unique and frightening nature of paralytic polio as a personal, political and worsening public health threat that grew within a context of medical success against other serious diseases and rising expectations for protection from this particularly dreaded one. Secondly was the dramatic public imagery of paralytic polio, generated by the popular press out of the inherent emotional impact and newsworthiness of

Michael Bliss, The Discovery of Insulin (Toronto: McClelland and Stewart, 1982).

#### Conclusions

polio epidemics. This was strongly reinforced by the predilection of paralytic polio to suddenly strike and permanently disable growing numbers of healthy and innocent middle class children as well as adults. Finally, and perhaps most salient to the state-oriented Canadian response to polio was the central role of Connaught Laboratories at the University of Toronto, and especially the scientific and practical leadership of Dr. Robert D. Defries. His national public health connections, professionally and politically, as well as personally, built on the shared educational experience and values disseminated through the School of Hygiene and Connaught, established the foundation upon which a generation of provincial and federal health leaders across Canada approached the many and unusual public health, public policy and scientific complexities of the polio problem.

Of primary importance to understanding the social and political impact of polio was that, unlike almost all other diseases, the paralytic effects of polio were sudden, plain to see, and usually permanent. Major polio epidemics also created large populations of "polios" at once in a given area. This was multiplied over time and across the country as epidemics worsened. Such public visibility, therefore, demanded an equally public and visible response. Through the same period, many infectious diseases, such as measles, chicken-pox, whooping cough, or scarlet fever, occurred at much higher levels than polio, but on a more constant and publicly invisible level. or in rare outbreaks with transitory illnesses and death, or a full recovery that left little subsequent evidence of the disease. Although dramatic and tragic, the 1918-19 influenza pandemic was a singular event. Similarly, diphtheria was a major childhood killer that came under control just as polio became a major threat. Yet, while it left many emotional scars, diphtheria left few that were physically visible. The effects of tuberculosis, venereal disease, cancer, and heart disease, all of which affected and killed far more people than polio ever did, were also generally invisible in daily life, both by their insidious and chronic nature and by personal choice. More impor-
tantly, these diseases did not occur in regular and dramatic epidemic form, nor were associated in the public mind with anything quite like a "polio season." There have been many seasonal and episodic diseases in the history of medicine, such as malaria, plague, cholera, smallpox and typhus, and while they generated significant political responses, especially in the nineteenth century, they have not occurred in any significance during the twentieth century. Meanwhile, through the first half of this century, everybody knew a polio victim, but nobody wanted to become one. It was the high visibility of a growing community of "polios" that layed the foundation of the disability rights movement.

Faced with worsening and unpredictable polio epidemics, the medical profession was essentially helpless in preventing or controlling them, or effectively treating their short and long term paralytic effects. This was an emotionally and professionally uncomfortable situation for physicians in light of celebrated medical successes against other infectious diseases. While public expectations of medicine and science grew, physicians were rendered all but impotent before this disease on many levels, especially in the fundamental inability of making an early and accurate diagnosis before paralysis appeared. This was further complicated by the innocuous and non-specific nature of polio's initial symptoms that could suddenly and dramatically develop into paralysis.

Confounding the medical management of polio was its variability in paralytic effects that could not be predicted, nor treated with any speed or certainty. Despite Sister Kenny's methods, paralytic polio could not be cured, at least not by any specific or reliable medical or therapeutic intervention. Short and long-term recovery was almost totally dependent upon the degree and specific site of motor neuron damage inflicted by the poliovirus, and by the individual's capacity to compensate for such damage with spontaneous motor neuron reconnections, muscle restructuring and rehabilitation. In light of such variability, any predictions about the degree or

timing of recovery, or controlled evaluations of particular therapies such as convalescent serum, or Kenny's therapeutic methods, had little real meaning. The recovery from paralytic polio took considerable time, patience, physical effort and financial expense, and as is increasingly clear with the recent emergence of postpolio syndrome, such recovery is by no means permanent. Indeed, intensive compensatory efforts soon after the original infection and over many years, represent a major underlying factor in the development of post-polio syndrome.

Another powerful factor reinforcing polio's potency was the enigmatic nature of the poliovirus that seemed immune to efficient scientific investigation through most of the epidemic era. There was also the irony of polio's long mysterious epidemiology. It was both an ancient endemic illness and a modern epidemic plague that grew into a major public health threat directly because of improving public health infrastructures and modern hygienic standards. In this sense epidemic polio was an ironic result of twentieth century public health progress, felt most severely among those most confident and unsuspecting in their modern sanitized environment. This is an epidemiological situation that has likely occurred with other viruses during this century.

Magnifying the general impact of these singular features of epidemic polio was the growing influence of the popular press and media in general. Beyond polio's strong newsworthiness, the press' coverage played an unusually strong and practical role in the management of this disease. In order to ease the widespread fears of polio and give every chance of protecting children, parents, physicians and the public needed to know as much about polio as possible. This practical element first became an important part of the provincial public health strategy against polio with the preparation and wide use of convalescent serum during the first epidemic wave. The Toronto nasal spray trial in 1937 also reinforced the strong pragmatic, though problematic role played by the press in the management of polio and the evaluation

of any preventive agent. The gamma globulin and Salk vaccine trials later reinforced the serious public health and political challenges such intense polio publicity increasingly created.

During major epidemics especially, the popular press further intensified and probably exaggerated polio's terrifying public image in Canada. Frequent nursing shortages grew into crises in many provinces and led to the issuing of desperate pleas in the press for volunteer nurses, and anyone else, to help handle the overwhelming numbers of cases. Such public campaigns, however, undermined efforts to control unusually strong public apprehensions about this disease already heightened during an epidemic, reinforced by press coverage of iron lung emergencies and daily reports and running tolls of polio victims. At the same time doctors and health authorities increasingly targeted the press for its excessive publicity about polio and the "overplaying" of its threat. Despite the statistics and logic of physicians, who were essentially helpless against polio anyway, what scared parents and the public the most was the grim spectre of unpredictable epidemics of paralysis, randomly striking down innocent children. Also greatly feared were the short and long-term social and financial costs of major polic epidemics to individuals, families. hospitals, communities and provincial governments. Paralytic polio could bring a long-term financial and psychological crisis to even the most financially secure individuals and families.

As this study has shown, it was in this context that provincial governments were forced to do something. anything, to mitigate the impact of polio epidemics. What could they effectively do about epidemics, and more importantly, their broad personal, social, economic and political effects in their wake? A Canadian tradition of provincial public health intervention had built up by the 1920s with the provision of free biologicals and TB and VD clinics. But there was always something specific to offer patients to at least diagnose the illness, if not treat it. This is why the coinci-

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dence of a sudden rise in American interest in convalescent serum with Canada's first wave of polio epidemics was so significant. Regardless of whether or not the serum had any real effect, it was harmless and gave provincial health departments something specific and standardized to uniformly offer all polio cases.

Particular stress has been placed on the importance of conjunctions between new polio weapons and Canadian epidemics, conversely reinforced by the 1935 polio vaccine debacle in the U.S. But there were no serious epidemics in Canada in 1935 and thus no pressure for provincial governments to adopt the vaccines. However, the American excitement over preventive nasal sprays in 1936-37 did coincide with major epidemics in Manitoba and Ontario. In light of earlier uncontrolled American trials of the spray, the need for its standardization and control led to a definitive evaluation through a broad cooperative effort led by the Ontario Department of Health. This significant pattern was repeated provincially during and after major epidemics with the adoption of Sister Kenny's methods in 1941-42, and in joint federal-provincial programs with gamma globulin in 1952-53, the Salk vaccine in 1954-55, and finally the Sabin vaccine in 1959-60. While some provinces also established special polio treatment policies by 1938, under the influence of Kenny's methods and further epidemics through the 1940s and early 1950s, such policies were expanded significantly in most provinces in a variety of ways. The severity of the 1952, and especially the 1953 epidemics, was the most significant in forcing further polio policy expansions and also the development of new, provincially funded home care and rehabilitation programs.

After 1938 the North American polio experience was dominated and shaped by the National Foundation for Infantile Paralysis and its annual "March of Dimes" campaigns. The NFIP's unprecedented fundraising success and sophisticated voluntary, patient care and polio research program strongly reflected the particular middle class threat of epidemic polio. While the NFIP's power and presence effectively

minimized American state and federal government involvement in the polio problem, as shown in this study, it had the opposite effect in Canada. The Canadian Foundation for Poliomyelitis was directly inspired by the NFIP model, but clashed with the strong interests of many provincial governments, and Ottawa, over who would best manage the polio problem. The prevailing attitude was to place voluntary agencies in a clearly supportive role to government polio policies. The two ends of this spectrum were most evident in western Canada. The Alberta government all but rejected the CFP outright, confident that its Polio Act was sufficient to deal with polio in the province. British Columbia, in contrast, had a strong voluntary spirit and a decentralized provincial health department thankful for any responsibilities the B.C. Polio Foundation wished to assume to assist polio patients, as well as the government itself.

The escalating challenge of polio and its long-term complexities and costs in Canada stretched the concept of "state medicine" further, and beyond a more traditional government support for the indigent, as was the general case during this period with provincial TB and cancer programs. Broad hospital, medical and nursing services to polio patients were increasingly provided in many provinces unconditionally, or at least very liberally, in response to public and political pressure to provide the full advantages of modern medical treatment, especially for children and when effective treatments were rare or non-existent. The potential costs of polio to even the most affluent families if left only to personal resources, coupled with the potential social costs to the state should paralysis be neglected or improperly treated for lack of financial resources, fueled a significant expansion in provincial health services as polio epidemics worsened, despite the costs incurred. Alberta, Ontario, Saskatchewan and Manitoba faced this dilemma most often and developed the most unconditional and generous polio policies in Canada.

At the federal level, it is clear significant interest in the polio problem did not emerge until 1947. This reflected Ottawa's general centralizing efforts after World

War II, its increasing interest in health care, and the sharply rising incidence and scientific and political challenges surrounding polio. Paul Martin's earlier personal and then family encounter with polio in 1946 just before becoming federal health minister, energized the federal polio effort considerably and was closely linked to his larger political goal of universal health insurance in Canada. Guiding Martin's larger goals, and the more particular management of the polio problem was his long-serving Departy Minister of Health, Dr. G.D.W. Cameron. In shaping the Canadian polio story, especially after World War II, Cameron's importance was second only to Defries. Canada's fourth wave of major epidemics placed increasing pressure on Ottawa to do something to assist the affected provinces, investigate outbreaks, and coordinate a consistent national effort against the disease. For federal health officials, such as Cameron and Martin, the growing challenge of polio presented major obstacles that often proved politically embarrassing and reinforced a closer dependence upon the experience and staff of Connaught.

The severity of the 1952 and 1953 epidemics brought this situation to a climax with the emergence of gamma globulin. Under public pressures generated out of its American mass use by the NFIP, Ottawa expedited its "emergency" production at Connaught. The preparing of gamma globulin provided a valuable opportunity to finally establish a Canadian blood fractionation capacity. Moreover, this gamma globulin emergency prompted an unusually centralized national response to control its use and distribution that represented a new challenge to the otherwise exclusive provincial jurisdiction over biologicals use. The even more dramatic emergence of the Salk vaccine and its Canadian introduction further extended this federal involvement, ensuring basic national quality and evaluative standards, and guaranteed free and unconditional access for those most threatened by the disease. In each of these aspects, the Canadian experience contrasted sharply from the American, the impli-

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- 13 - 23

cations of which were most significant and politically prominent on both sides of the border in the wake of the Cutter crisis.

The Canadian Salk vaccine experience dramatically demonstrated the value of government intervention in public health, which resulted ultimately in a fairer, faster, safer and much less expensive program than was the case south of the border. These were fundamental values underlying the subsequent politics of the Salk and Sabin vaccines, as well as the larger evolution of the Canadian health care system, especially the development of public hospital and medical insurance between 1957 and 1968. As the Canadian polio story underscores strongly, central to the practical and professional evolution of such public health values was Connaught Laboratories, and especially the leadership of Defries. Others clearly played important roles in the polio story, especially provincial deputy ministers of health, but it was Defries that taught most of them at the School of Hygiene. Defries embodied such public health values and applied them practically on a national level in many ways. This was most evident with the Salk vaccine, but the broader problem of polio represented a major and growing public health and scientific challenge to Defries through the epidemic era. The recruitment of Dr. A.J. Rhodes in 1947 brought a vital element to Defries' pragmatic approach to polio research that reflected and was guided by intense public hopes for an effective polio vaccine.

Under Defries' direction, especially after World War II, Connaught had become a unique medical research and biologicals production institution well experienced on both levels and well prepared to begin a comprehensive polio research program led by Rhodes. In this sense, the Connaught polio research and vaccine story followed the model established with the discovery and initial production of insulin at the University of Toronto in the early 1920s. As stressed in Michael Bliss' *Discovery of Insulin*, the U. of T.'s research and production facilities were each well prepared to

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support and quickly exploit the work of Banting, Best, Collip and Macleod with minimal delay and to enormous public benefit.

The NFIP recognized and exploited these Canadian assets early by quietly investing the American public's dimes on an ever-increasing level, especially once Connaught's Medium 199 emerged as the key to making a safe and practical polio vaccine possible. Among the most important advantages Connaught had over American pharmaceutical companies, beyond its long vaccine research and production experience, and its capacity to house large numbers of monkeys, was that it was a non-commercial, university-based institution. Salk could make a small supply of his vaccine in his laboratory, but no American commercial manufacturers were prepared to get involved with an expensive and risky effort to produce the vaccine for the NFIP's unprecedented field trial until Connaught established the methods to make poliovirus production possible on a mass scale.

Despite such American dimes, it is important to emphasize that the NFIP's financial support of Connaught's polio work was reinforced by substantial levels of Canadian private and government funding. This Canadian funding largely built the physical capacity and research experience at Connaught that the NFIP later found essentia! to making a polio vaccine work on a large scale. Under Defries' and Rhodes' leadership, Connaught's polio research program also sparked major expansions of its virus research facilities generally, promoted closer ties between Connaught and the federal government, and facilitated Ottawa's capacity to investigate virus diseases and ultimately to test and control polio vaccines. This process continued during the large scale production of the Salk vaccine and later with the development and production of the combined and Sabin types.

This study of the Canadian polio experience represents the first national word on this subject. There have yet to be written similar national studies of polio elsewhere, nor indeed, of other major twentieth century diseases. There are thus few

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comparable historical models to draw on. Reinforced by the pragmatic elements of this disease currently, priority has thus been given to establishing the historical foundation of the Canadian polio story within an approachable and coherent narrative structure, perhaps at the expense of more focused historical analyses of particular themes. This study thus raises a variety of important issues about the particular history of polio in Canada, and the larger development of Canadian public health in the twentieth century. For example, more intensive and thematic provincial and local examinations of polio epidemics and their larger social, economic, political and personal impact are needed, as are other national and international approaches. More detailed studies of the unique personal experience of polio over the long term are also necessary. There are also the more traditional historical issues such as the role of gender with respect to Sister Kenny's prominence and the relationship she, and nurses in general, had with the medical profession in managing polio cases. There is also the question of polio's medical management and public, popular and personal attitudes and reactions towards it. What other middle class diseases have there been and how has their management differed from other, more lower class public health threats, especially in the twentieth century?

It is clear that the Canadian polio experience was unique, both in terms of the leadership of a few key individuals, a single public health institution and the provincial and federal governments, as well as in its relationship and dynamics with the U.S. encounter. Despite the expansion in public health services polio forced in Canada, its threat was but one component -- albeit a significant one -- in the larger evolution of the Canadian health care system. What was the precise role of the polio threat in this broader process? What were the political and scientific contributions of Connaught, and more specifically, of Defries in this area? What other diseases had a strong influence? This study has also stressed a significant American influence on the expansion of Canadian government intervention in health care. Ironically, it

seems that a tradition and ideology of less state involvement in health care in the U.S. reinforced more state intervention north of the border. In what other ways was this process at work in Canadian health care? Moreover, the tragedy of the Cutter crisis and the Canadian government's management of the Salk vaccine provided a strong lesson for the Americans of the political benefits of such state involvement. Were there any other diseases that had a similarly potent cross-border impact in both directions? Furthermore, how important has the popular media been in the evolution of this pattern, the management of other diseases, and in the larger development of Canadian health policy? The Canadian polio story suggests the press had a highly significant role on many fronts, an important component of which was American. The phenomenal success and aggressiveness of the NFIP in its fundraising, patient care and research program, and its singular drive to win the war on polio at all costs, raises important questions about the larger role of voluntary health organizations in the U.S. and Canada. What influences have they had? How and why do such organizations differ nationally and internationally in their development, structure, financial success and political impact?

For most Canadians the polio story ended in 1962 as serious polio epidemics no longer occurred and there were no more "polio seasons" for parents to worry about. However, for the survivors of those epidemics the effects of this complex disease persist, and for increasing numbers such debilitating effects have recently worsened due to post-polio syndrome. Despite the Salk and Sabin vaccines, polio outbreaks and epidemics continue in many parts of the world and their high cost has led to the World Health Organization's comprehensive international effort to follow the smallpox precedent and eradicate polio on Earth by the turn of the millennium. Polio has now been officially eradicated from the Western hemisphere.<sup>2</sup> Continued vigilance is required to ensure this happy situation is maintained and expanded world-wide.

<sup>&</sup>quot;Polio Conquered in the West," Toronto Star, (Sept. 30, 1994): D24.

## **APPENDIX:**

Figure 1: Poliomyelitis Incidence in Canada, 1927-1962

- Table 1: Poliomyelitis Case Rates per 100,000 Population, Canada and by Province, 1927-1962
- Table 2: Poliomyelitis Reported Cases, Canada and by Province, 1927-1962
- Table 3: Poliomyelitis Death Rates per 100,000 Population, Canada and by Province, 1927-1962
- Table 4: Poliomyelitis Deaths, Canada and by Province, 1927-1962
- <u>Table 5:</u> Connaught Medical Research Laboratories: Research Funding Priorities by Outside Grants, 1947-1954
- <u>Table 6:</u> Average Annual Death Rates per 100,000 Population Leading Causes of Death, Canada, for 5-year Periods, 1921-1965
- Table 7: Annual Rates of Notifiable Diseases, Cases per 100,000 Population, Canada, 1927-1962
- Exhibit 1: Historical Questionnaire for Polio Survivors (Distributed through Canadian network of Post-Polio Support Groups, 1993)
- Exhibit 2: Sample Pages of Historical Questionnaire Analysis



395

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#### Appendix

## Table 1

## Poliomyelitis Case Rates per 100,000 Population Canada and by Province, 1927-1962<sup>1</sup>

(All Cases, 1927-1956;	Paralytic Cases Only,	1957-1962 *)
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Year	CAN	BC	AL	SA	MA	ON	QU	NB	NS	PEI	NF
1927	6.3	29.2	48.8	1.0	0.9	1.6	0.4	4.0	5.0	0	
1928	8.0	15.9	13.7	3.3	65.4	2.6	1.4	1.2	1.9	0	
1929	7.7	6.5	4.5	6.6	8.1	14.8	3.2	1.2	0.6	4.5	
1930	10.1	5.0	20.3	7.9	6.5	19.8	1.1	0.2	5.4	4.5	
1931	12.9	6.1	3.1	0.7	2.1	4.7	37.5	1.5	2.5	0	
1932	9.1	0.7	4.7	0.7	1.0	5.0	24.2	3.1	0.8	2.2	
1933	2.4	0.7	4.1	3.0	1.0	1.5	4.2	1.2	0.4	0	
1934	4.8	4.4	1.5	1.5	1.4	9.2	3.8	0.7	1.9	1.1	
1935	3.4	2.7	19.9	2.3	3.4	3.0	1.0	0.7	0.4	1.1	
1936	8.9	3.6	2.1	9.6	73.8	5.8	3.9	0.7	0	0	
1937	35.4	3.4	21.5	54.5	37.3	70.0	5.5	37.5	7.8	1.1	
1938	5.2	5.5	13.3	3.2	22.2	4.4	1.7	3.8	0.9	0	
1939	3.2	0.1	3.1	1.7	3.6	5.8	1.8	0.4	3.6	0	
1940	1.7	0.6	0.3	1.0	2.5	2.4	2.0	0.2	0.4	0	
1941	16.4	7.1	20.9	6.2	132.7	3.8	1.4	91.6	3.3	Ō	
1942	5.9	5.4	1.0	1.6	9.9	2.4	4.5	29.1	27.6	3.3	
1943	2.8	0.9	2.5	4.4	5.3	2.1	3.3	3.9	1.5	3.3	
1944	<u>5.1</u>	2.0	12.0	2.0	13.6	8.5	1.3	18.4	3.3	1.1	
1945	3.2	5.3	1.7	2.4	3.3	4.6	1.6	1.5	4.2	Ō	
1946	20.6	2.1	8.5	4.4	6.6	12.7	44.4	19.7	8.1	85.1	
1947	18.3	29.9	9.9	33.1	79.4	19.1	3.9	4.1	11.5	2.1	
1948	9.1	11.6	42.0	10.0	19.0	8.7	1.2	2.0	4.6	1.1	
1949	18.3	20.2	14.6	13.3	15.7	26.0	15.1	7.9	13.5	0	5.8
1950	6.7	6.4	15.1	14.4	2.9	8.4	1.9	2.9	2.7	69.8	0.9
1951	18.4	8.0	6.3	11.1	7.1	37.0	6.8	9.9	33.6	23.4	1.4
1952	32.9	49.6	76.3	142.9	105.1	14.7	3.0	81.2	8.7	57.0	1.1
1953	59.9	63.1	145.5	139.6	286.4	42.7	11.4	16.5	4.7	10.9	60.8
1954	15.7	16.3	49.5	22.6	13.9	4.9	17.9	11.3	20.4	82.2	5.6
1955	6.5	16.7	19.7	8.2	3.9	3.2	2.7	7.1	16.8	11.0	3.7
1956	3.7	6.0	6.8	2.4	2.6	3.6	3.3	4.3	2.9	4.0	1.0
1957*	1.1	1.8	3.1	2.3	0.8	0.9	0.6	0.9	0.1	Ō	0.2
1958*	1.5	0.8	1.8	0.1	12.3	0.4	1.5	0.8	0	0	0.9
1959*	10.7	8.4	6.7	5.1	2.9	3.4	23.2	10.7	1.3	6.9	31.5
1960*	5.1	10.3	15.6	6.0	1.4	0.6	5.6	15.6	1.2	1.0	10.7
1961*	1.0	0.4	2.0	0.8	0	0.4	2.2	0.2	0.1	0	2.0
1962*	0.5	0.1	0.4	0.3	0.4	0.3	1.0	0.2	0.1	0	0

<sup>1</sup> R. Kohn, "Some Figures on Poliomyelitis in Canada," Canadian Journal of Public Health, 45 (June 1954): 225-35 (1927-30 figures); Canada, Dominion Bureau of Statistics, Poliomyelitis Trends, 1956 through 1960 (Ottawa:1957-1961) (1931-60 figures); Annual Reports of Notifiable Diseases, 1961-62 (Ottawa: 1961-63). See also Table 2 footnote regarding case reporting variations.

#### Appendix

## Table 2

#### Poliomyelitis Reported Cases Canada and by Province, 1927-1962<sup>1</sup>

(All Cases, 1927-1956; Paralytic Cases Only, 1957-1962 \*)

Year	CAN	BC	AL	SA	MA	ON	QU	NB	NS	PEI	NF
1927	609	182	313	8	6	52	14	16	26	0	
1928	787	102	93	26	434	85	37	5	10	0	
1929	770	-43	45	59	58	480	90	5	3	4	
1930	1027	34	144	70	45	671	35	1	28	4	
1931	1342	-42	23	5	15	161	1077	6	13	0	
1932	956	5	35	6	7	175	769	13	4	2	
1933	255	5	31	28	7	53	124	5	2	0	
1934	520	32	11	12	10	326	115	3	10	1	
1935	363	20	152	21	24	108	32	3	2	1	
1936	978	27	16	77	525	208	122	3	0	0	
1937	3905	26	167	519	267	25-46	172	164	-43	1	
1938	577	43	104	34	160	160	54	17	5	0	
1939	359	1	24	11	26	216	59	2	20	0	
1940	192	5	2	9	18	91	64	1	2	0	
1941	1881	58	166	59	969	143	-48	419	19	0	
1942	687	47	8	15	72	92	152	135	162	3	
1943	327	8	20	37	38	81	113	18	9	3	
1944	722	19	97	17	99	337	47	85	20	1	
1945	384	52	14	20	24	184	57	7	26	0	
1946	2527	21	68	37	-48	518	1612	94	-49	80	
1947	2291	312	82	277	587	796	144	20	71	2	
1948	1168	125	359	84	142	372	-46	10	29	1	
1949	2458	229	129	111	119	1138	587	-40	85	0	20
1950	911	76	138	120	22	376	77	15	17	67	3
1951	2568	92	59	92	55	1701	274	51	216	23	5
1952	4755	596	740	1205	839	705	125	-127	57	57	4
1953	8878	797	1472	1202	2317	2239	488	88	31	11	233
1954	2390	217	523	197	114	250	786	61	137	83	22
1955	1021	230	215	72	33	169	122	39	115	11	15
1956	600	84	76	21	22	193	152	24	20	-1	-1
1957*	182	26	31	20	8	54	37	5	0	0	1
1958*	249	12	22	1	107	20	79	4	0	Ō	
1959*	1886	132	83	- 46	26	200	1171	62	9	7	139
1960*	909	165	201	56	13	39	284	92	9	1	49
1961*	188	6	26	7	0	23	115	1	1	ō	9
1962*	89	2	5	3	1	19	56	1	1	Ō	Ő
Total	49711	3873	5694	4584	7260	14981	9336	1942	1251	367	508

Meeting, Dominion Council of Health, October 15-16, 1937, NAC, Microfilm, C9815 (pre 1930 figures); Canada, Dominion Bureau of Statistics: Poliomyelitis Trends, 1956 through 1960 (Ottawa: 1957-1961) (1931-1960 figures); Annual Reports of Notifiable Diseases, 1961-62 (Ottawa:1962-63). Note that there was some variability in polio case reporting practices between provinces, especially before 1931. There are also some minor differences between polio case statistics reported by the Dominion Bureau of Statistics and those recorded in provincial health department annual reports. Figures listed in this table from 1931 to 1962 are from the Dominion Bureau of Statistics, and exclude the Yukon and North West Territories.

## Table 3

Year	CAN	BC	AL	SA	MA	ON	QU	NB	NS	PEI	NF
1927	2.0	5.9	10.3	1.0	0.8	0.7	1.5	1.5	2.1		
1928	1.9	3.0	5.3	1.3	6.5	1.0	1.3	1.0	0.4		
1929	1.5	2.0	1.2	2.3	1.9	1.4	1.6	0.7	0.8		
1930	2.1	1.2	4.5	2.3	0.9	2.7	1.6	0.7	1.6	1.1	
1931	2.2	1.6	1.1	1.2	0.3	0.8	5.2	0.5	1.9	1.1	
1932	1.6	0.1	1.9	0.6	0.3	0.7	3.8	0.5	0.8	0	
1933	0.7	0.3	0.9	0.9	0.7	0.4	0.9	0.7	1.1	0	
1934	0.8	0.4	0.5	1.1	0.4	1.1	0.6	0.7	0.8	0	
1935	0.6	0.1	2.0	0.5	1.4	0.4	0.5	0.2	0.4	2.2	
1936	0.9	0.9	0.5	1.0	5.2	0.6	0.5	0	0.2	1.1	
1937	1.8	0	1.7	2.4	1.7	3.3	0.7	1.1	1.5	0	
1938	0.7	0.5	1.9	0.8	1.5	0.7	0.5	0.9	0.2	Ō	
1939	0.5	0.4	0.6	0.1	0.7	0.6	0.4	0.2	0.5	1.1	
1940	0.4	0.2	0.5	0.2	0.7	0.4	0.5	0	0.5	1.1	
1941	0.6	0.1	1.0	0.3	2.7	0.3	0.1	4.2	0.7	0	
1942	0.5	0	0	0.4	0.1	0.3	0.6	1.7	2.9	4.4	
1943	0.2	0.1	0	0.4	0.1	0.2	0.3	0.4	0.2	0	
1944	0.3	0.2	0.1	0.1	1.0	0.5	0.05	0.9	0.2	0	
1945	0.2	0.1	0	0.4	0.3	0.3	0.1	0.2	0.2	0	
1946	1.5	0.1	1.0	0.4	0.4	0.8	3.2	1.0	0.3	11.7	
1947	0.7	1.1	0.8	1.4	0.9	0.7	0.3	0.2	1.1	1.1	
1948	0.6	0.5	3.3	1.4	0.5	0.5	0.2	0	0.6	0	L
1949	1.3	0.3	1.0	0.7	1.5	1.9	1.1	1.4	2.1	0	0
1950	0.3	0.2	0.9	1.1	0.1	0.2	0.2	0	0	4.2	0
1951	1.2	0.5	0.2	1.4	0.5	2.2	0.2	0.4	3.6	2.0	0
1952	2.2	3.3	8.1	10.7	3.1	1.0	0.3	2.1	0.9	2.0	0
1953	3.3	2.4	10.7	8.4	11.2	2.5	0.8	0.9	0.9	1.0	2.9
1954	1.0	0.5	2.6	0.8	0.6	0.4	1.8	0	0.9	4.0	0
1955	0.2	0.4	0.4	0.6	0.1	0.1	0.3	0.2	0.1	0	0
1956	0.3	0.3	0.3	0.3	0	0.2	0.6	0	0.1	<u> </u>	0
1957	0.2	0.1	0.5	0.5		0.1	0.1		0.1	<u> </u>	0
1958	0.2	0.2	0.1		1.3		0.1	0.2	0		0
1959		0.9	1.0	0.3	0.2	0.4	2.1	1.2	0	1.0	2.7
1960	0.5	0.9	0.9	0.9	0.1	0.05	0.7	0.3	0.1	0	1.1
1961			0.2				0.2	0	0.1	<u> </u>	o
1962	0.05	I OF	1 0	I OL	I OL	I OF	I 0.11	I OL	0	1 0	1 0

## Poliomyelitis Death Rates per 100,000 Population Canada and by Province, 1927-1962<sup>1</sup>

<sup>1</sup> Canada, Dominion Bureau of Statistics, Vital Statistics, 1927-1930 and 1961-62 (Ottawa: 1928-31 and 1962-63); Canada, Dominion Bureau of Statistics, Poliomyelitis Trends, 1956 through 1960 (Ottawa: 1957-1961).

#### Appendix

## Table 4

Year	CAN	BC	AL	SA	MA	ON	QU	NB	NS	PEI	NF
1927	193	37	65	8	5	21	40	6	11	0	
1928	182	19	35	11	43	34	34	4	2	0	
1929	152	13	8	20	13	46	45	3	4	0	
1930	215	8	32	21	6	92	44	3	8	1	
1931	223	11	8	11	2	28	150	2	10	1	
1932	164	1	14	6	2	24	111	2	4	Ō	
1933	73	2	7	8	5	15	27	3	6	0	
1934	84	3	4	10	3	39	18	3	4	0	
1935	64	1	15	5	10	14	14	1	2	2	
1936	97	7	4	9	_ 37	23	15	0	1	1	
1937	200	0	13	22	12	119	21	5	8	0	
1938	83	4	15	7	11	25	16	4	1	0	
1939	56	3	5	1	5	23	14	1	3	1	
1940	48	2	4	2	5	14	17	0	3	1	
1941	68	1	8	3	20	10	3	19	4	0	
1942	64	0	0	3	1	12	19	8	17	4	
1943	26	1	0	3	1	8	10	2	1	0	
1944	38	2	1	1	7	21		4	1	0	
1945	24	1	0	3	2	11	5	1	1	0	
1946	179	1	8	3	3	31	115	5	2	11	
1947	88	12	7	12	7	31	10	1	7	1	
1948	74	5	28	3	4	22	8	0	4	0	
1949	175	3	9	6	11	82	44	7	13	0	0
1950	41	2	8	9	1	9	8	0	0	4	0
1951	162	6	2	12	4	101	10	2	23	2	0
1952	311	40	79	90	25	46	12	11	6	2	0
1953	494	30	108	72	91	124	33	5	6	1	11
1954	157	6	28	7	5	21	80	0	6	4	0
1955	36	5	4	5	1	6	13	1	1	0	0
1956	51	4	3	3	0	13	27	0	1	0	0
1957	26	1	6	4	0	8	6	0	1	0	0
1958	26	3	1	0	11	5	5	1	0	0	0
1959	182	14	12	3	2	23	106	7	0	1	12
1960	83	14	11	8	1	3	38	2	1	0	5
1961	11	0	2	0	0	0	8	0	1	0	Ó
1962	7	0	0	0	0	0	7	0	0	0	0
Total	4157	262	554	391	356	1104	1134	113	163	37	28

## Poliomyelitis Deaths Canada and by Province, 1927-1962<sup>1</sup>

Canada, Dominion Bureau of Statistics, Vital Statistics, 1927-62 (Ottawa: Queen's Printer, 1928-63). National totals include the Yukon and Northwest Territories, where polio deaths occurred in 1953: Yukon (9), N.W.T. (4); and 1959: N.W.T. (2). Official statistics are not available prior to 1950 for the Territories.

#### Appendix

## Table 5

## <u>Connaught Medical Research Laboratories</u> <u>Research Funding Priorities by Outside Grants</u><sup>1</sup> <u>1947-1954</u>

RESEARCH AREAS (Total Outside Grants)	1947-48 <sup>2</sup> (\$26,000)	1948-49 <sup>3</sup> (\$78,533)	1949-50 <sup>4</sup> (\$123,175)	1950-51 <sup>5</sup> (\$181,527)	1951-52 <sup>6</sup> (\$301.115)	1952-53 <sup>7</sup> (\$296,965)	1953-54 <sup>8</sup> (\$365.329)
Poilom yelitis (including gamma globulin and Coxsackie studies) (percentage of total outside grants)	\$4,242 (16%)	\$22.270 (28%)	\$25,250 (20%)	\$38,860 (21%)	\$79,590 (26%)	\$71,440 (24%)	\$174,926 (48%)
General Virus Studies (including influenza, encephalitis, hepatitis and related work)	<b>S4</b> ,007	<b>\$</b> 29,662	\$24,688	\$36,555	\$25,512	\$47.995	\$75,338
Cancer studies (including chemotherapy, synthetic medium and animal cell nutrition studies)	<b>\$8</b> ,593	<b>S</b> 16,506	\$16,987	<b>\$11,120</b>	\$25,023	\$27,765	\$25,000
Tuberculosis and related studies (penicillin, antibiotics)		\$3,925	<b>\$16,5</b> 00	\$22,492	\$31,100	\$24.163	\$23,000
Hormones and related studies (ACTH, pituitary, sex)		<b>\$3</b> ,900	\$15,000	\$55,000	\$44,200	\$29,920	\$5,350
Typhoid vaccine and related			<b>S2,80</b> 0	<b>S2.8</b> 00	\$2,500	<b>\$</b> 4,900	\$4,925
Toxolds (diphtheria and tetanus studies)			<b>\$6,65</b> 0	\$6.950	<b>\$6.</b> 700	<b>\$6,25</b> 0	\$3,750
Glandular products (heparin/ dextran)					\$22.500	\$22,600	\$22.8CO
Insulin					<b>\$15,000</b>	<b>\$15,000</b>	\$30,000

<sup>1</sup> These Outside Grants originated from the following sources: National Research Council; Ontario Cancer Treatment and Research Foundation; National Cancer Institute of Canada; National Foundation for Infantile Paralysis (US); Canadian Life Insurance Officers Association; Public Health Research Grants; Tuberculosis Control Grant; Defense Research Board; Insulin Committee Grants; W.K. Boyd Memorial Fund: J.P. Bickle Grants; National Institutes of Health (US).

<sup>&</sup>lt;sup>2</sup> "General Research Including Development and Improvement of Products, April to December 1947, April to December 1946," CA, 83-005-06, Box 12, file 8/8. There were also \$9,159 worth of funding from the National Research Council, but it is unclear where it was spent, although it was likely on diphtheria/tetanus toxold studies, tuberculosis related work, and hormone studies.

<sup>&</sup>lt;sup>3</sup> "Grants From Outside Sources to CMRL, 1948-49," CA, 83-005-06. Box 1, file 1/5; "CMRL, Applications for Aid in Research, 1948-49, 1949-50," CA, 83-005-06, Box 11, file 2/11; "CMRL Research Numbers, 1949-50, CA, 83-005-06, Box 2, file 1/4; (Untitled, CMRL Research Numbers, 1948-49), CA, 83-005-06, Box 1, file 3/5.

<sup>&</sup>lt;sup>4</sup> "CMRL, Applications for Aid in Research, 1948-49, 1949-50," CA, 83-005-06, Box 11, file 2/11; "CMRL, Outside Grants, 1949-50, 1950-51," CA, 83-005-06, Box 11, file 2/11.

<sup>&</sup>lt;sup>5</sup> "CMRL, Outside Grants, 1949-50, 1950-51," CA, 83-005-06, Box 11, file 2/11.

<sup>&</sup>lt;sup>6</sup> "Research Projects, CMRL, Outside Grants, 1951-52," CA, 83-005-06, Box 11, file 2/11.

<sup>7 \*</sup>CMRL Research Applications, 1952-53,\* CA, 83-005-06, Box 11, file 2/11.

<sup>8 &</sup>quot;CMRL Outside Grants, 1953-54," CA, 83-005-006, Box 7, file 4/7.

## Table 6

#### Average Annual Death Rates per 100,000 Population Leading Causes of Death Canada, for 5-year Periods, 1921-1965<sup>1</sup>

Year	Heart Disease <sup>2</sup>	Cancer	Accidents	Tuber- culosis	Infantile diseases <sup>3</sup>	Lung infections <sup>4</sup>	Intestinal infections <sup>5</sup>	Communi- cable diseases <sup>6</sup>
1921-25	221.9	75.9	51.5	85.1	110.0	141.1	72.2	-47.1
1926-30	273.1	88.0	58.8	80.3	97.7	133.8	5-4.9	35.0
1931-35	297.5	100.9	52.4	65.5	74.5	100.6	35.4	17.8
1936-40	337.6	113.8	55.9	56.2	60.2	97.5	24.1	15.6
1941-45	-403.3	123.3	60.6	50.1	57.2	69.1	19.2	9.7
1946-50	-413.0	129.3	58.9	37.1	58.3	55.3	14.2	4.9
1951-55	414.0	128.7	57.4	14.6	49.5	45.9	7.8	2.5
1956-60	399.9	12 <b>8.</b> 6	55.1	6.2	+4.2	-++.9	5.7	1.1
1959	-401.3	127.2	54.0	5.5	-42.6	47.1	5.7	0.8
1960	395.9	129.7	52.6	-1.6	39.6	-40.4	5.5	0.8
1961-65	388.9	131.9	54.4	3.9	-	38.8		0.6

<sup>1</sup> F.H. Leacy, M.C. Urquart and K.A.H. Buckly (eds.), *Historical Statistics of Canada* (Second Edition) (Ottawa: Statistics Canada, 1983), Table B35-50

<sup>2</sup> Cardiovascular renal diseases

<sup>3</sup> Diseases of early infancy, including pneumonia

<sup>4</sup> Influenza, bronchitis and pneumonia

<sup>5</sup> Gastritis, duodenitis, enteritis and colitis

<sup>6</sup> Includes diphtheria, whooping cough, measles, scarlet fever, typhoid and paratyphoid fever.

## Table 7

## Annual Rates of Notifiable Diseases Cases per 100,000 Population Canada, 1927-1962<sup>1</sup>

Year	Chicken-	Diph-	Measles <sup>3</sup>	Mumps <sup>2</sup>	Whooping	Polio <sup>4</sup>	Scarlet	Tuber-	Typhoid
	pox <sup>2</sup>	theria			Cough		Fever <sup>5</sup>	culosis	Fever
								L	L
<u>1927</u>	143.5	89.1	295.2	-	70.2	6.4	162.5	55.4	85.1
<u>1928</u>	165.3	90.2	284.9	245.8	68.3	8.1	151.3	56.9	23.1
1929	180.7	90.6	424.3	121.4	106.1	7.7	161.5	57.6	19.0
1930	199.7	78.8	211.9	92.8	115.2	10.1	173.1	64.4	22.1
<u>1931</u>	185.8	57.1	247.6	107.7	88.5	12.9	125.8	69.4	28.4
<u>1932</u>	170.5	37.3	510.7	118.3	114.9	9.1	93.8	84.2	23.6
1933	219.8	22.4	127.8	108.9	137.7	2.4	97.1	79.6	22.0
<u>1934</u>	218.7	21.1	271.4	78.9	181.6	4.8	154.0	76.3	21.7
<u>1935</u>	255.2	18.5	767.6	209.1	166.1	3.4	167.3	81.0	18.2
1936	232.6	18.6	509.6	272.1	148.7	8.9	198.5	79.2	16.7
<u>1937</u>	220.1	26.7	520.5	130.9	157.7	35.4	156.5	77.4	20.5
1938	242.3	33.0	235.4	75.4	143.7	5.2	154.9	81.0	16.5
1939	225.1	25.8	395.3	51.9	159.8	3.2	140.5	88.4	11.7
1940	288.3	20.5	403.5	118.8	174.9	1.7	128.0	86.6	13.8
1941	242.5	24.9	705.4	199.6	144.9	16.4	153.9	88.0	13.5
1942	265.7	25.4	225.6	449.8	158.0	5.9	185.2	100.6	9.8
1943	258.6	23.8	513.5	410.1	162.0	2.8	163.4	104.5	9.8
1944	297.6	27.0	463.7	166.1	103.8	6.1	181.1	125.3	10.4
1945	262.5	23.1	223.8	169.2	101.1	3.2	105.5	113.9	7.3
1946	237.3	20.7	550.4	212.4	62.5	20.6	80.5	119.1	7.5
1947	258.9	12.4	315.0	257.5	82.4	18.3	63.2	105.7	5.6
1948	326.3	7.0	515.7	192.2	55.3	9.1	63.5	93.9	4.4
1949	346.2	6.1	447.4	187.8	60.7	18.6	71.2	94.8	5.8
1950	260.1	3.1	406.6	319.0	89.0	6.8	71.9	87.0	5.2
1951	333.5	1.8	438.3	251.6	63.6	18.2	110.4	77.8	4.0
1952	317.9	1.3	389.2	266.3	59.0	33.0	145.4	70.0	3.5
1953	320.2	0.9	390.5	244.9	63.3	59.8	107.8	65.7	3.1
1954	247.3	1.4	241.5	176.3	76.0	15.7	86.0	63.0	3.1
1955	214.5	0.9	363.3	173.5	87.3	6.5	59.7	58.6	2.4
1956	-	0.8	336.1	-	53.0	3.8	72.7	52.3	2.8
1957	-	0.9	-	-	45.0	1.6	52.5	46.2	1.7
1958		0.4			40.7	1.9	65.2	42.3	1.8
1959		0.2			41.5	10.8	133.9	37.6	3.1
1960		0.3			33.6	5.1	119.1	35.5	1.9
1961		0.5			30.0	1.0	71.6	32.7	1.5
1962		0.4			43.5	0.5	55.1	33.8	1.5

<sup>1</sup> F.H. Leacy, M.C. Urquart and K.A.H. Buckly (eds.), *Historical Statistics of Canada* (Second Edition) (Ottawa: Statistics Canada, 1983), Table B517-525.

2 Not reportable since 1958.

3 Not reportable between 1958 and 1968.

4 All types.

5 Scarlet fever and streptococal sore throat.

6 Typhoid and paratyphoid fever.

## Exhibit 1

## HISTORICAL QUESTIONNAIRE FOR POLIO SURVIVORS1

#### In support of a Ph.D. Thesis project entitled:

### "POLIOMYELITIS IN CANADA, 1927-1962"

#### By Christopher J. Rutty

## Department of History, University of Toronto Professor Michael Bliss, Thesis Supervisor February/March 1993

#### **INSTRUCTIONS:**

This is not a scientific survey in any way, just a sampling of personal reflections by polic survivors for possible use in a Ph.D. thesis in history.

All information gathered in this questionnaire is to be considered strictly confidential and to be used only for the academic purposes of this researcher.

In order to protec, privacy, any personal information directly or indirectly quoted from this questionnaire will be cited in footnotes only through the use of initials or first name and last initial.

Please provide as much information as possible on this form, although feel free to use the back of each page, or separate sheets of paper as needed.

Only answer those questions which seem personally relevant and which you feel able to provide a clear and comprehensive response.

This questionnaire can be answered in a group format with small groups each answering selected questions, or it can be the focus of a special meeting of your local or provincial post-polio support group. The support group could then discuss the questions openly under the direction of the group leader. The proceedings could be taped and summarized, or a secretary appointed to take notes, from which this form could be filled out based on the general consensus of the discussion of each historical theme addressed in the questionnaire.

## PART A) SPECIFIC PERSONAL INFORMATION

1.NAME:
2. PRESENT ADDRESS:
3. ADDRESS AT ONSET OF POLIO (City and Province):
4. YEAROFONSET OF POLIO:
5. YOUR AGEATONSET OF POLIO:
6. BRIEF DESCRIPTION OF EFFECTS OF POLIO:
a) Site(s) of Paralysis or weakness:
b) Degree of Paralysis or weakness:
c) Degree of Recovery:
7. OTHER RELEVANT DETAILS AT ONSET OF POLIO
a) Personal or Family Occupation(s) and Income:
b) Previous, concurrent, or subsequent Family or friend's experience with Polio:

2

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## PART B PERSONAL HISTORICAL REFLECTIONS OF POLIO EXPERIENCE

## Topic 1) General Understanding of Polio Prior to Onset.

- a) What memories do you have about poliomyelitis and polio epidemics prior to your being infected by the disease?
- b) How much did you or you family know about polio, and what was done, if anything, to prepare for when "polio season" arrived each summer?

## Topic 2) Where, When and Why you Caught Polio

- a) Describe what you remember about where and when you first contracted polio, and what did you and your family initially do about it?
- b) How and/or why do you think you got polio?

## Topic 3) Doctors, Diagnosis, Treatment and Hospitalization

- 1) What was the first response of your family physician to your case?
- b) How long did it take for a diagnosis of poliomyelitis to be confirmed by your doctor, and what treatment did he/she offer you?
- c) Were you hospitalized, and if so how were you treated and under what conditions?
- d) How long were you hospitalized and how was your rehabilitation managed?
- e) What are your general feelings about how your case was managed by the medical profession?

f) Under the circumstances was your case handled well, or were there particular problems that you felt were not responded to as well as they could have been?

## Topic 4) The Financial Costs of Polio

- a) What is your estimation of the immediate financial impact of your case of polio on yourself and your family with respect to your family physician's fees and the cost of your medical care and hospitalization while you recovered over the next year or so?
- b) How did you and your family manage these costs?
- c) Did you have any kind of medical insurance or other sources of financial assistance during the initial acute and recovery stages?

## Topic 5) The Local Public Health Management of Polio

- a) What was you and your family's experience with the local public health authorities before, during and after your case of polio was first diagnosed?
- b) How did you see the local and/or provincial outbreak/epidemic being managed when you caught polio?
- c) What are your general feelings about how polio epidemics were dealt with before your case (if applicable) and after?

## Topic 6) Polio and the Popular Media

- a) How do you remember polio being presented or covered by the popular media (newspapers, magazines, radio, TV) before, during and after the epidemic in which you were infected with polio?
- b) How important was the media coverage of polio towards how you and your family understood the disease, and how you saw it being medically and politically managed during polio epidemics?

## Topic\_7) Voluntary Polio Organizations

- a) Were you involved with any voluntary organizations closely concerned with polio, such as the Canadian Foundation for Poliomyelitis (March of Dimes) or its Provincial Chapters?
- b) Did such organizations provide any direct assistance to your case, and if so can you outline how such support was provided and utilized?

## Topic 8) Polio and Provincial Government Health Departments

- a) How did you and your family view the Provincial Government's (Department of Health) public health handling of polio epidemics, and in particular, the financial challenges polio presented to those it affected?
- b) What were you and your family's particular experience with your province's policy on polio treatment and rehabilitation and any financial support it offered?
- c) How aware were you and your family of the existence of such a polio policy or program, and if so how well was it promoted and provided in your case?
- d) How significant do you feel such government programs were at the time to your particular case, and to the government's changing role in health care generally?

Thanks to Shirley Teolis, Post-Polio Coordinator, Ontario March of Dimes, Toronto, for her valuable help in designing and distributing this questionnaire.

In response to this questionnaire, distributed through a national network of provincial postpolio support groups across Canada, in addition to a small number of published sources, a collection of 96 individual cases were assembled. This consisted of 61 females and 35 males who contracted polio between 1905 and 1961 at ages ranging from 6 months to 50 years, specifically: ages 0-4 (20 cases), 5-10 (32), 11-15 (5), 16-20 (8), 21-25 (12), 26-30 (8), 31-35 (7), 36-40 (2), 40-50 (2). The following periods are represented: 1905-1926 (8 cases), 1927-1930 (9 cases), 1937-1938 (9 cases), 1939-1946 (13 cases), 1947-1953 (47 cases), 1954-1961 (10 cases). The provincial breakdown of cases is: British Columbia (8), Alberta (5), Saskatchewan (5), Manitoba (15), Ontario (49), Quebec (3), New Brunswick (10) and Nova Scotia (1), and originated fairly evenly from large cities, small towns and isolated rural areas. For reasons of confidentiality, in referring to these questionnaires last names have been reduced to an initial. Included in the reference are the year, age and place of onset, followed by the date the completed questionnaire was received, or other reference.

CONMENTS	Mother's conflict with government provably disqualified her for provincial money		L. Scrivener, -The Plague of -37, Taronto 5tar (Sept. 6, 1987)
IMPACT	Not aware of media coverage		
GOVI. EXPERIENCE	Government officals visited and gave mother hard Lots of red transfusion Constant transfusion friction with Public Health nurse Mother refused her entrance into house	Government	
PINANCTAL INIPACT	Unsure of impact Father on Forced to Forced to No help No help	Feeling that government paid costs	
EXPERICE	Mother forced to take daughter to HSC for spinal tap but mother still retused until month later - mother needed to Od Grace Hospital. Excruci- sting treatment for limbs and lungs frame and splints No visitors Mother fold not wother fold not wother relused to wother refused to wother refused to wother refused to wother events	B months in hospital Couldn't see Legs strapped to board Frequent rehab. visits	Old Hospital for neurables near Don Jai (Riverdale?) There (Riverdale?) There (Riverdale?) There (Riverdale?) There (Riverdal?) There Sowy, awful Sowy, awful Sowy, awful Sowy, awful Sowy, awful street to wave and street to
EUMANENCE	Doctor wanted to hosptakze her but mother refused and nursed at home Dr. visited/ quar- antined famity Lost blood Little hope offered Cried with pain Of signed her out of Ok Grace Hospital	Dr sent Public Health nurse to enforce isolation	
EXPERIENCE	Unemployed steamfitter Mother "practical nurse" nursed at home Did not restrict Later events proved mother right	Father taylor limited income Mother rehab. Mother rehab. Mother a Public laughed at Public Health nurse for inconsistent ideas about stopping yrus	
CAUSE AND LINDERSTANDING	Not mentioned At fresh air camp Loved the water Saw camp nurse Driven to Toronto	Limited knowfedge No swimming Played in curb water	Now (1987) grandfather of three. Supplies chalk and tack Board of Education Education
SEVERITY	All limbs Back Abdomen	Legs only	
PROV.	Toronto ONT	Toronto ONT	ONF
ONSET	1937	1937	1937
NAME/SEX ONSET AGE	19. A Vol 10 y. E e you E e	20. Beryl G. m/ 4	21. Earl E. m/ 6

# Sample Pages of Questionnaire Analysis Chart

Appendix

## Exhibit 2

NAME/SEX	YEAR	CITY	Sinea	CAUSE AND	PAMILY	PHYSICIAN	HOSPITAL	FINANCIAL	GOVT.	PRESS	OTHER
ONSET AGE	ONSET	PROV.	SEVERITY	UNDERSTANDING	EXPERIENCE	EXPERIENCE	EXPERIENCE	IMPACT	EXPERIENCE	IMPACT	COMMENTS
68. Shirley S. 1/ 18	1953	Calgary ALB	Leg and hip	Knew little Pre '53 thought only children got infantile paralysis, but now saw adults falling prey Only dirty people got polo Unwashed fruit. Mother honestly believed this epidemic supposedly over when struck Rundown after series of required	Student nurse with no income First trouble unable to move head after movie - bad night but went to work at hospital anyway	Collapsed at work in hospital and immediately hospitalized Unable to move head. Rigid spine led to spinal tap then isolation	Isolated 2 weeks in hospital then 4 weeks Recovery at home 292s for pain. Hot packs for all affected muscles Muscle testing and continued for 1 yr Treated exceptionally well by all. Student nurse and welfare responsibility of hospital. All help needed was given	As student nurse all costs covered by hospital then hired as ward clerk during training and physio	Marked increase after '53 in public education and awareness programs	Minimal publicity No big thing Lots of fatalisitic thinking since didn't know how to avoid it	
69. Yvonne H. I/ 25	1953	Winnipeg MAN	Total paralysis In iron king Delivered baby in king	Immunizations Two close friends got polio plus some friends from 30s and 40s Away from crowds, pools, theatres Exposed from child of friend who later had slight polio. Two friends with polio close, one was pregnant too, and other w/ newborn	Housewife and mother Very modest income Terrible headache and fever and went to bed and called Dr Next day trouble swallowing and breathing, weak arm Eight months pregnant	Dr sent her for spinal tap. Polio diagnosed immediately and kept in hospital Well managed considering immensity of epidemic. Huge numbers crowded into King George Hospital Overworked staff Warm Springs positive No facilities for full rehab in Winnipeg	by staff Admitted to Isolation hospital, King George H. Condition deteriorated After 5 days put in iron lung and baby born 15 hours later. No visitors allowed until then Special nurses hired then to insure proper acute care and for 2 months after Still in iron lung, physio minimal 6 months in lung and weaned out 3 months on rocking bed Hospital Sept'53 to June '55, then to Warm Springs for rehab Oct'54 to Apr'55. Fitted for braces/	Had polio insurance which covered most immediate expenses	Government hadled things well, but neither hospital or med insurance, but much of financial burden absorbed for those without private insurance thome care allowance covered 1/2 cost of heme attendant to get cases out of hospital	Daily reports in newspa- per and radio Statistics oriented Little real informa- tion about disease	

## **BIBLIOGRAPHIC ESSAY**

This dissertation has been built upon a wide variety of primary sources, especially provincial and federal health department records, medical journals, and the papers, correspondence and reports of Connaught Medical Research Labcratories. A number of provincial archives were visited with an emphasis on Ontario and the western provinces where polio epidemics were the most frequent and serious, Manitoba, Saskatchewan and Alberta. Research was focused primarily on the records and correspondence of provincial departments of health, the papers of ministers, or deputy ministers of health, and specific government files and reports on polio. The Ontario, Manitoba and Saskatchewan provincial archives possessed the largest and best organized collections of such documents on their polio experience.

Limited time and resources, and lesser relative polio incidence, precluded extended research trips to the Maritimes, Quebec, British Columbia or the Territories. However, the polio experiences of these parts of Canada have not been excluded from this study. Annual Reports of al. provincial departments of health, other than Newfoundland, have been collected, while medical journal articles and federal government records include considerable documentation originating in, or directed to, these other provinces. This archival base has provided a sufficient level of material to develop a detailed picture of how polio was managed by all provincial governments in Canada, from coast to coast.

Perhaps the most valuable archival source has been the National Archives of Canada, and especially the records of the Department of National Health and Welfare (NAC). While the NAC possesses important manuscript collections, namely the early papers of the Canadian Foundation for Poliomyelitis, and the Paul Martin papers, the federal government health records provides a rich and extensive collection of files that are specifically focused on polio. These files include some thirty different clas-

sifications under the general heading of "Epidemiology: Diseases - Poliomyelitis," and contain detailed correspondence between federal and provincial health officials, reports, and large collections of newspaper clippings and medical journal reprints, especially during the post-war period. There are also large files devoted to the national use, policy development and evaluations surrounding gamma globulin, the Salk vaccine, and the Sabin vaccine. Correspondence and vaccine protocol files between the Laboratory of Hygiene in Ottawa and Connaught Laboratories also exist at the NAC. Also valuable are the minutes of the Dominion Council of Health (DCH) meetings, collected at the NAC on microfilm, as well as at the Archives of Ontario in hard copies, which also include some DCH correspondence files. A variety of other useful government files were found at the NAC under several other classifications and accessions.

The archive collection in Balmer Neilly Library at Connaught Laboratories Ltd. in Toronto was crucial to the researching of this dissertation, particularly with respect to Connaught's general polio research efforts, its relationship with the National Foundation for Infantile Paralysis (NFIP) and the federal and provincial governments, and Connaught's involvement in the Salk vaccine's development, trial and Canadian introduction. The 2 are detailed research reports and correspondence preserved in this archive, especially in the papers of R.D. Defries, the Office of the Director, and in a series of specific polio files which contain correspondence files with the NFIP, Salk and Sabin. There is also an extensive and broad collection of press clippings. Understanding the Connaught polio story was made easier through the kind assistance of Dr. Andrew J. Rhodes, Dr. Arthur E. Franklin and Frank Shimada, all of whom consented to interviews and informal discussions of their research work on Connaught's polio research team.

Other sources of particular value to this study include polio files and clipping collections at the Toronto Hospital for Sick Children Archives; correspondence files

at the University of Toronto Archives, institutional records and miscellaneous files at the Ontario March of Dimes and the Ontario Society for Crippled Children; and interview field tapes and archival television material made available by the Canadian Broadcasting Corporation collected for a December 1993, CBC "Prime Time News" documentary, "Conquering the Crippler," with which this author was involved.

Of the primary published works consulted for this project, of most value were: Saul Benison's oral history, Tom Rivers: Reflections on a Life in Medicine and Science; Fred Davis' sociological study of the polio experience, Passage Through Crisis: Polio Victims and Their Families; David L. Sills' comprehensive sociological study of the NFIP and its organization, The Volunteers: Means and Ends in a National Organization; and Richard Carter's insightful examination of American voluntary health organization, particularly the NFIP, The Gentle Legions. These are all American works, but in the absence of equivalent Canadian texts, and in light of their value in establishing polio's unique nature, impact and imagery, they are essential to understanding this disease and the broad North American context within which Canada's distinctive response developed. Important Canadian primary texts include: Robert D. Defries' collection of histories and surveys of Canadian government health services, The Federal and Provincial Health Services in Canada: Manitoba's detailed Report on the Poliomyelitis Epidemic in Manitoba, 1928; and the similar, but even more detailed Report on Poliomyelitis in Ontario, 1937.

Of considerable importance to the researching and development of this project was a large collection of articles and editorial material from Canadian medical journals. Canada's two national medical journals were closely surveyed for all references to polio between 1927 and 1962. These journals were the *Canadian Medical Association Journal* and the *Canadian Public Health Journal* (which in 1943 became the *Canadian Journal of Public Health*). Also valuable was the *Canadian Nurse* and the *Canadian Journal of Medical Sciences*; provinc al journals such as the *Manitoba Medical* 

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(Association) Review, the Ontario Medical Review, the Alberta Medical Bulletin, and the Nova Scotia Medical Bulletin; and university medical school journals, such as those at the University of Manitoba, the University of Toronto, and the University of Western Ontario. Important American medical journals consulted include the Journal of the American Medical Association, the American Journal of Public Health, and the Proceedings of the Society for Experimental Biology and Medicine. The following Bibliography lists a selected, though large proportion of the Canadian articles collected. The most useful of these were editorials, reports on major provincial epidemics, articles on various polio treatments, nursing management, and a large collection of articles generated by Connaught's polio research and vaccine program, under the leadership of Drs. A.J, Rhodes and R.D. Defries. Such articles are a rich source of information on the history of polio in Canada, only a relatively small part of which has been tapped for this dissertation.

Popular magazine articles and newspaper reports are a further source of information for this study. Close surveys of a number of major newspapers were undertaken, namely of the Toronto Star, the Toronto Globe and Mail, the Toronto Telegram, the London Free Press, and the Winnipeg Free Press. However, a national crosssection of newspaper reports was available through large polio clipping collections contained in the government health records at the NAC, Connaught's archives, the Hospital for Sick Children archives, as well as at the provincial archives visited, especially in Ontario and Manitoba. Professor Joseph Kaufert of the University of Manitoba also kindly made his large collection of polio clippings available to me. Also valuable was a large collection of clippings, primarily from the London Free Press, simply called Poliomyelitis, 1937-1955, bound in a loose-leaf binder and originally located at the University of Western Ontario Medical Library. Important periodical sources included: Maclean's Magazine, the Canadian Magazine, Saturday Night, the Weekend Magazine and the Financial Post.

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As outlined in the Introduction, the secondary literature on the history of polio is relatively sparse, and almost non-existent for the Canadian story. However, key monographs to any study of this disease must include: John R. Paul's comprehensive, though internally focused A History of Poliomyelitis; Naomi Rogers' analysis of the American experience of polio up to 1920, Dirt and Disease: Polio Before FDR; and Jane S. Smith's survey of the American Salk vaccine story, Patenting the Sun: Polio and the Sa'k Vaccine. Important articles include those by Saul Benison (see the Bibliography), Allan M. Brandt, Dorothy M. Horstmann, Guenter B. Risse, Naomi Rogers, and Albert Sabin.

Of the small amount of Canadian scholarship on the history of polio that exists, my own previous work has provided a foundation for this national study, but others have also contributed. The most important include: Paul A. Bator with Andrew J. Rhodes, Within Reach of Everyone: A History of the University of Toronto School of Hygiene and the Connaught Laboratories, Volume I, 1927-1955; Robert D. Defries, The First Forty Years, 1914-1955: Connaught Medical Research Laboratories, University of Toronto; Gillian Liebenberg, "Disease and Disability: Poliomyelitis Rehabilitation and Social Reform for Disabled Persons in New Brunswick, 1941-1955;" Russell F. Taylor, Polio '53: A Memorial for Russell Frederick Taylor, and the various articles by Joseph M. Kaufert and others at the University of Manitoba that follow up respiratory polio cases from the great 1953 Manitoba epidemic.

There are a number of important historical studies of the impact of disease that have served as models for my analysis of the history of polio, although the necessarily broad approach I have taken is unusual. As my fundamental goal in this study was to establish a comprehensive national foundation for the history of polio in Canada, a rigcrous analytical approach was less important than sorting out the larger story in a coherent and historically meaningful way. The complex nature of polio and the general polio experience in Canada required a broad approach, out of which

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I, and hopefully others, can build more geographically, chronologically, thematically and analytically focused examinations of this rich topic. Nevertheless, important sources of inspiration and analytical insight have been: Michael Bliss, Plague: A Story of Smallpox in Montreal; Jay Cassel. The Secret Plague: Venereal Disease in Canada, 1838-1939; Elizabeth W. Etheridge, Sentinel For Health: A History of the Centers For Disease Control; Richard J. Evans, Death in Hamburg: Society and Politics in the Cholera Years, 1830-1910; James T. Patterson, The Dread Disease: Cancer and Modern American Culture; Eileen Pettigrew, The Silent Enemy: Canada and the Deadly Flu of 1918; Charles E. Rosenberg, The Cholera Years: The United States in 1932, 1849, and 1866; and Terra Ziporyn, Disease in the Popular American Press: The Case of Diphtheria, Typhoid Fever, and Syphilis, 1870-1920. The following articles were also important to the development of this thesis: Douglas O. Baldwin, "Volunteers in Action: The Establishment of Government Health Care on Prince Edward Island, 1900-1931;" David Gagan, "For 'Patients of Moderate Means:' The Transformation of Ontario's Public General Hospitals, 1880-1950;" Judith W. Leavitt, "'Typhoid Mary' Strikes Back: Bacteriological Theory and Practice in Early-Twentieth-Century Public Health;" Jane Lewis, "The Prevention of Diphtheria in Canada and Britain, 1914-1945;" Abraham M. Lilienfeld, "Ceteris Paribus: The Evolution of the Clinical Trial;" Heather MacDougall, "Researching Public Health Services in Ontario, 1882-1930;" Katherine McCuaig, "Tuberculosis: The Changing Concepts of Disease in Canada, 1900-1950;" Guenter B. Risse, "Epidemics and History: Ecological Perspectives and Social Responses;" and Ton van Helvoort, "History of Virus Research in the Twentieth Century: The Problem of Conceptual Continuity."

## **BIBLIOGRAPHY**

Abbreviations:

- AJPH American Journal of Public Health
- CJMS Canadian Journal of Medical Sciences
- CJPH Canadian Journal of Public Health
- CMAJ Canadian Medical Association Journal
- CPHJ Canadian Public Health Journal
- JAMA Journal of the American Medical Association
- PSEBM Proceedings of the Society for Experimental Biology and Medicine

#### 1) Primary Sources:

#### a) <u>Principal Archival Sources</u>

National Archives of Canada, Ottawa (NAC):

- RG29, Department of National Health and Welfare records
  - Dept. of Agriculture, Public Health, Subject Files
    - Epidemiology Division (Accession 85-86/248)
    - Research and Statistics Divison (Accession 77-78/198)
    - Division of Laboratories (Accession 83-84/119)

MG28-I67, Canadian Foundation for Poliomyelitis, Papers, 1949-1951 MG32-B12, Paul Martin Papers

Connaught Laboratories Ltd., Archives, Toronto (CA):

83-002, Robert D. Defries, papers and correspondence

83-003, James K.W. Ferguson, correspondence

83-005, Office of the Director, papers, reports, grant applications

83-015, Polio files, papers and correspondence

83-020, News Clippings

Alberta Provicial Archives, Edmonton (AA):

Accession 73-42, Office of the Deputy Minister, Dept. of Health and Social Development

Accession 70-127, Records of the Deputy Minister of Health Accession 77-87, Dr. Malcolm R. Bow Papers

Saskatchewan Archives Board, Saskatoon and Regina (SA):

Department of Public Health records

R11, T.J. Bentley Papers

R-194, Regional Health Services Division

R-34, Salk vaccine

R88-327, Community Health, Yorkton-Mellville Health Region Tommy Douglas Papers

R-33.1, Dept. of Public Health

Manitoba Provincial Archives, Winnipeg (MA): G-157, Boxes 43, 63 and 64, Minister of Health and Welfare Office Files

Archives of Ontario, Toronto (AO):

RG10, Health Records Group

RG10-106, Supply and Services Branch, Public Health Central Files RG10-5, Deputy Minister's Office, Dominion Council of Health Files

## b) Other Archival and Reference Sources

Canadian Broadcasting Corporation, Toronto: Interviews and archival television material collected for "Prime Time News: Magazine" documentary, "Conquering the Crippler," aired December 7, 1993.

Canadian National Exhibition Archives, Toronto

City of Edmonton Archives

City of Toronto Archives

Hospital for Sick Children Archives, Toronto

Metro Toronto Reference Library

Ontario March of Dimes Archives, Toronto

Ontario Medical Association Library, Toronto

Ontario Ministry of Health Library, Toronto

Ontario Society for Crippled Children Archives, Toronto

Toronto Board of Education Archives

University of Alberta Archives, Edmonton

University of Manitoba Medical Library, Winnipeg

University of Toronto Archives

University of Toronto Science and Medicine Library

University of Western Ontario Regional Room and Medical Library, London

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# BIOGRAPHICAL SKETCH Christopher James Rutty

I was born on August 17, 1962, in Burlington, Ontario, and grew up there with my three brothers. My father taught high school history and economics and my mother is Director of Therapeutic Recreation at St. Peter's Hospital for the aged in Hamilton, Ontario.

While attending Burlington Central High School (1976-81) my interests focused on Art, English, Music and Science. In an effort to combine these aptitudes with an interest in film making, I enrolled in a three year Classical Animation program at Sheridan College in Oakville, Ontario. Before graduating in 1984, my interest in pursuing a career in Animation was displaced by a growing attraction to science and a desire to popularize it. This shift led to registering in a full science program at the University of Western Ontario in London in 1985. U.W.O's Department of the History of Medicine and Science (Faculty of Science) offered a combined honors BA degree in the history of science and history in which I found great satisfaction during my third and fourth years. This program offered a valuable opportunity to combine my growing interest in medical history (and a variety of courses in the history of science, the history of evolutionary thought and the history of astronomy), with courses in European Medieval, Renaissance, Enlightenment, Christianity and Urban history.

I first studied the history of polio during a course in the History of Medicine and Science in Canada in 1987-88. This was followed by a study of the major 1937 polio epidemic in London, Ontario, and in 1989-90 by a Master's thesis on polio in Ontario between 1937 and 1953. My MA was undertaken in the Department of History at the University of Western Ontario under the direction of Professor James T.H. Connor of the Department of History of Science and Medicine and involved courses in Ontario and 19th and 20th-century British history. This thesis was entitled "A Grim Terror More Menacing, More Sinister Than Death Itself:' Physicians, Poliomyelitis

449

and the Popular Press in Early 20th Century Ontario" and was defended in August 1990. This project was supported by a graduate scholarship from the Hannah Institute for the History of Medicine, supplemented by special scholarships from the University.

In September 1990 I joined the Department of History's doctoral program under the supervision of Professor Michael Bliss. I also broadened my academic focus and selected Canadian history as my major comprehensive field under the direction of Professors Paul Rutherford and Arthur Silver. Professor Bliss direc: d my specialty field in Canadian medical history. My minor comprehensive fields were 16th-century British History under the direction of Professor Kenneth Bartlett, and the History of Medicine under the supervision of Professor Pauline Mazumdar of the Institute for the History and Philosophy of Science and Technology. I successfully completed my written and oral comprehensive exams in April 1992.

In my first year of the doctoral program I was awarded a University of Toronte Open Scholarship and the Department of History's C.P. Stacey Fellowship in Canadian History. In my second (1991-92), third (1992-93) and fourth years (1993-94) I was awarded graduate scholarships from the Hannah Institute for the History of Medicine. In my final year I was awarded another University of Toronto Open Scholarship which has allowed me to complete this dissertation.

Further financial support, along with academic and practical experience was made possible through a series of Teaching Assistantships from the Department of History. I was involved a variety of introductory Canadian History courses. In 1990-91 and 1991-92, I led tutorials and marked written work at the U. of T.'s Erindale College under the supervision of Professor Thomas Socknat. This experience led to a series of summer teaching assistantship appointments at the downtown campus in 1991, 1992 and 1994, again under Professor Socknat's supervision. During the 1992-93, 1993-94 and 1994-95 academic terms I was employed as a marking TA on the downtown campus under the direction of Professor Michael Bliss. In 1994-95 I was also employed on the downtown campus as a tutorial leader and marker for Professor Carl Berger.

During my doctoral program I have attended a number of academic conferences and presented papers. I would like to thank the Hannah Institute for the History of Medicine and the Department of History for providing financial assistance. The following is a list of papers I have presented and those that have been published.

Publications and Academic Presentations

- Article: "Poliomyelitis, Science and the State in the Pre-Salk Era: The Ontario Epidemic of 1937," Canadian Bulletin of Medical History, (forthcoming).
- Lecture: "Polio and its Echoes: Historical Perspectives on a Continuing Challenge," presented for Nursing and Support Staff, Day Hospital, St. Peter's Hospital, Hamilton, ON, May 26, 1995.
- Conference Paper: "The March Across the Border:' The Canadian Foundation for Poliomyelitis and the Politics of the March of Dimes, 1945-1951," paper presented, Annual Meeting American Association for the History of Medicine, Pittsburgh, PA, May 1995.
- Article: "40 Years of Polio Prevention!: Canada and the Great Salk Vaccine Trial of 1954-55," Abilities (Canada's Lifestyle Magazine for People With Disabilities), #19 (Summer 1994): 26, 28.
- Lecture: "The Canadian Connection: Polio Epidemics, Connaught Laboratories and the Salk Vaccine, 1927-1955," presented at the History of Medicine Wednesday Noon Lecture Series, McMaster University, Hamilton, ON, Nov. 1993.
- Conference Papers: "The Canadian Connection: Poliomyelitis Research, Connaught Laboratories and the Salk Vaccine, 1947-1955," Annual Meetings: Canadian Society for the History of Medicine, Ottawa, ON, June 1993; American Association for the History of Medicine, Louisville, KY, May 1993.
- Book Review: of Heather MacDougall, Activists and Advocates: Toronto's Health Department, 1883-1983, (Toronto: Dundurn Press, 1990) in Scientia Canadensis, 16(1992):109-12.
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451

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