



***Making a Difference:***  
**Milestones in Public Health &**  
**Biotechnology: Canadian Connections**

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**Lecture #6 – Polio: Conquering the Crippler**  
**(1950s-60s)**

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Previous lecture slides available via:  
<http://healthheritageresearch.com/clients/LLiR/>

# Introduction

- This class focuses on the major impact of polio, “The Middle Class Plague,” during the 1950s and the essential biotechnology contributions made in Canada to enable its prevention and control by the early 1960s
- As discussed in previous classes, “The Crippler” emerged as an increasingly serious summer plague during the early 20<sup>th</sup> century, an ironic result of rising sanitary standards; although as shown last week, the Arctic polio epidemic in Chesterfield Inlet during the winter of 1949 certainly belied the “summer plague” idea
- Canada was among the countries hardest by polio until the Salk vaccine was launched in 1955
- A safe and plentiful supply of the vaccine would have been impossible without advances made at Connaught Labs

## THIS IS PUBLIC HEALTH: A CANADIAN HISTORY

Executive Summary

**This is Public Health, A Canadian History** explores the evolution of public health from its early foundation before Canada was a country until 1986, when the Ottawa Charter for Health Promotion launched what many considered to be a new era in public health. During this time span, numerous public health milestones were achieved through organized community efforts to promote health and to prevent disease and injury, which have always been at the core of public health.

Canada, despite the tensions of jurisdictional boundaries. The struggle to eliminate disparities—between geographic regions, urban and isolated communities, Aboriginal and non-Aboriginal people—was a longstanding concern that continues to this day. Since its beginnings, public health has faced changes and challenges and has too frequently been undervalued. However, a number of remarkable advances in Canada over the past 100-plus years can be attributed to public health.

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**The Public Health Journal**

Public Health Journal, November 1917

This history has been compiled by the Canadian Public Health Association (CPHA), to mark its 2010 centenary. Like the field of public health, CPHA has much to celebrate in addressing ongoing challenges over 100 years as the national voice for a very diverse field. This narrative is dedicated to those public health advocates and activists who have “fought the good fight,” struggling to advance community health long before Canadian health systems were in place.

This history underlines the importance of federal leadership in the implementation of successful public health initiatives in

THE GOVERNMENT INSPECTOR'S OFFICE  
Hours from 9 to 4

THE GOVERNMENT INSPECTOR'S OFFICE  
The government inspector's office, 1850

Canadian Public Health Association

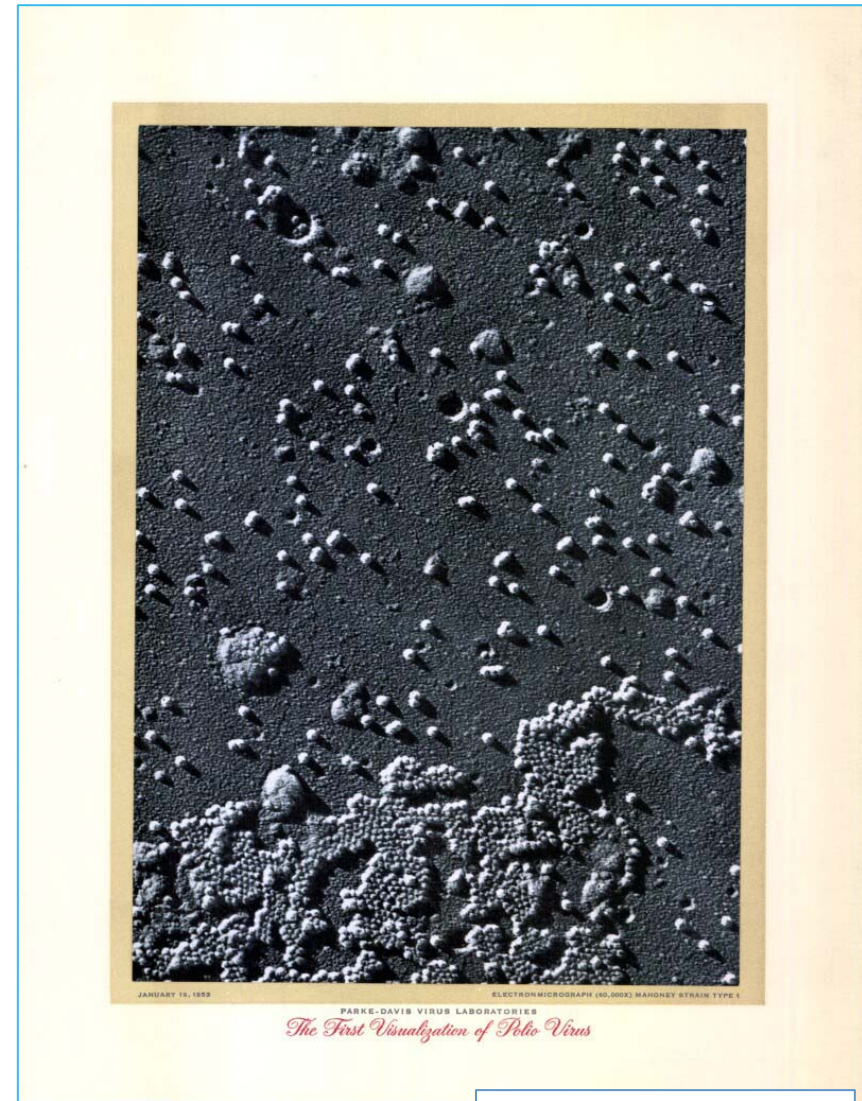
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C.J. Ruty, *This is Public Health: A Canadian History* (Canadian Public Health Association eBook, 2010) - <https://www.cpha.ca/history-e-book>



## Polio: “The Middle Class Plague”

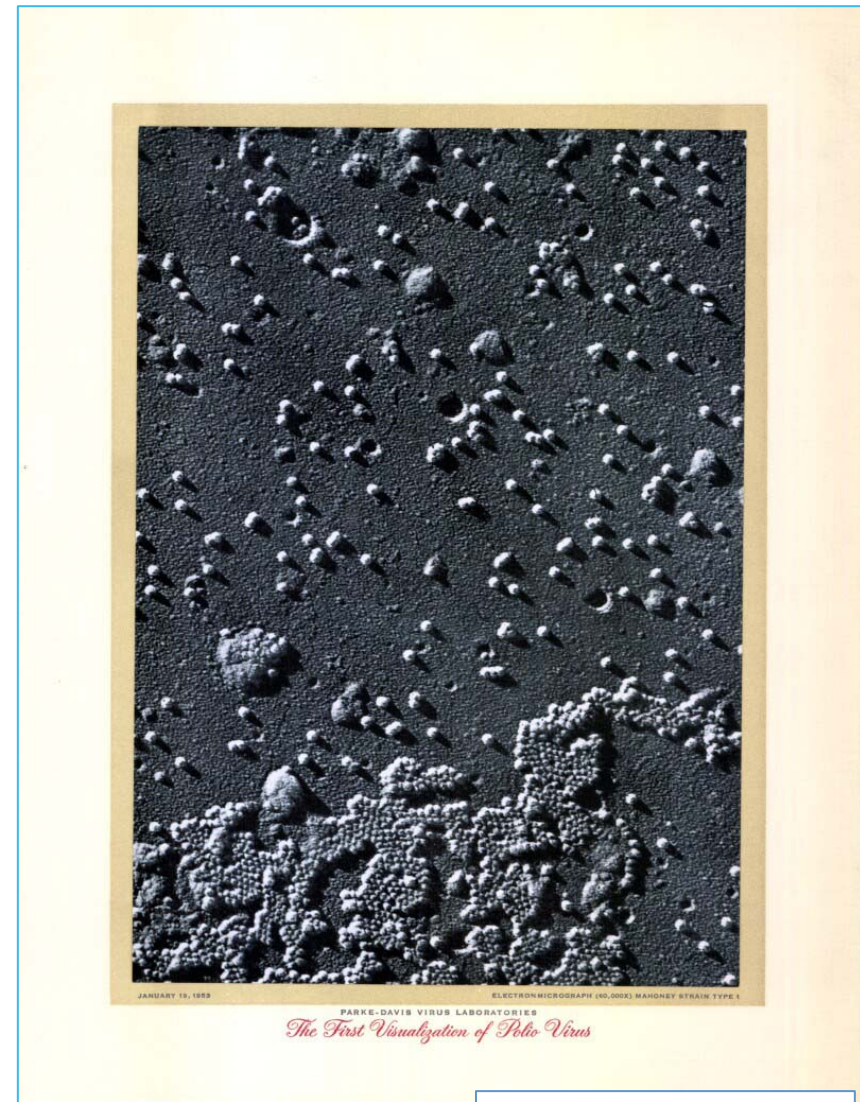
- By 1950, most of the mysteries about polio were resolved:
- Caused by one of the smallest known viruses, that can damage the motor-neurons in the spinal cord, causing muscle weakness or paralysis
- No two cases of paralytic polio alike; virus could cause weakness/ paralysis of a finger, to a leg, arms, chest and/or throat muscles (requiring an “iron lung”), or the whole body
- Prior to late 19th century the poliovirus (types I, II, III) was endemic, primarily spreading oral-fecally, and infecting almost all very young children with a harmless & immunizing gastro-intestinal ‘flu-like illness



Sanofi Pasteur Canada Archives

## Polio: “The Middle Class Plague”

- As public health/ hygiene standards improved, exposure to the poliovirus became increasingly delayed and less universal
- Over time, more children (and young adults) thus grew vulnerable to paralytic infection if the poliovirus was able to invade nervous system
- Polio outbreaks and epidemics increased until polio vaccines were available; the middle class was particularly vulnerable

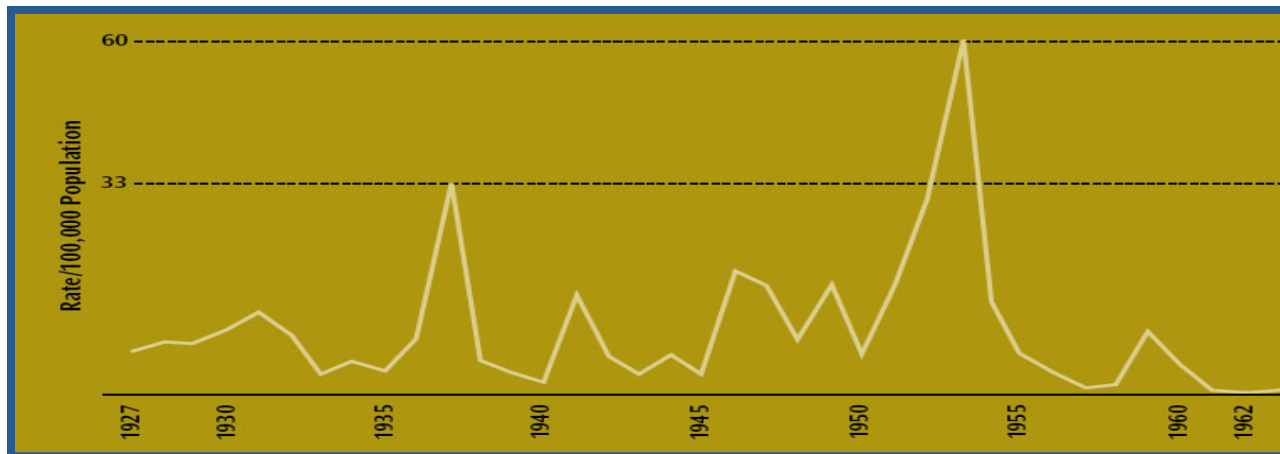


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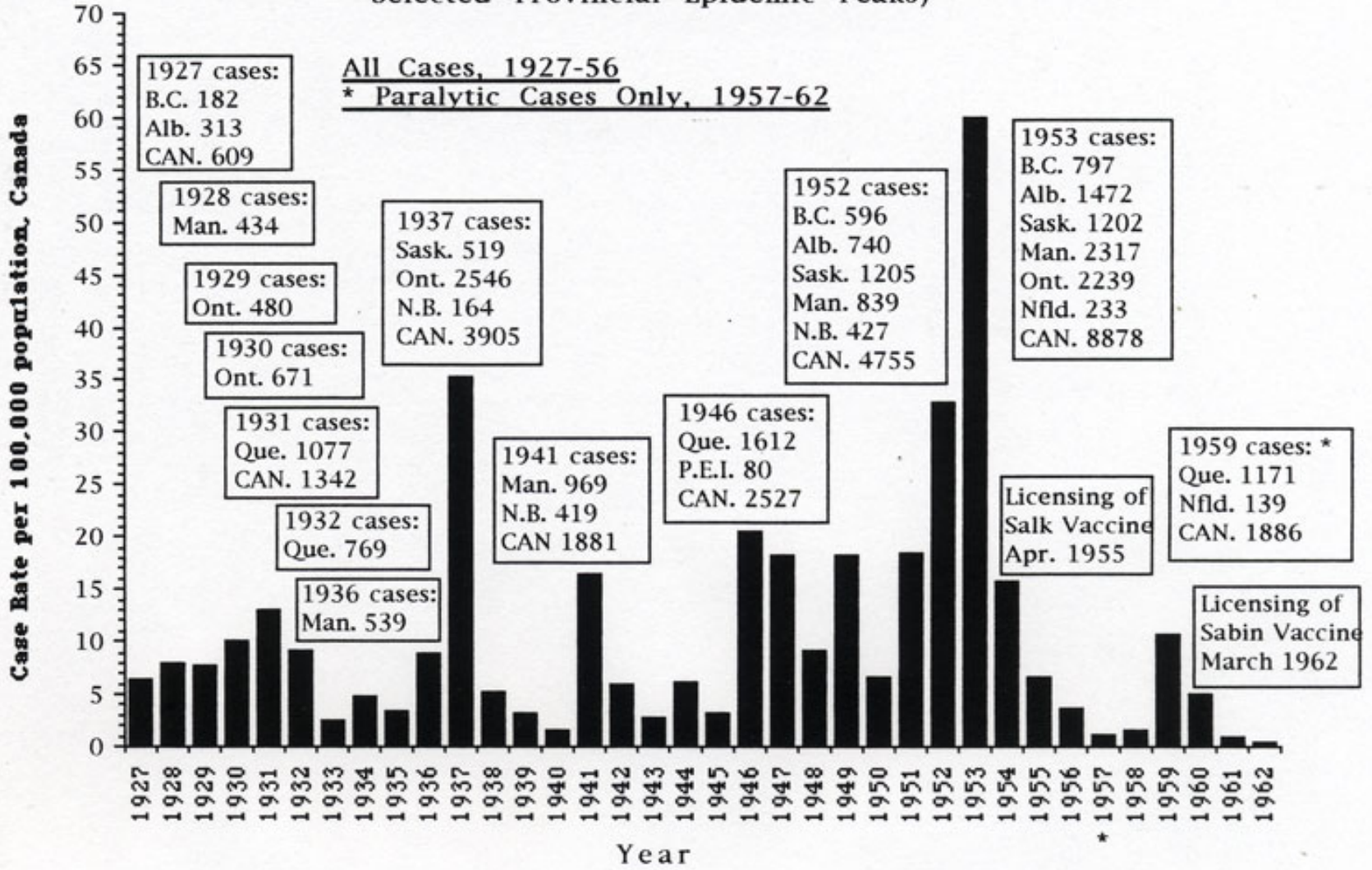
## Polio: “The Middle Class Plague”

- Canada was among the nations hardest hit by major polio epidemics
- Some 50,000 Canadians, mostly children, were affected by paralytic polio between 1927 and 1962
- Canada suffered through 4 major epidemic waves which resulted in 4,000 deaths



# Poliomyelitis Incidence in Canada, 1927-1962

(Case Rates per 100,000 Population &  
Selected Provincial Epidemic Peaks)



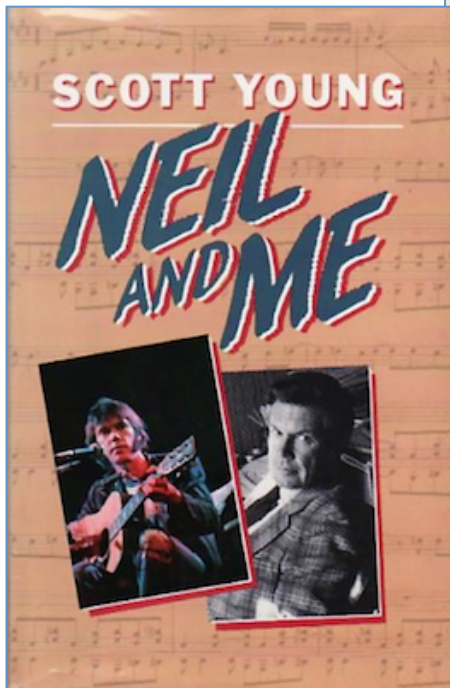


# Polio: “The Middle Class Plague”

## 1951 - Ontario

“Polio is the worst cold there is.”

*Neil Young, 1951, age 5  
Omemees, ON*



### CHAPTER THREE

## Polio Was a Killer – and Neil Had It

You have to be a certain age to remember the polio epidemic in the late summer of 1951, before there was Salk vaccine to control the disease. In Omemees, as elsewhere in Canada, the headlines every day gave the statistics, usually using the phrase “infantile paralysis” because the killer disease most often struck the young. News reports explained the different types. One form could kill a person in a few hours. Another could result in paralysis and leave a person crippled for life. People that August stayed away from fairs and exhibitions and were urged to avoid mingling in crowds anywhere. In cities the ultra-cautious walked instead of taking streetcars, and kept their distance from everyone else. City or country, the fearful woke in the night wondering if that back pain was the polio back pain, or that sore throat was the polio sore throat. There was, however, no polio in Omemees as the summer wore on into early September and the ducks began to flock up on the lake and partridges in farm wood lots began to feed in late afternoons under the apple and hawthorn trees.

Then Omemees did have its first case, and ten days later in September I went up to my third-floor study and wrote something, not for sale, but just so I would remember. It sat in my files for nearly thirty years, unpublished. Here it is, exactly as written in 1951:

The night that polio first made my younger son groan sleepily in his bed, I was reading. It was past one o'clock and I was the only one awake in the house. I waited for a minute or two after the first sound I heard from Neil's room. He seemed to be mumbling to himself. I got out of bed, trying not to disturb my wife, and opened his door. In the dim light that shone across the hall from

30



Scott Young, *Neil & Me* (Toronto: 1984)

## Polio: “The Middle Class Plague” 1951 - Ontario

- **July 1951** – “Polio season” began with some 227 cases reported across Canada, with 161 in Ontario
- **Aug 1951** – Another 761 cases reported nationally; 561 in Ontario
- **Sept 1951** – 973 more cases nationally, 659 in Ontario
- **Polio Totals for 1951:**
  - 2,568 in Canada, 162 deaths
  - 1,701 in Ontario; 101 deaths

• Worst polio year in Ontario since 1937

### Exhaust Oxygen Supply; Firemen Lose Race To Save Polio Victim

Peterborough, Aug. 6. — Two Peterborough firemen fought hard against insurmountable odds Sunday night in an effort to save the life of a young poliomyelitis victim.

In a rush trip to Riverdale Isolation Hospital in Toronto they used two ambulances, two inhalators and artificial respiration, but 25-year-old Alvin Snowden, Peterborough optical firm employee, was dead on arrival. During the trip one ambulance broke down, and at Oshawa they had to pick up a second inhalator. Before they reached Toronto it too, ran out of oxygen.

Capt. Garnet Brown and Fireman Bill Bloom left Peterborough at 11:05 and, in spite of their difficulties, arrived at the hospital at 12:50.

“We started out in Nesbitt’s ambulance from Peterborough,” said Bloom, “but about three miles east of Bowmanville a rod went through the motor. I hitchhiked into Bowmanville and got an ambulance from J. J. Morris and Sons and we went back and transferred Snowden.

“Then as we got near Oshawa Capt. Brown noticed we were run-

ning low on oxygen, so we stopped at the Oshawa Fire Department for their inhalator. Both of us were working on the man while Mr. Morris’ son drove so I don’t know just where it was, but about the time Scarboro police gave us an escort we ran out of oxygen. Capt. Brown started giving Snowden artificial respiration and I helped him.

“When we got to the city, the Toronto accident squad gave us an escort, and at 12:50 we were at the hospital, but it was all in vain.”

The death was Peterborough’s first from polio this year. Snowden had worked on Friday, but complained of feeling ill on Saturday. A doctor was called and on Sunday night he was ordered to the Toronto hospital for polio treatment.

### 14 Polio Cases During Weekend

The three-day holiday weekend turned up 14 new cases of poliomyelitis in Toronto, Health Department officials reported last night. The new cases, all but one being children, were reported between Friday night and Tuesday morning.

So far this year, 47 Torontonians have been stricken with the disease, as compared to only 30 for the whole of 1950 and 62 for the same period in 1949. The sole death this summer, that of a 22-year-old woman, occurred on July 19.

Of the weekend cases, one was a man of 26, the remainder youngsters between the ages of 2 and 14. Eight had no paralysis, the other four were slightly paralyzed either in legs or face.

At present, 17 of the 1951 cases are hospitalized, with nine still in the active stage.

*Globe & Mail, Aug 7, 1951, p. 1*

*Globe & Mail, Aug 8, 1951, p. 5*



## Polio: “The Middle Class Plague” 1951 - Ontario

- The Toronto and surrounding area was hardest hit, with cases in Hamilton and Halton to the west, and the Peterborough area to the east
- Of particular note were the cases of respiratory paralysis, including many adults, some not making it in time to an iron lung

- Most dramatic was the case of a baby born to 25-year-old Peterborough woman in an iron lung at Riverdale Isolation Hospital; the first such case in Canada
- The news, however, soon turned tragic, first for the baby and then the mother

### Mother Stricken by Polio, Baby Born in Iron Lung; Report Condition Good

A six-pound baby girl was born last night while her mother fought for her life in an iron lung at Riverdale Isolation Hospital.

According to Dr. Frank O'Leary, head of the obstetrical department at St. Michael's Hospital, the birth is the first, to his knowledge, of its type in Canada. There have been two or three cases in the United States of a polio victim giving birth in an iron lung.

Late last night both Mrs. William Miller, 25, and her new daughter were in good condition.

Earlier Dr. O'Leary and Dr. W. H. Jacques, assistant superintendent at the hospital, had followed the course of labor through portholes in the lung which completely covered the mother from the neck down.

Both doctors were contemplating the possibility of a Caesarian operation or even a post-mortem Caesarian when Mrs. Miller was brought in from Peterborough early in the evening.

In what hospital authorities described as "very critical" condition when she was admitted, she was kept alive during the last 17 miles of the ambulance trip with oxygen administered by a registered nurse.

While the two doctors were discussing the case, Mrs. Miller showed signs of regaining her strength and complained of a backache and other first signs of labor.

Through an anxious hour and a half they made complete preparations. When it was obvious that the moment of birth was near, the woman was slid out of the lung for less than a minute and Dr. O'Leary guided the birth with forceps.

The woman was immediately placed back in the lung and delivery of the placenta was made through the portholes. Following the delivery, Mrs. Miller showed good respiration and a marked improvement over her condition when she was admitted.

Her legs and chest muscles are paralyzed and her arms are partially paralyzed, Dr. O'Leary explained, "Mother Nature just overcame the obstacles."

The doctor said Mrs. Miller was given a few whiffs of anaesthetic just before she was taken out of the lung. "For the 30 seconds or so she was out of the lung," he said, "she was not breathing because of the paralysis in her chest muscles."

The baby, the doctor said, appears to be perfectly normal. She was due within the next week.

Mrs. Miller was stricken with polio Tuesday and the decision to move her to Toronto made yesterday after her respiration became serious.

Mr. Miller is a technician at Lumina Process Co. The couple has one other child, Michael, 2 years old.

### Iron Lung Mother Dies of Polio

Mrs. William Miller, 25, of Peterborough, who gave birth to a six-pound girl while in an iron lung Thursday night, died Saturday of poliomyelitis, at Riverdale Isolation Hospital.

The child, born as Mrs. Miller was removed from the lung for less than a minute, died shortly after birth. Mr. Miller was on his way to Toronto when his wife died.

Globe & Mail, Aug 10, 1951, p. 1

Globe & Mail, Aug 13, 1951, p. 5

## Polio: “The Middle Class Plague” 1951 - Ontario

- As the 1951 “polio season” continued in Ontario, there were other cases that seemed unusual, but which reflected polio’s broadening and highly variable threat during the early 1950s
- There were multiple cases in families, affecting children and parents, often with relatively mild effects
- Others, were deadly and heart-breaking

### Polio Hits Scarborough Family of Seven

Three children are still in bed, while two adults, one older child and a baby have recovered from a mild form of polio which infected a Scarborough Township family one by one, over the past three weeks.

Only the mother, Margaret Woolhead, 33, was admitted to the hospital. She entered Riverdale Isolation Hospital on July 30 and was released on Aug. 4. Dr. C. D. Farquharson, medical officer of health for Scarborough, said the family has been released from quarantine.

Polio first struck the eldest daughter of Mr. and Mrs. Edward Woolhead, 13-year-old Myrna, a third form student at Markham High School. Then the parents contacted

Globe & Mail, Aug 17, 1951, p. 5



**Polio Hits Family**—Ernest Ward of Toronto, his wife and 5-year-old son Tommy, were all reported improving last night after being stricken with poliomyelitis while visiting in Peterborough. The Wards' youngest child, Susan, 1½, has escaped the disease and is being cared for by grandparents. Mrs. Ward became ill last Tuesday, and on Wednesday her husband and son were stricken. Medical authorities said multiple cases in families were not common, but not unusual. Mr. Ward is a draftsman with the Ontario Hydro and lives at 20 Arden Cres., Scarborough.

Globe & Mail, Aug 14, 1951, p. 5

Two cousins of the Woolhead's also were reported affected by the mild polio. They recovered. Mr. Woolhead's side, nor

Three

A 9-year-old woman and the three other children had to be sent to the hospital for only partial paralysis weakness

The total was any number

### 'A Perfect Pair,' 2 Young Sisters Killed by Polio

Two young sisters have died of polio in Toronto within two weeks. Frances Howell, 10, died at her Havelock St. home on Aug. 9. Her elder sister, Shirley, 15, was fatally stricken by the disease at Riverdale Isolation Hospital Monday.

She was one of three children to die of polio within 24 hours here. The other victims were Gordon Smith, 12, of Bellair St. and Garry Young, 14, of Malton.

"Shirley and Dolly were a perfect pair of happy sisters," mourned their bereaved father. "Now we have nothing to live for any more."

The father, Frank Howell, said the family had cancelled vacation plans because of the death of Frances, affectionately called Dolly, but had decided because of the city heat to spend a few days at their cottage near Eight Mile Point on Lake Simcoe.

"I wonder if we would have been better off to stay at home," he said. "Perhaps Shirley would be still with us."

Shirley became ill Saturday morning and was taken to Memorial Hospital at Orillia. When her condition was diagnosed, she was rushed to Isolation Hospital here Saturday evening in a police-escorted ambulance.

"I watched Dolly die," her father said. "I saw the same look in Shirley's eyes." Shirley was a star swimmer and basketball player at Central High School of Commerce, and was popular with all her classmates, who always regarded her as the life of the party.

Gordon Smith died Monday night, less than 48 hours after he had been taken to the Isolation Hospital. He became ill Friday just after the family had returned from a month at Wasaga Beach.

Garry Young also died in the hospital Monday night, and was buried yesterday in Sanctuary Park Cemetery. His father, Harry Young, died

Globe & Mail, Aug 22, 1951, p. 5



## Polio: “The Middle Class Plague” 1951 - Ontario

- **End of August 1951** – As the Labour Day weekend began, Toronto had reported 197 polio cases and 8 deaths so far, and there was debate over whether the start of school should be postponed
- In the county of Peterborough, to the north-east of Toronto, there would be a total of 7 deaths due to polio
- **Aug 31** – Within Peterborough county, the small village of Omemee would report its first case of polio, the youngest son of Scott Young, a noted writer, 5-year-old Neil; the town’s 2<sup>nd</sup> case would prove fatal

THE GLOBE AND MAIL, FRIDAY, AUGUST 31, 1951. 5

### Postpone School Start Due to Polio: Lamport

With summer vacation due to end next Tuesday, the possibility of postponing the reopening of the schools, in view of the polio situation, was raised last night by ex-Con. Allan Lamport.

Mr. Lamport said that he had wired Harold Males, chairman of the board of education, suggesting consideration of such a step as a means of protecting the children.

With four new cases and one death among Toronto residents in the last 24 hours, total for the year now stands at 197 cases and eight deaths. For the corresponding date in 1949, there were 127 cases and three deaths and in 1937, the year

of the last epidemic, there were 263 cases and 11 deaths.

The board of education would have to have the permission of the Education Department at Queen's Park to prolong the vacation period. The board of health, however, has authority to keep schools closed. It would be guided by the advice of Dr. L. A. Pequegnat.

Mr. Lamport said the incidence of polio appears to be approaching a peak and for that reason he felt that postponement warranted some consideration.

There were three polio deaths in the last week at Riverdale Isolation Hospital, all adults. The Toronto victim was Thomas Edward Little, 25, a member of the Royal Canadian Regiment, who became ill while at home Saturday.

Paul Eric Schweltzer, 23, Old Mill Dr., York Township, and William Reginald Barrett, 35, Scarborough Township, were the other two fatal cases.

Of the four new cases among Toronto residents, two were boys, aged 6 and 7, and the others were a 19-year-old youth and a 26-year-old man. Two were non-paralytic.

### Toronto Suffers 12th Polio Death

The 12th polio death of the year among Toronto residents was reported yesterday by the Department of Public Health. The victim was Fred Schaeff of Silverthorn Ave., 26-year-old father of two children, who died in hospital Sunday night.

Thirteen new cases developed over the weekend, making the total for the year 292. For the corresponding date in 1937, the year of the polio epidemic, there were 562 cases and 24 deaths. Eleven of the cases were children under the age of 14. The other two were a man and woman in the 20-24 age group.

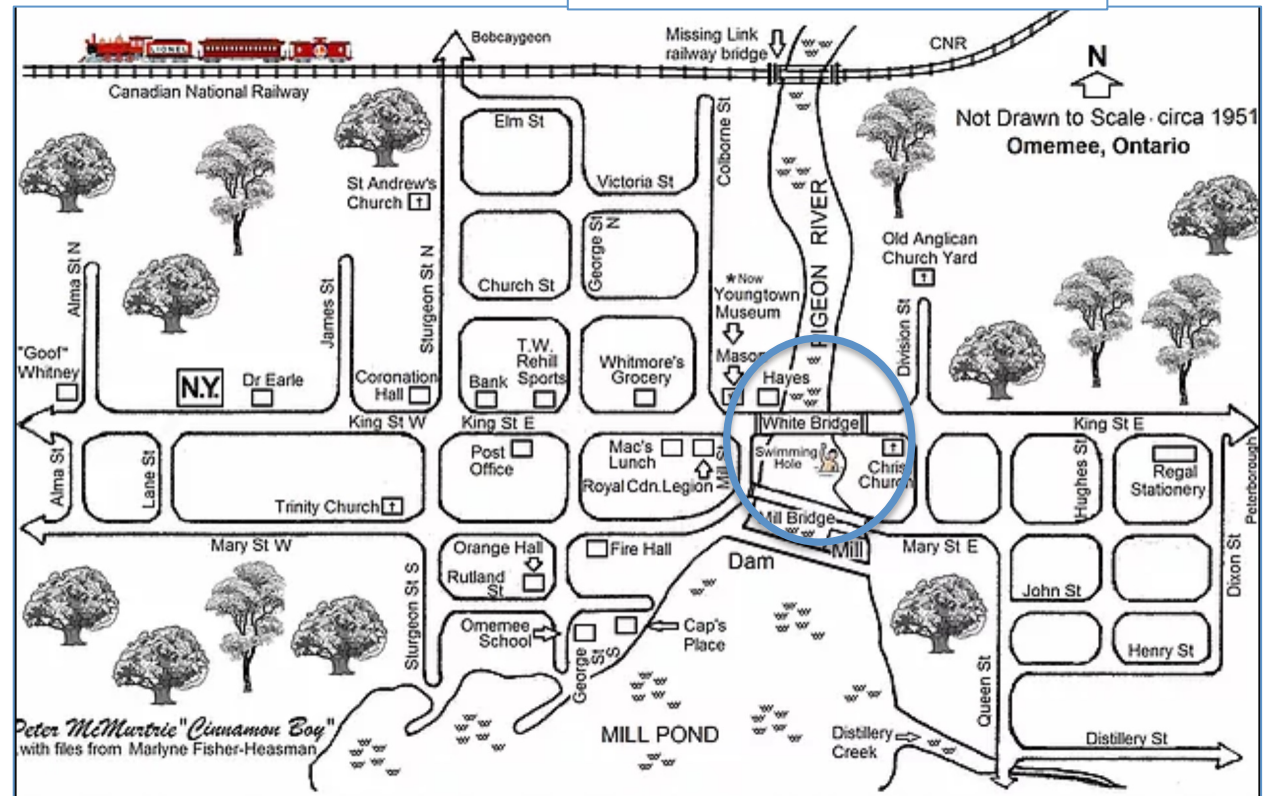
Globe & Mail, Sept 18, 1951, p. 5

# Polio: “The Middle Class Plague”

## 1951 – Omeme to Toronto

Sharry Wilson, *Young Neil*, blog,  
<https://www.youngneil.com/photo-gallery>

- **Aug 30** – Neil and his father went swimming in Pigeon River, the local swimming hole
- **Aug 31, 1:00 am** – Neil wakes up groaning, his back hurting, and feverish
- Scott Young was well aware of the polio spectre, especially with recent headlines
- He would also document the story



- The next morning, with Neil still in pain, the family doctor was called and after some tests, he suspected polio
- After considering their options, it was decided to drive the 90 miles, through a thunderstorm, to the Hospital for Sick Children in Toronto



## Polio: “The Middle Class Plague” 1951 – Omemee to Toronto

- The Hospital for Sick Children that Neil arrived at was brand new, opening in February 1951
- Soon after arriving a spinal, or lumbar, puncture test confirmed the polio diagnosis and Neil was admitted to the isolation ward
- Though scary and painful for Neil, and worrisome for his parents, his case was fairly typical, affecting his left shoulder, and after 5 days he was able to go home to recover

“I didn’t die, did I?” was the first thing Neil said when he was picked up



- Much later, Neil said of polio’s effects, “My left-hand side got a little screwed. Feels different from the right. If I close my eyes, my left side, I really don’t know where it is – but over the years I’ve discovered that almost one hundred percent for sure it’s gonna be very close to my right side... probably to the left.”

## 1951 – Key Poliovirus Studies

- **Fall 1951** – While young Neil Young stabilized in the Hospital for Sick Children’s isolation ward, little did he know that elsewhere in the hospital some very significant polio research was taking place in a state-of-the-art Virus Laboratory designed by Dr. Andrew J. Rhodes
- Since 1947, Rhodes, based at Connaught Labs, had led a comprehensive poliovirus research initiative that had contributed much to unraveling the epidemiology, and especially, based in particular on the 1949 Arctic polio epidemic, the immunology of the poliovirus



### PROGRESS IN RESEARCH ON POLIO ROUSES HOPE FOR PREVENTIVE TOXOID

By ROY GREENAWAY

An important step in polio research, which may eventually lead to production of a prevention vaccine or toxoid similar in effect to diphtheria toxoid, is credited to Dr. Andrew Rhodes, a young Toronto research worker at the Connaught Laboratories. The research, originated in the Hospital for Sick Children, is being continued by the Connaught Laboratories under the direction of Dr. Rhodes, who for years has been concentrating on polio.

The fundamental idea behind the research is to obtain an attenuated or weak strain of the polio virus which the body can easily destroy, and in the process build up effective antibodies. These antibodies, remaining in the body, would prevent future serious attacks of the disease.

Toronto Star?, Fall 1951



## 1951 – Key Poliovirus Studies

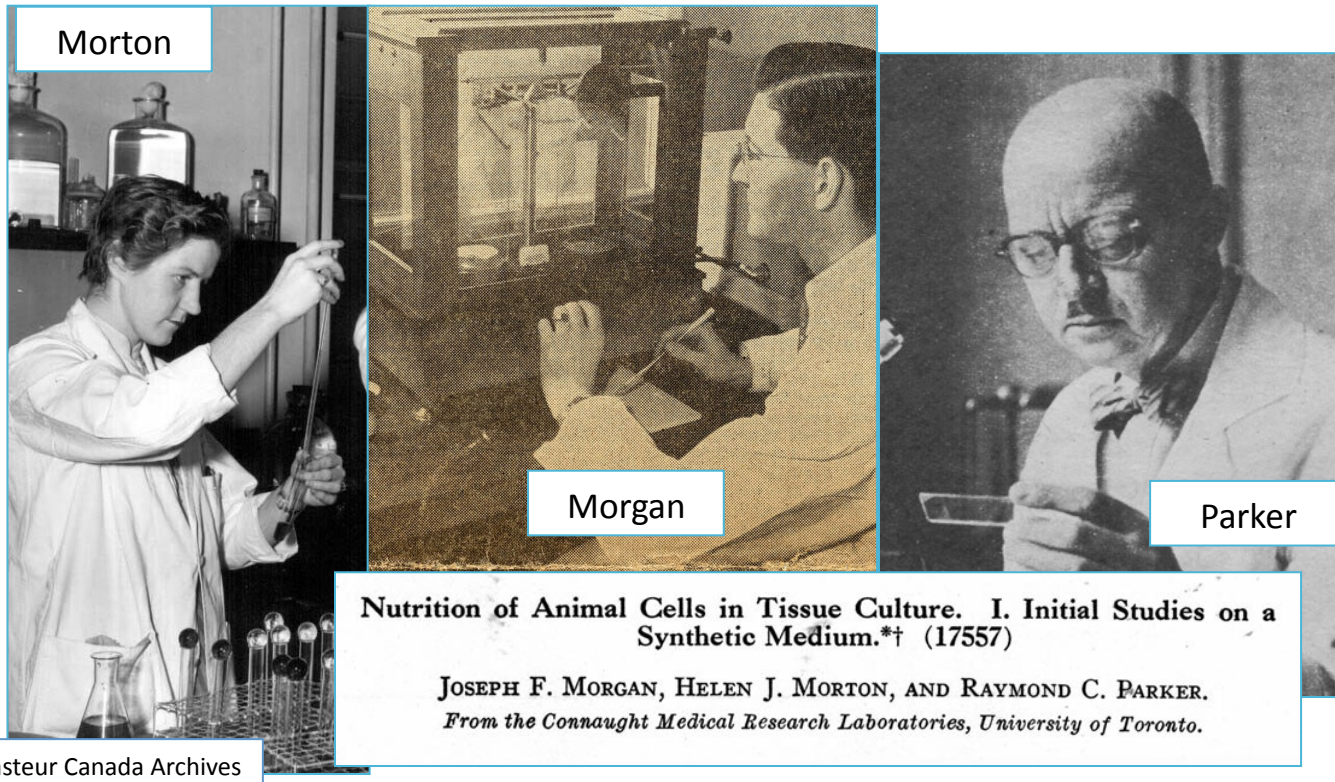


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- **June 1951** – Dr. Arthur E. Franklin (left), who had recently earned his Ph.D. in Biochemistry, joined Rhodes’ polio research group, focusing his skills on cultivating the poliovirus in various tissues using a traditional animal serum-based nutrient media solution, but with limited success
- **Nov 1951** – After trying to modify the existing medium, Franklin happened to meet at a Connaught Labs seminar, Dr. Joseph Morgan, the biochemist behind Connaught’s recently developed “Medium 199,” the world’s first purely synthetic tissue culture nutrient medium

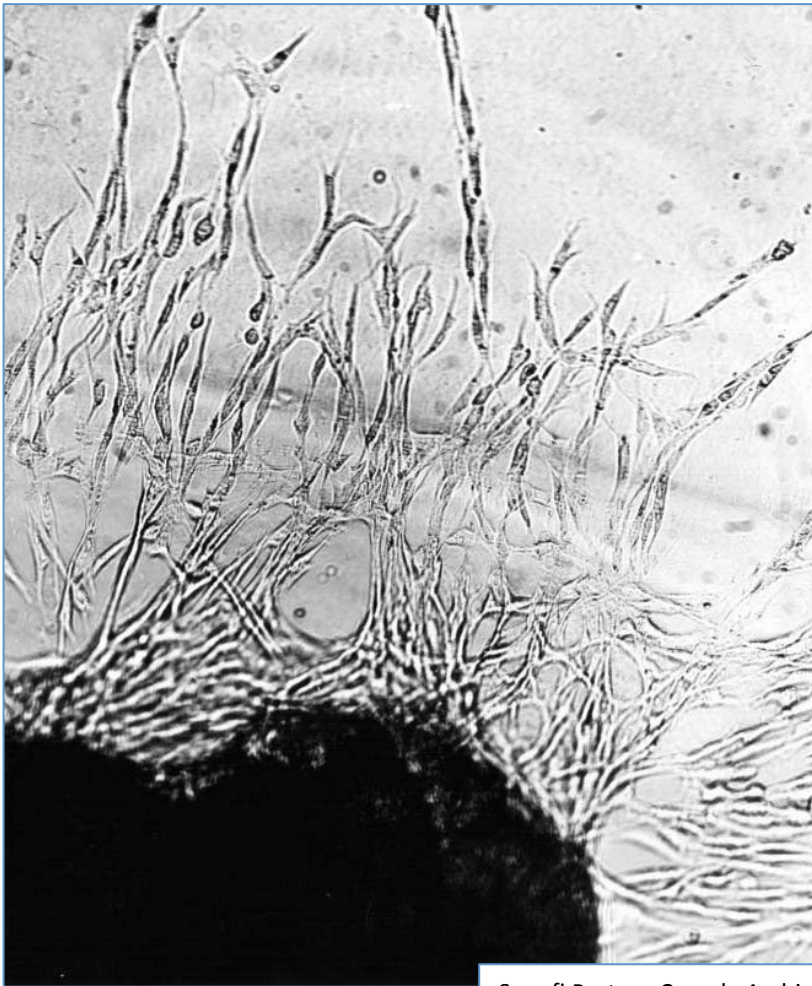
## 1951 – Key Poliovirus Studies

- **1949-50** – As described in last week’s class, “Medium 199”, a precise mixture of 60+ ingredients, was originally developed at Connaught Labs for nutritional studies of cancer cells
- A lot could be learned about cancer cells when scientists were able to precisely measure what elements they require nutritionally, or do not require





## 1951 – Key Poliovirus Studies

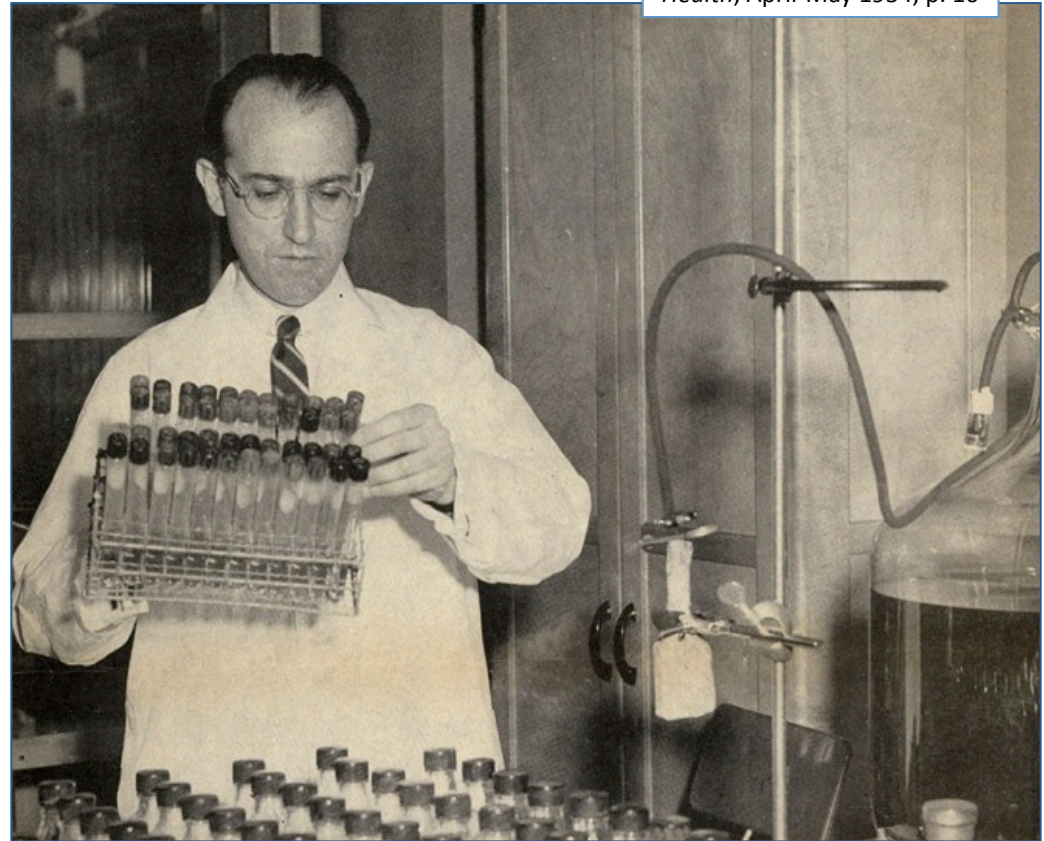


Sanofi Pasteur Canada Archives

- Morgan supplied Franklin with some Medium 199, and it was quickly apparent that it solved, quite spectacularly, most of the problems Franklin was having with cultivating the poliovirus, vastly improving the yields and purity of poliovirus cultures
- When Rhodes' initially found out about Franklin's remarkable results with 199, in an uncharacteristic display of excitement, he jumped up on a chair and cheered

## Dr. Jonas E. Salk: Polio Vaccine Pioneer

- **1951** - In the meantime, Dr. Jonas Salk, at the University of Pittsburgh, had shown that an inactivated poliovirus vaccine could prevent polio in monkeys
- **1952** - News of Connaught's "Medium 199" and its successful use for poliovirus cultivation, opened the door for Salk to plan for a first human trial of his polio vaccine
- **Late 1952** – The first trial took place at a residence for disabled children, most with polio, to test for antibody response and general side effects



- The first vaccine trial, and then a second, proved successful, but the major problem remained of how to make the vaccine on a large enough scale for a definitive field trial



## Polio: “The Middle Class Plague” 1952 – Saskatchewan

- **1952** – Meanwhile, polio’s devastation shifted to the west, with Saskatchewan at the epicentre
- Also major outbreaks in B.C., Alberta, Manitoba, P.E.I and New Brunswick
- 1,205 cases and 90 deaths in Saskatchewan
- 142.9 per 100,000 case rate, the highest provincial rate yet seen in Canada
- The first cases in an isolated Mennonite community north of Saskatoon; the virus likely imported via a group who had visited Texas: the U.S. endured its worst ever polio epidemic year in 1952
- The epidemic spread slowly and continued into December



- Among the victims of polio in Saskatoon was 9-year-old Joni Mitchell
- Polio made her “prematurely adult and stubborn.”

## 1952 – Joni Mitchell & Polio

- **Christmas 1952** – Joni was stricken with polio sometime in December, and spent six scary weeks in St. Paul’s Hospital in Saskatoon
- “The polio ward is a really depressing place,” she remembered, “and you hear the whining of the iron lungs, a bunch of them going away, and you’re just praying that you don’t go into one. The disease only rampages for two weeks and then you’re left with the disaster. I was unable to walk or stand. I was train-wrecked. My spine looked like the freeway after an earthquake...

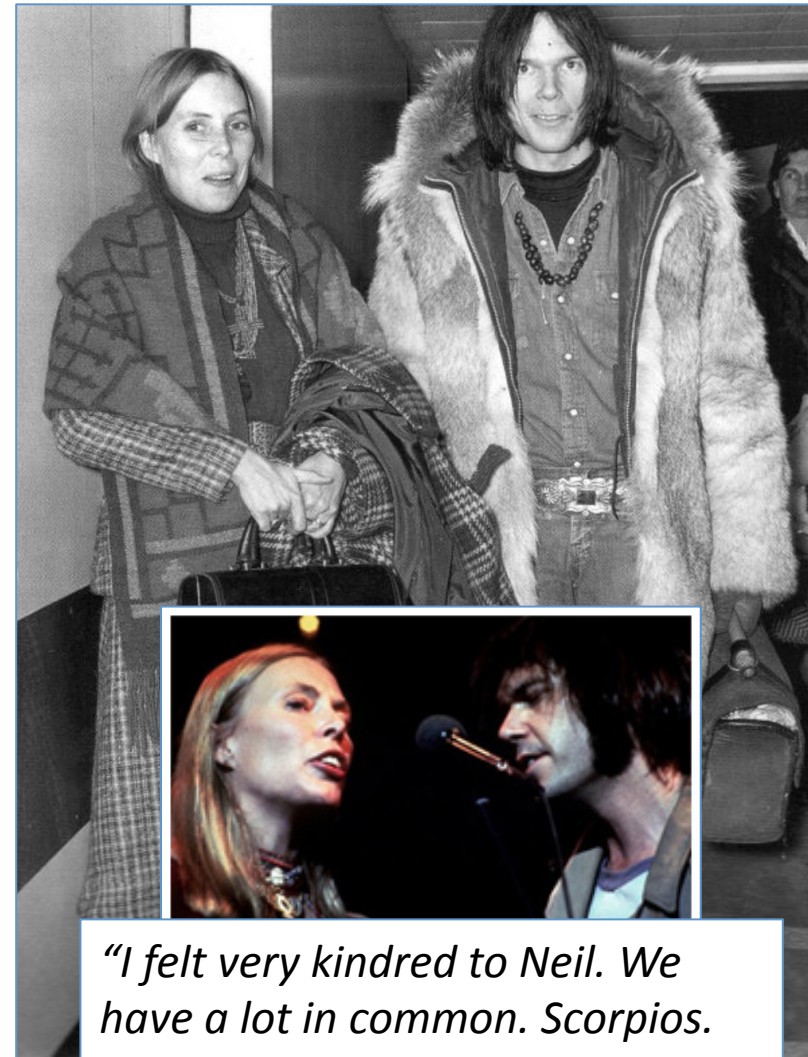


- “My mum put up a Christmas tree in my room. and I remember saying to the tree, ‘I am not a cripple.’ They would come with cauldrons of hot flannel rags and pin them all over you – the heat was meant to do something to the muscles. In a very short space of time, I unfurled. They sent me home in a wheelchair, but I refused to use it.”



## 1952 – Joni Mitchell & Polio

- “There was a boy in the bed next to mine in the polio ward who was really depressed. He didn’t even have polio as bad as I did, but he wasn’t fighting it – he wasn’t fighting to go on with what he had left.” Joni had to “learn to stand, and then to walk”
- “Through all of this, I drew like crazy and sang Christmas carols. I think that the creative process was an urgency then, but it was a survival instinct. I left that ward long before that boy, who had a mild case of polio in one leg. He lay with his back to the wall, sulking. When the spirit of child’s play enters into the creative process, it’s a wonderful force and something to be nurtured.”
- As Joni recovered at home, she developed a strong artistic sensitivity. “A great sorrow hath humanized me”



*“I felt very kindred to Neil. We have a lot in common. Scorpios. Polio in the same epidemic struck the same parts of our bodies. And we both have a black sense of humour. Typical Canadians.”*

## 1952-53 – Key Poliovirus Studies

- While Joni was recovering in Saskatoon, Connaught Lab's Spadina Building, acquired by the Labs a decade earlier to prepare penicillin, became the focus of solving the problem of how to produce Salk's inactivated polio vaccine on a larger scale
- **1952** - Recognizing Connaught's experience in developing large scale vaccine and biologicals production technologies, the NFIP financed a major pilot project to cultivate poliovirus in large quantities



Sanofi Pasteur Canada Archives



## 1952-53 – Key Poliovirus Studies: The Toronto Method

- Key to efforts to grow the poliovirus in larger containers was Dr. Leone N. Farrell, who had considerable experience with the large-scale production of biologicals, such as pertussis vaccine, as we've seen



Sanofi Pasteur Canada Archives



## 1952-53 – Key Poliovirus Studies: Dr. Leone N. Farrell

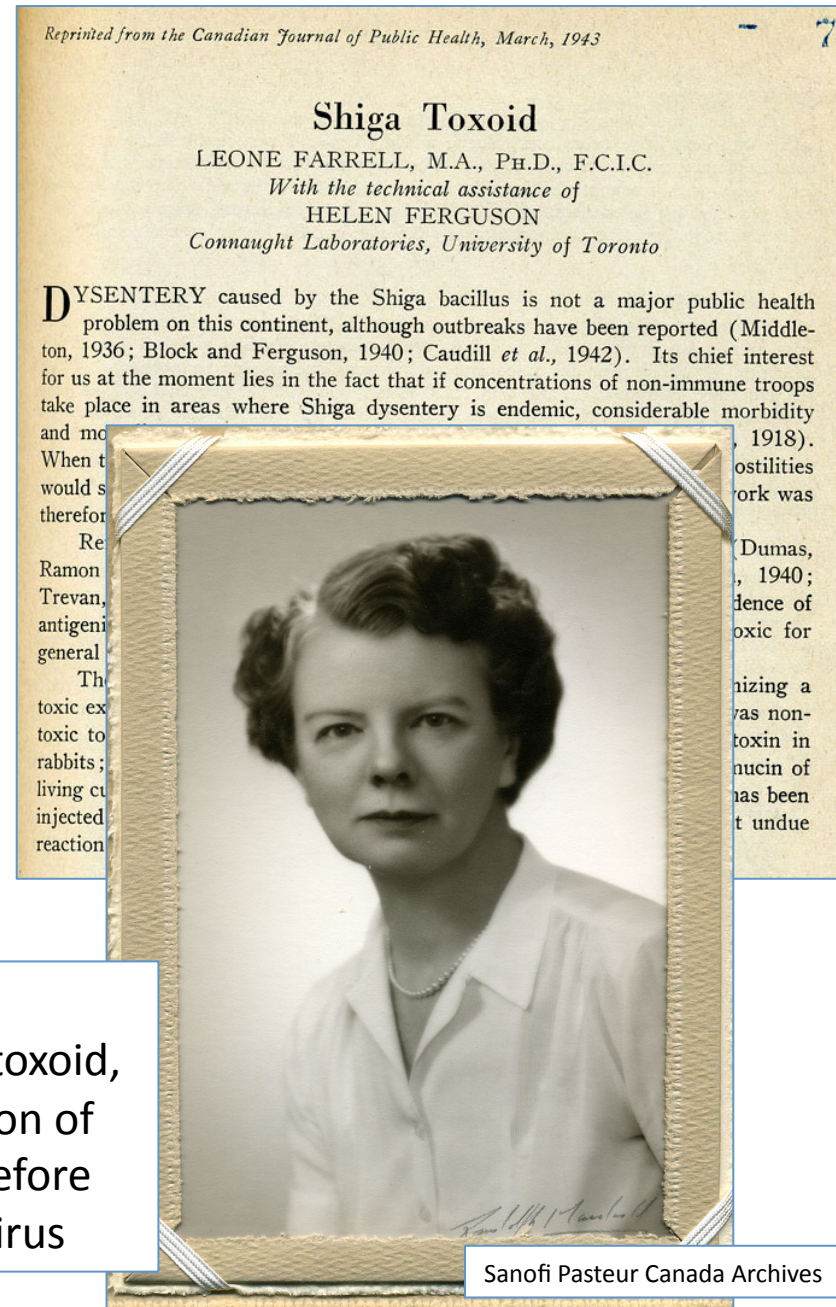


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- Dr. Leone Farrell was among a small group of women of her generation to earn a Ph.D. in the sciences
- She was a true pioneer in the laboratory, innovative in her work and inspirational in her dedication to it
- Born in a small farming community near Ottawa, she grew up in Toronto, earned a B.A. in Chemistry at the University of Toronto in 1928; a Masters in Zymology followed in 1929, focused on the chemistry of fermentation, particularly in honey.
- After working at the National Research Council in Ottawa, she studied at the London School of Hygiene & Tropical Medicine, then returned to UofT to complete her Ph.D. in Biochemistry in 1933

## 1952-53 – Key Poliovirus Studies: Dr. Leone N. Farrell

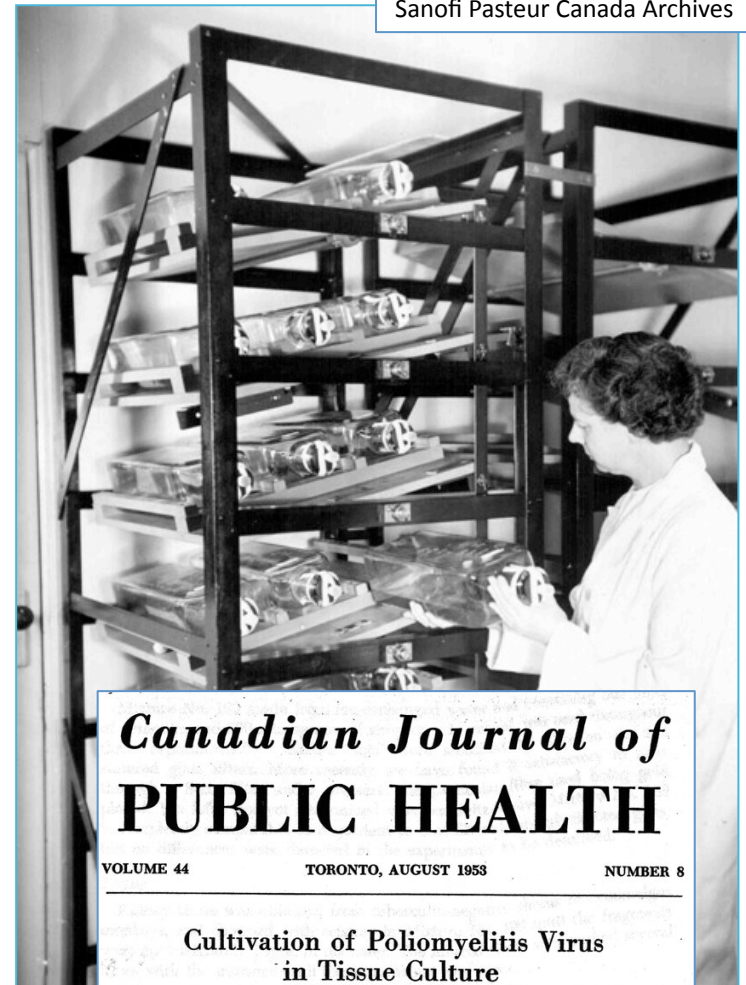
- **1934** – After joining Connaught, Farrell focused on the development of toxoid vaccines against staphylococcus and dysentery
- **1939-40** – She then developed a new deep culture method of “rocking” cell cultivation (“Toronto Method”) for the bulk production of toxin in a liquid semi-synthetic cell nutrient mixture
- **Early 1940s** – She adapted this deep culture “rocking” method for the production of pertussis vaccine
- During WWII, Farrell was involved with the production of cholera vaccine and dysentery toxoid, then concentrated on improving the production of penicillin in the late 1940s and early 1950s, before turning her attention to cultivating the poliovirus



## 1953 – Key Poliovirus Studies: The Toronto Method

- **1953** - Building on her experience with 'deep culture' production, Farrell adapted the "Toronto Method" to the production of poliovirus fluids using Medium 199 to cultivate the virus in monkey kidney cells in large Povitsky bottles that were incubated on custom built rocking machines
- **July 1953** - In the wake of the worst polio epidemic year in U.S. history, and encouraged by Salk's and Connaught's progress, the NFIP asked the Labs to provide all of the poliovirus fluids required for an unprecedented controlled field trial of Salk's inactivated polio vaccine, which would hopefully start in the spring

• Canada's worst polio epidemic year was just starting...



### *Canadian Journal of* **PUBLIC HEALTH**

VOLUME 44

TORONTO, AUGUST 1953

NUMBER 8

#### Cultivation of Poliomyelitis Virus in Tissue Culture

VI. METHODS FOR QUANTITY PRODUCTION OF POLIOMYELITIS  
VIRUSES IN CULTURES OF MONKEY KIDNEY\*

L. N. FARRELL, M.A., Ph.D.

W. WOOD, M.B., B.S.

A. E. FRANKLIN, Ph.D.

F. T. SHIMADA, B.A.

H. G. MACMORINE, M.A.

and

A. J. RHODES, M.D., F.R.C.P. (Edin.)

Connaught Medical Research Laboratories

University of Toronto



## 1953 – Summer of Fear

- **1953** – Canada’s worst polio year 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
- To the east, Newfoundland was hit by its worst epidemic, involving 233 cases and causing 11 deaths.
- Ontario experienced its worst polio epidemic since 1937, with a total of 2,239 cases and 124 deaths reported

### Poliomyelitis in the Yukon

J. D. ADAMSON, M.D.,<sup>1</sup> MALCOLM R. BOW, M.D.<sup>2</sup>  
AND E. H. LOSSING, M.D.<sup>3</sup>

THE YUKON is a sparsely settled Territory in the north-west extremity of Canada. It extends into the Arctic, lying between 60° and 40°N. longitude and between 130 and 140°W. latitude (see map). To the north is the Arctic Ocean, to the west, Alaska, to the south, British Columbia, and to the east, the Northwest Territories. The capital city, Whitehorse, lies 1,369 miles by the Alaska Highway north-west of Edmonton. The most northerly settlement, Dawson City, lies 250 air miles farther north. The country is mountainous, with very little arable land, and is richly grown with poplar, spruce and jack pine of small size. It is drained to the north-west by many magnificent, rapidly flowing, navigable rivers, all of which ultimately join the Yukon, which empties into the Behring Sea. The climate is moderate in comparison to the Eastern Arctic and other parts of the earth of equal longitude. The annual mean temperatures for the past eleven years are as follows: 1942, 32.4; 1943, 33.2; 1944, 34.7; 1945, 31.0; 1946, 31.2; 1947, 32.7; 1948, 28.6; 1949, 30.8; 1950,

Globe & Mail, June 6, 1953, p. 1

#### Army Confirms 37 Polio Cases In Yukon Camps

Edmonton, June 5 (CP). — The presence of 37 cases of polio among Canadian Army men and their dependents in the Yukon was confirmed today by Western Command

31.4. The average

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Globe & Mail, June 24, 1953, p. 32

#### Yukon Polio Total 130 Cases, 5 Fatal

Edmonton, June 23 (CP). — An outbreak of polio in the Yukon has taken at least five lives, striking 59 civilians and 71 military men and their dependents. Three of the deaths were civilian cases. Canadian servicemen and their dependents are being attended in the 75-bed Whitehorse military Hospital. Civilians are being

- In the Yukon, there were 142 cases and 9 deaths among a population of about 9,000 civilians, natives, and Air Force and Army personnel
- Adults were the primary victims, many requiring iron lungs

## 1953 – Summer of Fear: Manitoba

- From Manitoba west, however, every province felt the full effects of epidemic polio at record or near record levels
- While the experience of each of the western provinces was dramatic and devastating, it was Manitoba that faced the worst crisis in the country, if not in the history of this disease

### National numbers:

- 9,000 cases (59.9 per 100,000)
- 500 deaths

### Manitoba:

- 2,317 cases (286.4/100,000)
- 91 deaths

### Winnipeg:

- 763 cases (318/100,000)

# *Canadian Journal of* **PUBLIC HEALTH**

VOLUME 45

TORONTO, MAY 1954

NUMBER 5

## The Poliomyelitis Epidemic in Winnipeg, 1953

EPIDEMIOLOGICAL STUDY, INCLUDING THE USE  
OF GAMMA GLOBULIN

R. G. CADHAM, M.D., D.P.H.  
*Deputy Medical Health Officer  
Winnipeg, Manitoba*

**D**URING the summer months of 1953 the City of Winnipeg (population 243,000) experienced the second largest case rate of poliomyelitis ever to occur in North America in an urban population of over 200,000. A total of 763 cases was reported. The case rate was 318 per 100,000 population. Type I virus was identified in stool specimens from hospital patients. The only previous epidemic in a large urban centre in which this case rate was exceeded was in Newark, New Jersey, in 1916, with a case rate of 340 per 100,000 population. Other severe poliomyelitis epidemics with a high incidence of reported cases in American cities with populations in excess of 200,000 are as follows (1): Los Angeles (1934), 95; Providence (1935), 100; Buffalo (1944), 110; and Minneapolis (1946), 150.

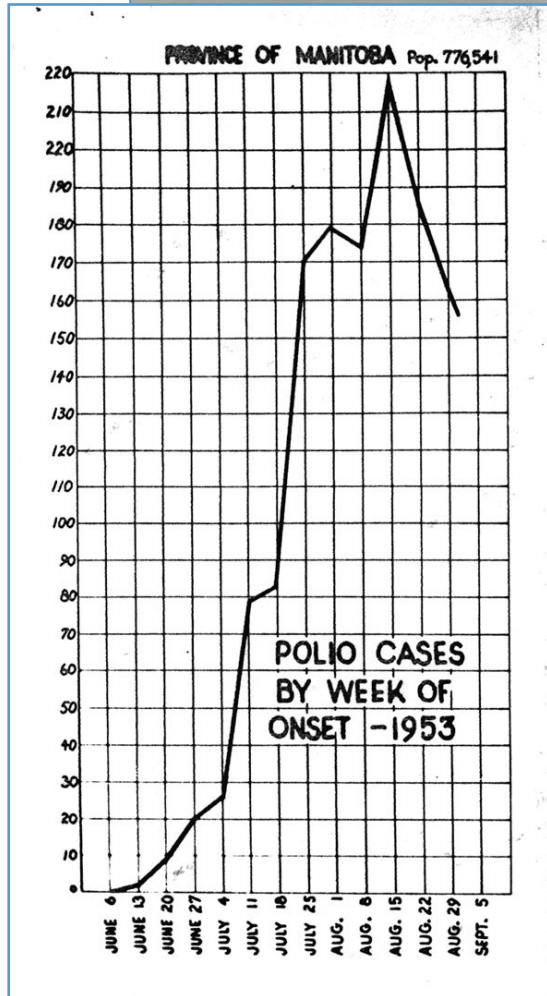
In Table I are shown the number of reported cases and the case rate for epidemics of poliomyelitis which have occurred in Winnipeg. In the 1953



Brandon Sun, Dec 28, 1953

## 1953 – Summer of Fear: Manitoba

- For Manitoba, the 1953 polio crisis followed a serious epidemic in 1952, which had continued into March 1953
- May 1953** - The first cases of the epidemic reported and the numbers 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 reported through December and to the end of February 1954





## 1953 – Summer of Fear: Manitoba

- As in previous epidemics, such as in Ontario in 1937, polio's worst impact was when breathing was weakened or paralyzed in many cases and many iron lungs were needed
- During the 1953 epidemic, many iron lungs were needed all over the country, although the greatest need was in Winnipeg
- The Canadian Air Force was called on to transport iron lungs in a desperate attempt to meet the crisis

Winnipeg Free Press, Aug 27, 1953, p. 1

# RCAF Flies F.P. 27 8 53 P. 1 Iron Lungs To Winnipeg

Ten iron lungs for treatment of polio victims at King George hospital arrived in Winnipeg from Boston Wednesday night aboard an RCAF C-119 "Flying Boxcar."

The 10 respirators bring to 14 the number flown here by the RCAF in answer to a request by provincial health authorities.

Difficulties in transporting iron lungs from Boston factories to Winnipeg originally prompted the request for air force assistance.

There is no immediate need for the respirators, but health authorities feel they will provide a safeguard against any future development in the Manitoba polio epidemic.

The aircraft, one of four of its kind in Canada, left its home base at Montreal Monday afternoon. It will leave Winnipeg today to return to Montreal.

## 1953 – Summer of Fear: Manitoba

- As the 1953 epidemic began there were 21 adult-size iron lungs and one child-size respirators in Manitoba, but of these, 13 were occupied by cases from 1952.
- Initial confidence that a stockpile of iron lungs, plus others on order would meet any need, was soon shattered and by August there was a desperate scramble to get iron lungs to Winnipeg's King George Hospital

Winnipeg Free Press, Sept 5, 1953, p. 1

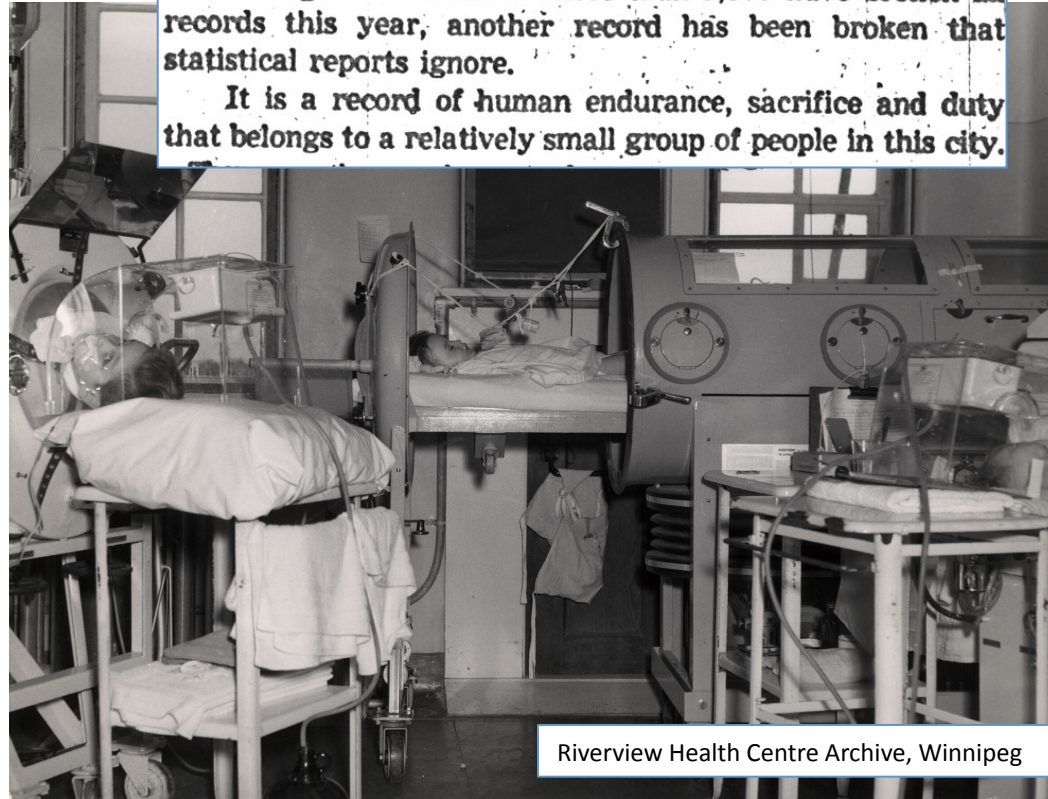
# Small In Number, A 'Fighting' Few, Stand Polio Siege

FP 5.9.53 p.1  
BY LYN CHANDLER

Statistics never tell the whole story of the Manitoba polio epidemic.

Though case totals of more than 1,300 have broken all records this year, another record has been broken that statistical reports ignore.

It is a record of human endurance, sacrifice and duty that belongs to a relatively small group of people in this city.



Riverview Health Centre Archive, Winnipeg



## 1953 – Summer of Fear: Manitoba

- The crisis grew sharply worse...
  - A total of 64 patients needed iron lungs by the end of August, 72 a week later, 82 by September 21st, and an overwhelming 92 cases were dependent on respirators at once at KGH at the beginning of October.
- In total, 165 cases were treated in iron lungs in Winnipeg's King George Hospital, 62 of which died during the epidemic



Riverview Health Centre Archive, Winnipeg



## 1953 – Summer of Fear: Manitoba

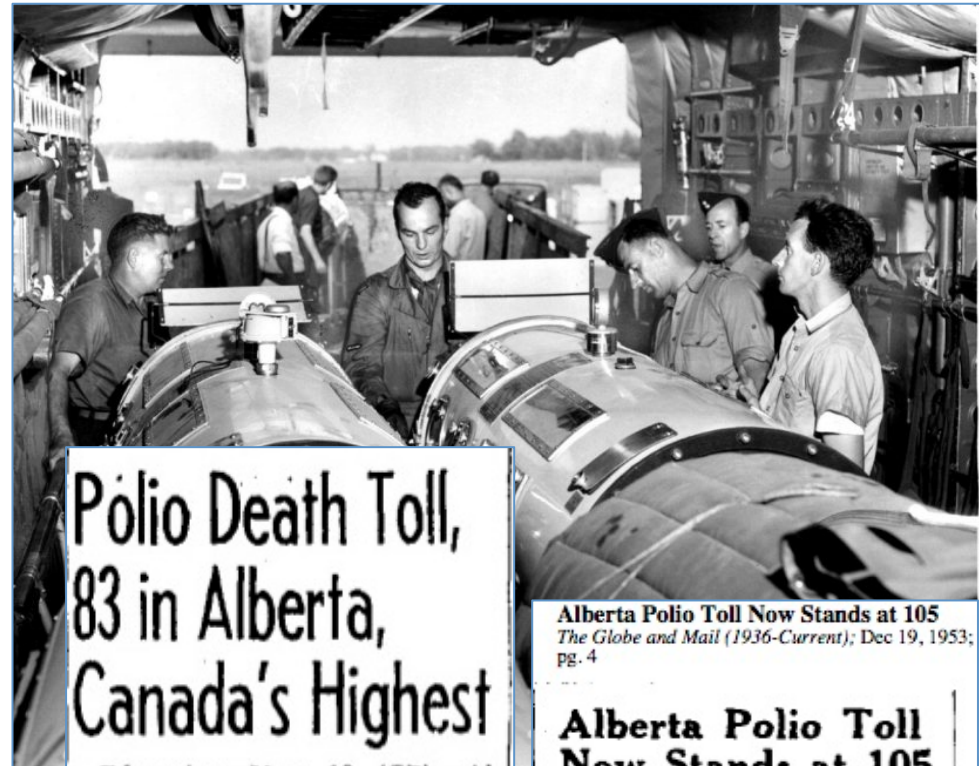
- This dramatic and desperate search for and transport of iron lungs, and of patients in need of them, by the Air Force, or any other means, was repeated, though on somewhat lesser scale, across Canada in 1953
- This was particularly true in British Columbia, Newfoundland and Alberta



- In Edmonton, the Royal Alexandra Hospital managed 107 respirator cases and had a maximum of 33 cases in iron lungs at one time, the situation complicated dramatically one night when a thunderstorm knocked out the hospital's power, forcing nurses, and anyone else available, to manually pump each iron lung until power was restored

## 1953 – Summer of Fear

- The cruelty of polio was manifested powerfully in Alberta in 1953 as it suddenly claimed five nurses (two died), two doctors, three teachers, and a lawyer and his wife, both of whom were dependent upon iron lungs at the same time.
- The husband later died along with two other lawyers and a newly married woman.



### Polio Death Toll, 83 in Alberta, Canada's Highest

Edmonton, Nov. 18 (CP).—Alberta's official 1953 polio death toll reached a record 83 Wednesday—highest in Canada. There have been 82 deaths in Manitoba and 67 in Saskatchewan.

Alberta's total lunged upward when the Provincial Health Department confirmed six deaths, five in the Calgary area and the other near Edmonton.

However, all six fatalities occurred in the nine-day period from Nov. 2 to Nov. 11, indicating a possibility that incidence of the disease had started to drop.

*Globe & Mail*, Nov 19, 1953, p. 17

Alberta Polio Toll Now Stands at 105  
*The Globe and Mail* (1936-Current); Dec 19, 1953;  
pg. 4

### Alberta Polio Toll Now Stands at 105

Edmonton, Dec. 18 (CP). — Alberta's official polio 1953 death toll was increased by two, to 105 today.

Cases were increased by four to 1,366.

*Globe & Mail*, Dec 19, 1953, p. 4



## 1953 – Summer of Fear

- 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

WINNIPEG FREE PRESS, THURSDAY, DECEMBER 10, 1953 p. 10

### Canada Hard Hit By Polio Epidemic

By THE CANADIAN PRESS

Canada is nursing the wounds of one of the worst outbreaks of polio in her history. The western flank of the 1953 epidemic out-maneuvred medical defenders and short-lived theories, resulting in at least 269 deaths in the four western provinces and a high rate of paralysis among the 5,316 cases.

In eastern Canada, polio followed a generally orthodox route, creating a record incidence and death only in Newfoundland, which experienced a 1953 increase to 12 deaths and 224 cases from the five cases and no deaths reported last year.

When final figures are available, the number of polio cases across Canada this year is expected to double the 1952 total. The federal health department reported in the Commons Wednesday that to Nov. 28 there had been 8,298 cases compared with 4,755 last year.

Manitoba, Alberta and Ontario were the hardest hit by this season's outbreak.

In Manitoba there were 300 cases of polio for every 100,000 persons, a total of 2,318 cases, of which 85 persons died. Government officials say this incidence exceeded all known Canadian and world figures.

Alberta, plagued with an epidemic prolonged beyond the normal period, has suffered 98 deaths

persons over 20. In Alberta, too, polio no longer is considered a children's disease. Seventeen per cent of the 98 Alberta deaths occurred in children under 10, while 60 per cent were persons between 20 and 40.

In previous years, the oil province has seen epidemics hit their peak in August and end their normal decline in September. This year, 40 per cent of deaths occurred in the final quarter of the year.

"Cold weather" polio also continues in British Columbia, where for bulbar and paralysis, 1953 has been the worst year in the province's history.

There have been 595 cases and 37 deaths in the B. C. this year, compared with 760 cases and 26 deaths last year. Medical authorities term the increased death rate "exceptionally low" compared to the Prairie figures but say Prairie provinces have had more bulbar.

Bulbar polio occurs when the polio virus attacks the "bulb," or spinal nervous system at the base of the neck, and affects respiratory muscles. Paralysis of other nature results from infections of other sections of the nervous system.

Alberta hospitals have crowded isolation wards with iron lungs, including 12 flown from Boston, to combat bulbar polio.

**CAUSE UNKNOWN**

Polio Now  
 P.P. 3.12.53 P.1.  
 Major Issue  
 Says Martin

OTTAWA (CP) — Poliomyelitis has assumed new prominence as a major public health problem in Canada, Hon. Paul Martin, health minister, said Wednesday in the Commons.

He said preliminary figures of 8,213 cases and 354 deaths "indicate that this year's outbreak will prove to be one of the most serious on record."

Replying to a question by E. G. McCullough (CCF—Moose Mountain) as to what federal assistance is being provided, Mr. Martin said the government has made more

Winnipeg Free Press, Dec 3, 1953, p. 1



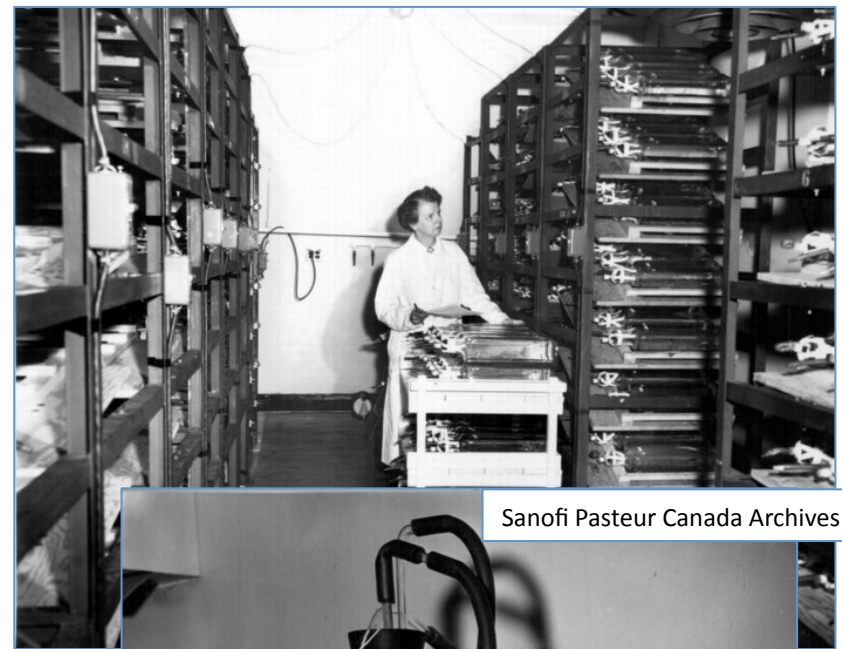
Riverview Health Centre Archive, Winnipeg



## 1953-54: Polio Vaccine Trial Connaught Lab's "Herculean Task"

- **1953-54** – While the polio emergency worsened, Connaught undertook -- as Jonas Salk described it to the Lab's Director, R.D. Defries -- the "herculean task" of producing over 3,000 litres of poliovirus fluids for what would be the largest vaccine field trial ever attempted
- The poliovirus fluids were shipped to two U.S. pharmaceutical firms by station wagon for inactivation and processing into the finished vaccine in time for immunizations to start in April 1954

**1954-55** - Connaught then focused its efforts on the full preparation of vaccine for eventual Canadian use, pending the results of the field trial



Sanofi Pasteur Canada Archives



April 24, 1954:

## Launch of Salk Vaccine Field Trial

- 1,800,000 “polio pioneer” children enrolled across U.S; in May, Alberta, Manitoba and Halifax joined trial, along with parts of Finland
- For this triple-blind field trial, children (grades 1-3) received either the vaccine, a placebo of Medium 199, or were observed

VOLUME 46

TORONTO, JULY 1955

NUMBER 7

### Preparation of Poliomyelitis Virus for Production of Vaccine for the 1954 Field Trial<sup>†</sup>

L. N. FARRELL, W. WOOD, H. G. MACMORINE,  
F. T. SHIMADA, AND D. G. GRAHAM  
*Connaught Medical Research Laboratories  
University of Toronto*

**T**HE important demonstration of Enders, Weller and Robbins (3) that viruses of poliomyelitis proliferate in cultures of human embryonic tissue opened wide areas for study of the cause and prevention of this disease. When Rhodes and his associates showed (5) that the entirely synthetic nutrient Medium no. 199 devised by Morgan, Morton and Parker (6) can replace conventional tissue culture media containing antigenic material such as horse serum, a cell-free vaccine suitable for use in children became a possibility. Salk and his colleagues in fact used Medium no. 199 in tissue cultures to prepare their

*Canadian Journal of Public Health*, July 1955, p. 265

man subjects



*Time (Canadian Edition)*, March 29, 1954



## April 24, 1954: Launch of Salk Vaccine Field Trial

- Meanwhile, Connaught proceeded to prepare the full vaccine while the federal and provincial governments planned an all-Canadian observed-controlled trial of it that would start in April 1955, regardless of U.S. results
- Each batch of vaccine was double-tested by Connaught and the Laboratory of Hygiene in Ottawa



### POLIO WEAPON

A Toronto lab is helping make vaccine that may protect half a million U.S. children in history's biggest medical experiment

By Jacqueline Moore  
WEEKEND Staff Writer



Photos by Herb Nott  
Cancer researcher Dr. Raymond Parker made the discovery being used in producing experimental polio vaccine.

Weekend Magazine, April 1954

Globe & Mail, April 5, 1954, p. 21

## All Virus for U.S. Polio Inoculations Made in Connaught Laboratories

By KEN W. MacTAGGART

During the next eight weeks, one of the greatest projects in medical history will be launched. By June 1, between 500,000 and 1,000,000 children of Grade Two age in the United States will have been inoculated against poliomyelitis. In the weeks that follow, medical authorities the world round will be watching breathlessly.

of brews, tested various tissues. Boston had been able to keep the virus alive on rare, hard-to-obtain embryo tissues. Connaught tried others, suddenly came up with monkey kidney tissue, and delved back into years-old studies to re-discover that a fluid, labelled by its Connaught discoverers years ago as 199, met all the needs. It was costly; one of its 62 ingredients alone costs \$2,500 a bottle.

The National Foundation had been watching Connaught. Swift-

team is spread through two of its divisions: College St., opposite police headquarters, and Spadina, the venerable building on the crescent which was salvaged by the scientists. Some idea of the work entailed, with thousands of flasks and tubes used daily, is given by the knowledge that 20 people work steadily at the single job of cleaning and sterilizing the glassware.

Three times a week, a station-wagon with the license-plates of a U.S. state arrives with a team

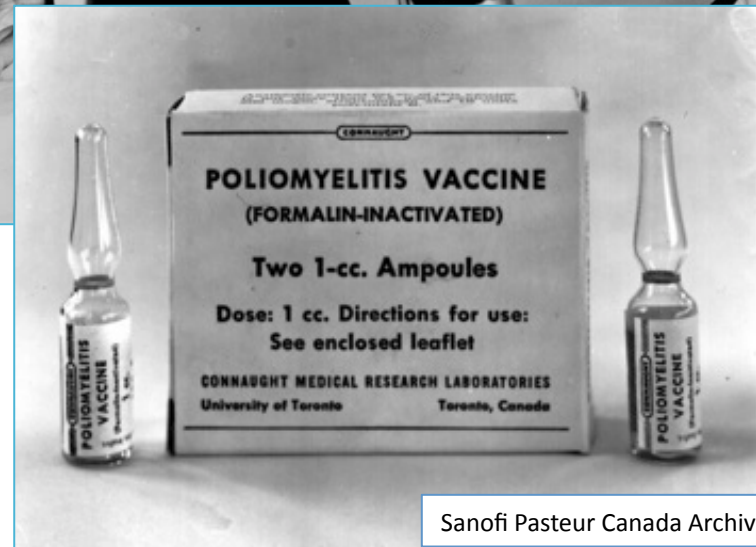
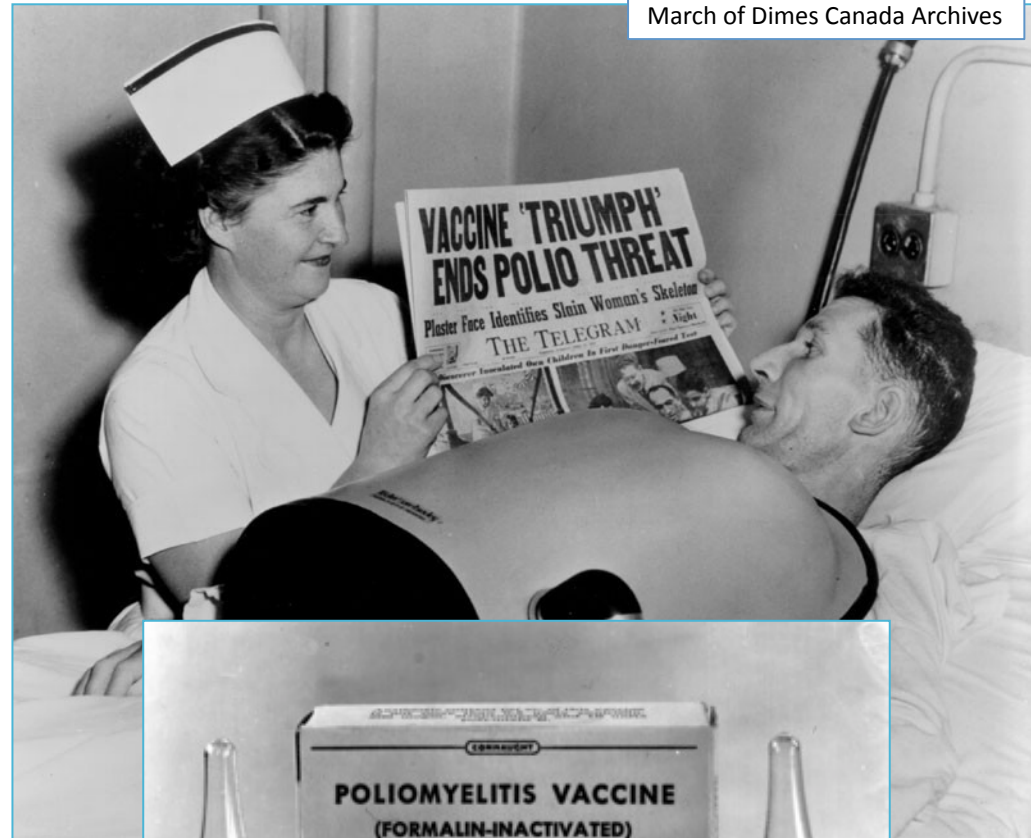


**April 12, 1955:**

**“V-Day”: Salk Vaccine Trial Results Announced**

- **April 12, 1955** – Unprecedented media attention to announcement of field trial results in Ann Arbor, Michigan
- Salk vaccine proves to be 60-90% effective against the three types of poliovirus
- Vaccine immediately licensed in U.S. and Canada
- In Canada, Salk vaccine distributed through a special federal-provincial free program for children and subjected to further study of its effectiveness

March of Dimes Canada Archives



Sanofi Pasteur Canada Archives

# “Cutter Crisis” U.S. Vaccine Suspension; Canada’s Choice?

- **April 25, 1955** – However, there was a major setback when it was discovered that some batches of vaccine from one U.S. producer, Cutter Labs in California, were not fully inactivated, leading ultimately to 79 polio cases linked to the bad batches
- **May 7** – After first recalling all of Cutter’s vaccine, and then setting up a national polio surveillance system, the U.S. Surgeon General suspended the entire vaccine program

• North of the border, the burning question was what should Canada do?

## 8 Get Polio, Serum Held Up; 'Can't Happen in Canada'

**By WHITNEY SHOEMAKER**  
Washington, April 27 (AP).—The U.S. Government ordered one of the companies making Salk vaccine to pull back all its shipments today after eight children inoculated against polio were reported hit by the disease. One death was listed.

Health authorities cautioned against a scare, however. They said there was no indication that the vaccine caused the disease, and that there was evidence to the contrary in some cases, at least.

The vaccine in question was made by Cutter Laboratories in Berkeley, Calif., which said it had made shipments for mass inoculations of school children in parts of California, in Arizona, New Mexico, Idaho, Nevada and Hawaii.

The Cutter firm also reported it had shipped relatively small lots for commercial use to its division sales offices in Los Angeles, Seattle, Dallas, Chicago.

**By KEN W. MacTAGGART**  
The chance of any child's getting polio after receiving Canadian-made Salk vaccine was doubted last night, and even termed by some medical authorities an impossibility.

In fact, local authorities' first reaction was to doubt that vaccination had anything to do with the cases reported in the U.S. On the basis of the known delay between infection and appearance of the disease—10 days—they suspected that coincidence was responsible for the U.S. outbreaks, and that children who had already contracted the dis-

## Recall Salk Vaccine Made by One Firm

*Continued from Page 1.*

Cutter personnel in investigating the vaccine.

Dr. Scheele gave his explanation of the Government's withdrawal order:

"We heard of some cases and we felt it was safest to study the problem. This is no indictment of Cutter vaccine at all. It was an action of safety to protect the children who may be getting shots today and tomorrow until we can make an investigation."

No parent should keep his child from being inoculated, he said. He added his own second-grade youngster is due for a shot.

The public health service reported polio cases among Cutter-inoculated

the gamma globulin as an antidote.

Cutter moved swiftly to recover its shipments. Six laboratories are producing the anti-polio vaccine, but Cutter is the only one in the West.

Dr. Scheele said studies indicate effective antibodies are not built up for more than a month after injections. In the six cases noted by the public health service, he said, even a wholly effective vaccine could not have been expected to create full immunity in the two weeks between inoculation and the flush of illness.

Inoculation in one case was given April 14, another April 15, the other four April 18. The incubation period in polio is from three to 30 days, with the average around 14.

...served by him. He added, the action in this one instance does not indicate even that the batches of vaccine which were used were in any way faulty."

The U.S. public health service sent Dr. John Tripp of the biologicals control laboratory, and Dr. Karl Habel, polio expert, to Berkeley. They will work with

RECALL—Page 2

## Couldn't Happen in Canada, View

*Continued from Page 1.*

vaccine to be faulty," said one official.

"After the tests have been made, and to give the vaccine every opportunity to reveal any improper test effects, it is then retained for two months. Not until it has been seen what results occur, even after a delay considerably beyond normal probability of infection, is any of the vaccine released for use."

Medical authorities noted that reports from the U.S. indicated that only vaccine produced by Cutter Laboratories of Berkeley, Calif., had been withdrawn from use. None of this firm's vaccine has been licensed for entry into Canada. Only two firms, Eli Lilly and Co. (Canada) Ltd. and Parke Davis and Co. Ltd., both of which were pioneers with Connaught, have licenses to import the vaccine.

Dr. Andrew J. Rhodes, virologist who headed the Connaught Laboratories group which made possible mass production of polio virus for the Salk program, last night urged parents not to become panicky because of the developments in the U.S.

The Canadians closest to the work, he said, were aware of the methods used at Connaught Laboratories and were convinced that faulty vaccine could not find its way into use from this source.

# “Cutter Crisis”

## U.S. Vaccine Suspension; Canada’s Choice?



Sanofi Pasteur Canada Archives

- While the U.S. launch of the Salk vaccine was suspended, after careful consideration and advice, yet some resistance from the Prime Minister, federal health minister, Paul Martin (himself a victim of polio, as was his son) decided that the Canadian launch of the vaccine should continue uninterrupted

**Canadian-made Salk Is Safe** *Toronto Star 1955 May*  
**Ottawa, All Provinces Sure**

“There is nothing wrong with the Salk vaccine made in Canada and we are continuing the mass inoculations according to program,” said Dr. T. J. Phair, deputy minister of health for Ontario, today. “Some 256,000 children have had their first shots without any ill effects and this is most reassuring,” he said. “If there is anything wrong with any U.S.-manufactured vaccine, which is used only in that country, it might be from the manufacture. It also might be psychological in many cases.”

“We are confident there is nothing wrong with the Canadian Salk vaccine and are proceeding in all Toronto schools according to plan,” said Dr. L. A. Peuegnat, Toronto medical officer of health.

“We have already inoculated more than 20,000 Toronto children in the first and second grades and this week we will give shots to some 10,000 third-grade students for the first time and seconds shots to the lower grades.”

“It is ‘No Stop’ in the Toronto program — we have been convinced,” said Dr. Peuegnat.

Canada has barred the entry of U.S.-produced Salk vaccine until the U.S. government releases its (Continued on Page 13, Col. 3)



**Toronto Star, May 1955**

—Star Photo by Douglas Cronk

“SEE? NOTHING TO IT,” PARK SCHOOL GIRL TELLS SCEPTICAL CHUM



## “Cutter Crisis”

### U.S. Vaccine Suspension; Canada’s Choice?

- There had been no reports of cases linked to Connaught’s vaccine and immunization continued uninterrupted without incident
- Moreover, a detailed Canadian evaluation of the vaccine further demonstrated its safety and effectiveness

- Considerable debate ensued over the different approaches to the vaccine between the two countries
- The Canadian success meant a lot to Dr. Salk and led to full scale immunization programs in the U.S.

**FIGHT INFANTILE PARALYSIS**

# NATIONAL FOUNDATION NEWS

PUBLISHED BY THE NATIONAL FOUNDATION FOR INFANTILE PARALYSIS • NEW YORK 5. N. Y.

VOLUME 15 MARCH, 1956 NUMBER 3

Dr. H.E. Van Riper – NFIP medical director:  
*“We in the United States have much to learn from you (in Canada)”*

## Canada Reports Shots Safe, 85% Effective

**Massachusetts Gets Enough Vaccine To Complete Its NFIP School Program**

Two or more shots of Salk vaccine proved completely safe and 85 per cent effective in preventing paralytic polio according to a national field study of some 1,500,000 Canadian children.

Canada’s Health Minister Paul Martin reported that only five of 589,716 children between the ages of five and ten years old who got two doses of the vaccine in 1955 were stricken with paralytic polio. The five cases in the vaccinated group compared with 51 cases among 885,000 children in the same age groups who were not inoculated.

## Canadian Polio Work Said Second to None

Edmonton, Sept. 7 (CP).—Canada is second to no country in control of polio, Dr. H. E. Van Riper, medical director of the National Foundation for Infantile Paralysis, New York, said today.

“Nowhere in the world has greater progress toward control of paralytic poliomyelitis been made than in Canada,” he told the annual convention of the Canadian Public Health Association.

“We in the United States have much to learn from you.”

in 1953 worked out methods for quantity production of polio viruses in the culture of monkey kidneys.

A second contribution, he said, was the discovery by J. F. Morgan, H. J. Morton and R. C. Parker of a satisfactory method for feeding animal cells and tissue culture and a synthetic medium used to grow virus in vaccine manufacture.

“I think it only fair to say that if this group had not so quickly worked out this technique, we could not

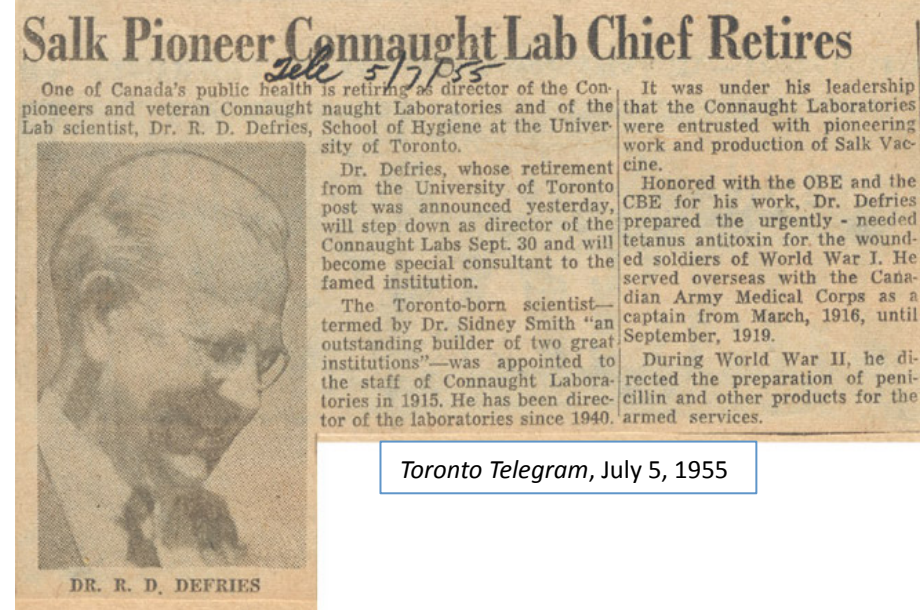
Globe & Mail, Sept 8, 1955

## Job Well Done “Mr. Public Health” Retirement of Dr. Robert D. Defries

- **Nov 17, 1955** – With polio immunizations proceeding smoothly on both sides of the border, and shortly after retiring as Director of Connaught and the School of Hygiene, Dr. Robert Davies Defries received the American Public Health Association’s highest honor, the Lasker Award, bestowed by former U.S. President, Harry Truman.
- The citation said: “Seldom is there combined in one man great scientific knowledge and judgment, together with the personality and organizing ability to carry through new technical advances to their effective application in the control of disease.”



Sanofi Pasteur Canada Archives



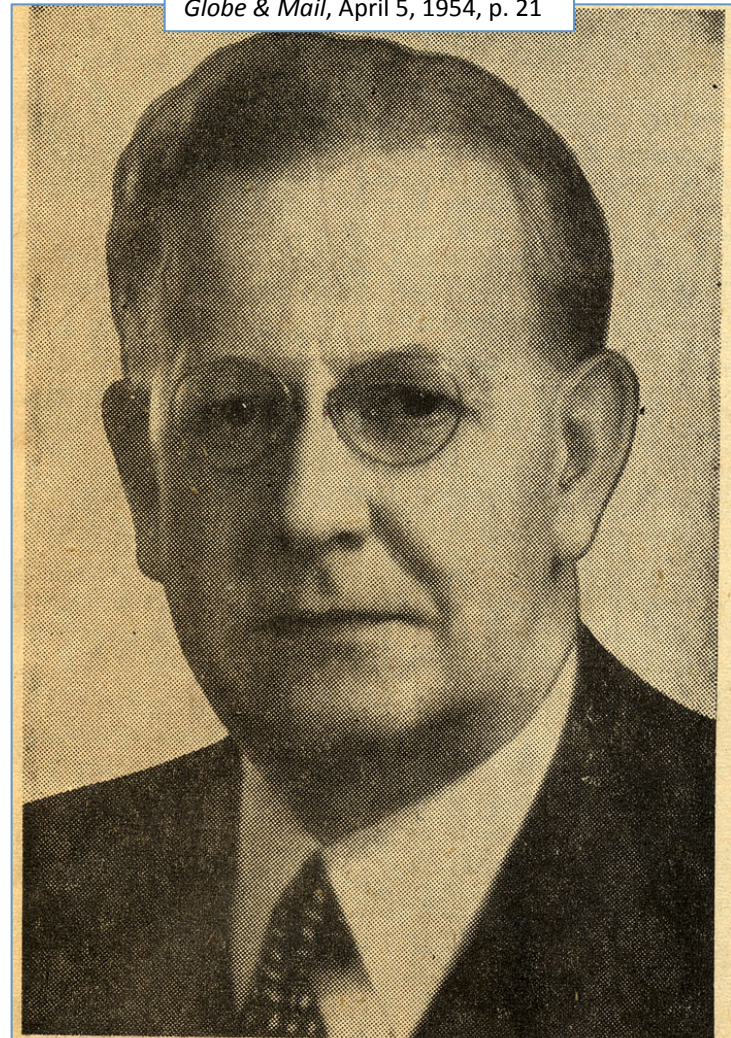
Toronto Telegram, July 5, 1955



## Job Well Done “Mr. Public Health” Retirement of Dr. Robert D. Defries

- “Dr. Bob’s” career built to a climax when he personally oversaw Connaught’s vital work on the Salk polio vaccine field trial
- He was also the backbone of the Canadian Public Health Association, serving as Editor of its journal between 1928 and 1964
- He formally retired on Sept 30, 1955, and later wrote *The First Forty Years*, a history of Connaught Labs up to 1955
- **1965** - Canadian Public Health Association established “The R.D. Defries Award,” the highest recognition of merit the Association could bestow

Globe & Mail, April 5, 1954, p. 21

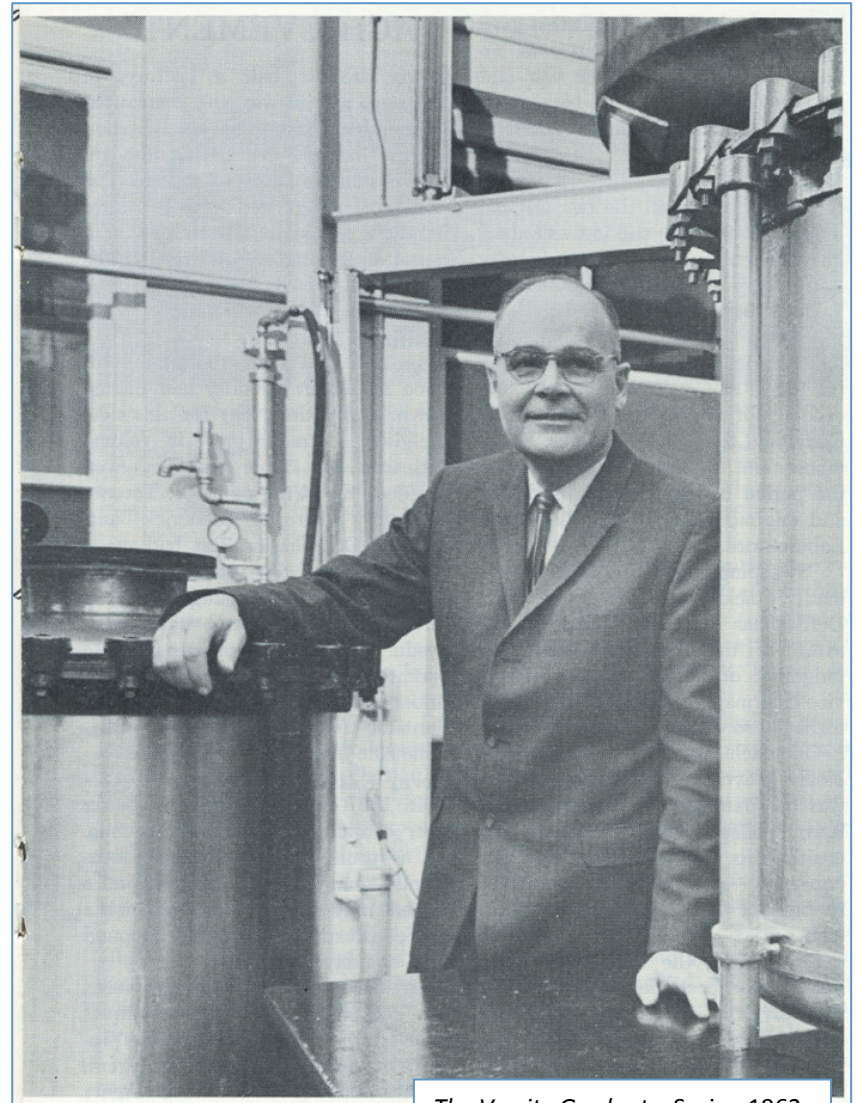


—Ashley and Grippen.  
Director of the Connaught Medical Research Laboratories, Dr. Robert D. Defries grew up with the institution which discovered Medium 199, the fluid in which polio virus was grown, making possible the mass production for Salk vaccine. Dr. Defries was in Ann Arbor yesterday for the announcements about the vaccine.



## Expanding Polio Vaccine Production: Dr. J.K.W. Ferguson Leads Connaught

- **Oct 1955** – Succeeding Defries as Director of Connaught Labs was Dr. J.K.W. (Kenneth) Ferguson, who as mentioned in Class #4, had connections with the insulin and heparin work of the Labs
- The retirement of Defries also resulted in the severing of Connaught's intimate administrative relationship with the School of Hygiene
- Upon becoming Director of Connaught, Ferguson was immediately tasked with expanding production and facilitating the export of the Salk polio vaccine



*The Varsity Graduate, Spring 1962*

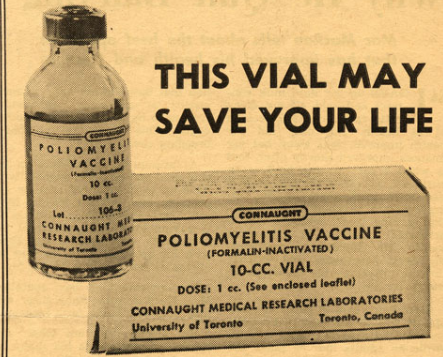
# Preventing Persistent Polio

- Despite the successful introduction of the Salk polio vaccine in Canada, it took time for all age groups to be immunized and time for polio outbreaks to end
- **1958-59** - In particular, significant polio epidemics struck several parts of the country, primarily effecting un-immunized pre-school and older children, as well as adults

Financial Post, Jan 11, 1960

## Polio Score

	Cases	Deaths
—1959—		
Que. ....	1,131	101
Ont. ....	198	21
Nfld. ....	139	12
B.C. ....	132	12
Alta. ....	81	12
N.B. ....	62	6
Sask. ....	46	3
Man. ....	26	2
N.W.T. ....	10	4
N.S. ....	8	0
P.E.I. ....	7	1



## POLIO CAN NOW BE PREVENTED

Polio can now be prevented and its effects limited. Don't take chances — you owe it to yourself and your family to obtain the protection offered by Salk Polio Vaccine.

Three properly spaced shots offer complete immunity to most people, and minimize the crippling effects for the balance. Since 1957, sufficient vaccine has been distributed to allow 2,296,359 people to receive three doses of Polio Vaccine. This has been supplied free to your Physician and Medical Officer of Health by the Ontario Department of Health. In the same period, the number of cases of Polio has shown a sharp decline attributed mainly to the intensive vaccination program.

Now is the time to act — summer and fall are the main polio seasons. Arrange your family's vaccination program today.

### FROM INFANCY TO 40 YEARS

The most critical ages for Polio are from infancy to 40 years. It is most important for everyone in these age groups to receive three properly spaced Polio Vaccine shots. Consult your local physician or Medical Officer of Health.



**ONTARIO DEPARTMENT OF HEALTH**

HON. MATTHEW B. DYMOND, M.D.  
Minister

## 99 New Cases, Polio Total Climbs to 969

Ottawa, Sept. 25 (CP)—There were 99 cases of paralytic poliomyelitis reported in Canada last week, more than half of them from Quebec, the Health Department said today.

They brought to 969 the number of 1959 cases up to Sept. 19, compared with 131 at the corresponding date last year. This year's total includes 73 polio deaths as against 14 at this time a year ago.

Only Manitoba, the Yukon and the Northwest Territories reported no polio cases last week. Nova Scotia had its first case of the year.

The Montreal outbreak and other Quebec cases have accounted for 656 in the national total of 969 cases. Only 35 were reported to this date last year.

Ontario reports 101 paralytic cases up to Sept. 19, compared with seven a year ago. Newfoundland had 95 cases, up from three at the same time last year.

Cases in other provinces, with comparable 1958 totals in brackets:

New Brunswick 28 (1); Prince Edward Island 2 (0); Manitoba 17 (60); Saskatchewan 16 (0); Alberta 22 (17); British Columbia 20 (8); Yukon 1 (0); North-

### POLIOMYELITIS—A CONTINUING MENACE

CASES of paralytic poliomyelitis in Canada last year numbered 177, the lowest number since 1949. There were 26 deaths. To the end of September of this year 151 cases were reported in contrast with 134 at the same time last year. Almost all the cases and all the deaths occurred in persons who had not received three doses of Salk vaccine. Throughout Canada, widespread use of the vaccine has been made as a result of the combined efforts of the federal and provincial departments of health and the medical profession. The Department of National Health and Welfare has given outstanding leadership by assisting the provincial departments through the payment of half the cost of the vaccine. The vaccine, in turn, has been supplied without charge by provincial departments of health to local health departments and to physicians for use in th

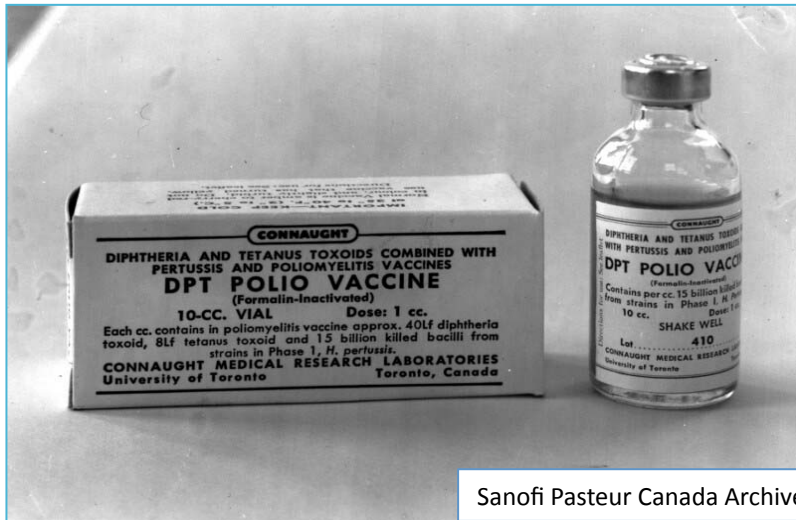
Canadian Journal of Public Health, Nov 1958, p. 489

Globe & Mail, Sept 26, 1959, p. 2



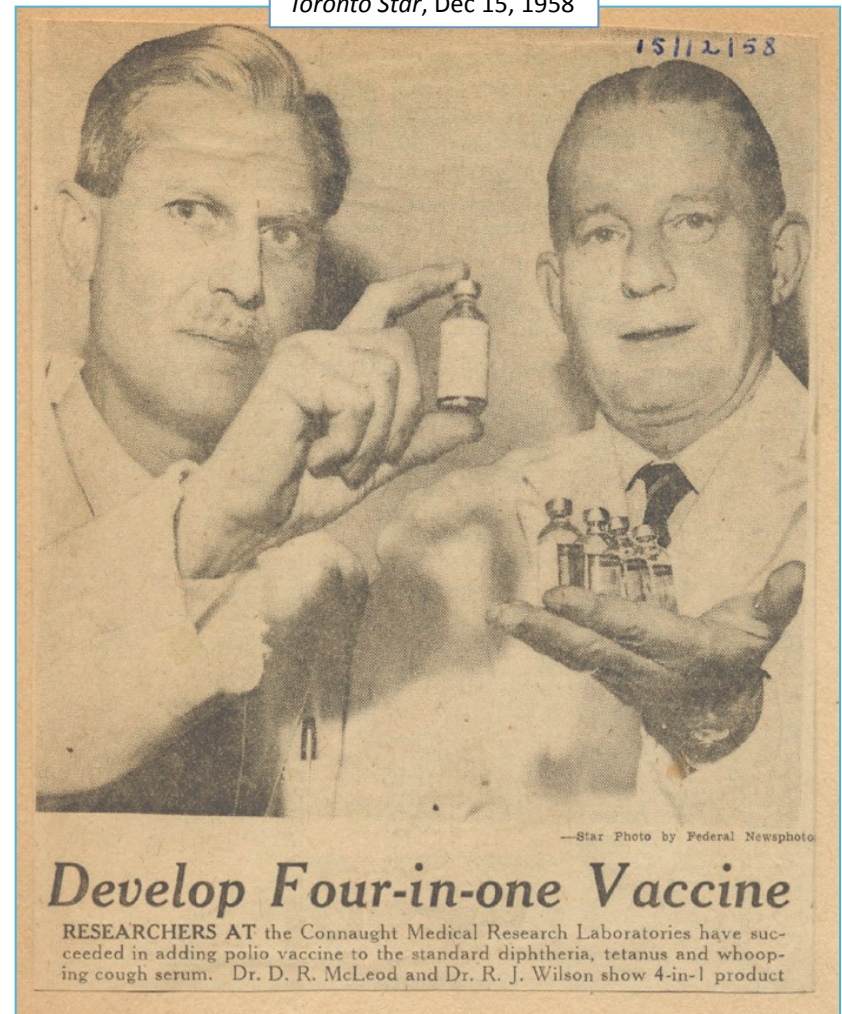
## Preventing Persistent Polio: The Right Combination

- The best strategy to broaden and simplify polio immunization was to build on the DPT combination vaccine model and add in Salk polio vaccine
- **Jan 1959** - Connaught pioneered a new generation of combined vaccines:
- DPT-Polio for primary immunization, DT-Polio for booster shots, and T-Polio for adult boosters



Sanofi Pasteur Canada Archives

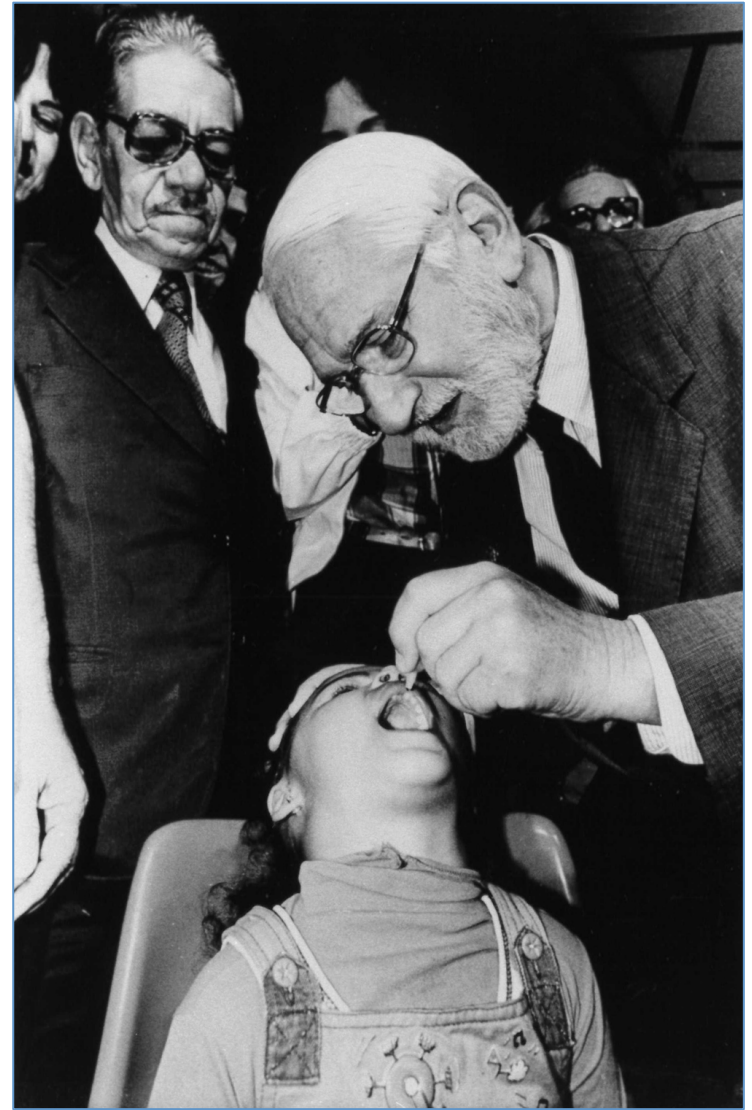
Toronto Star, Dec 15, 1958





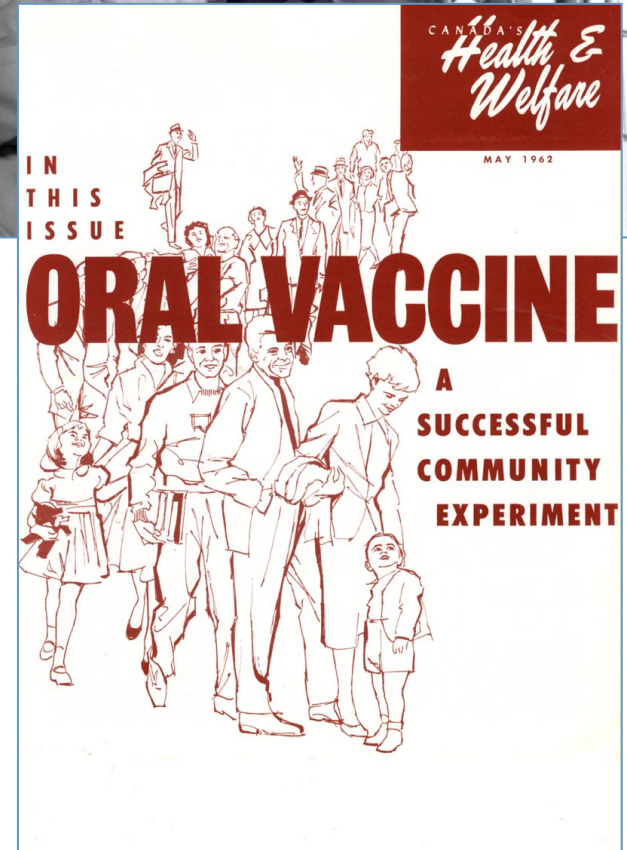
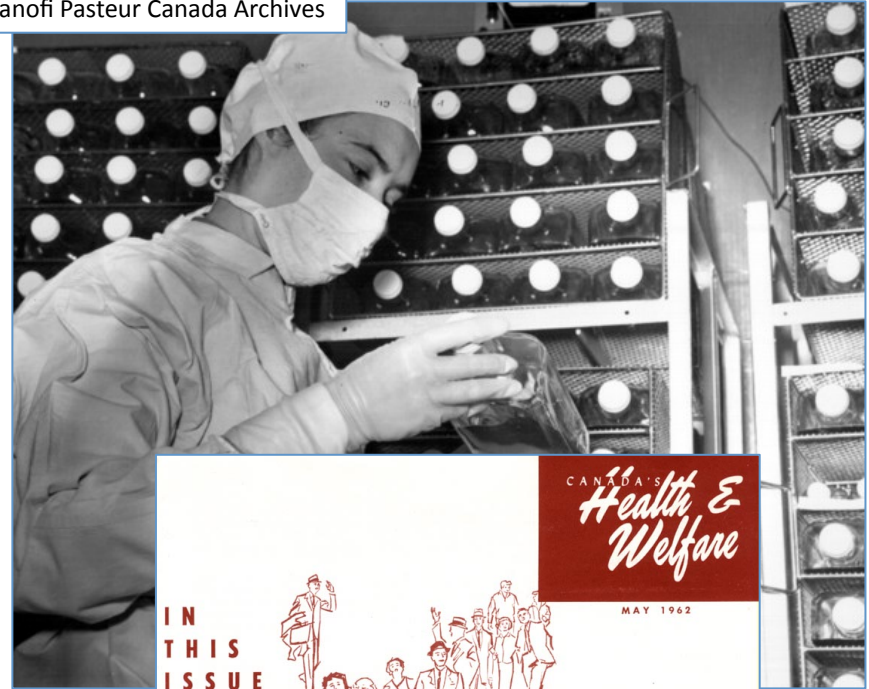
## Preventing Persistent Polio: From Salk IPV to Sabin OPV

- Persistent polio incidence during the late 1950s also highlighted the limits of the Salk inactivated vaccine
- Growing polio incidence internationally pointed to the need for another type of polio vaccine that was cheaper to produce and could be more easily given
- Salk's vaccine built blood immunity, but Dr. Albert Sabin focused on preparing a vaccine that would build immunity in the digestive tract – where the poliovirus naturally replicates
- Sabin's goal was to carefully cultivate live attenuated or weakened poliovirus strains, which would be administered with a spoon



## Preventing Persistent Polio: From Salk IPV to Sabin OPV

- **1959** - Connaught's OPV research intensified after Sabin provided attenuated strains from which vaccine could be produced
- The major challenge was maintaining the genetic stability of the vaccine strains
- Nevertheless, Connaught's key contributions included facilitating OPV field testing through uniquely designed "demonstrations" in several parts of Canada





# Preventing Persistent Polio: From Salk IPV to Sabin OPV

**1961** – Connaught also provided OPV on an experimental basis to a several countries facing major polio epidemics, such as in New Zealand and Japan

**March 1962** – Connaught’s trivalent Sabin Oral Polio Vaccine was licensed in Canada

## Reveal Canadian Aid Halted Japanese Polio

*Globe & Mail Feb 20, 1965*

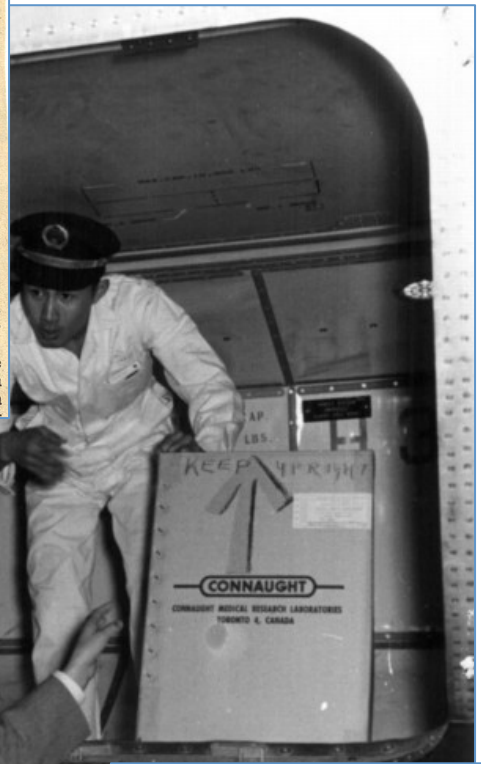
The story of how Canada helped to check a serious outbreak of polio in Japan during the late summer of 1961 was disclosed yesterday in the report of Dr. J. K. W. Ferguson, director of the Connaught Medical Research Laboratories.

With supplies of anti-polio vaccine scarce, the Japanese Government bought 3,000,000 doses of Sabin vaccine from the Connaught Medical Research Laboratories and 10,000,000 doses of Salk vaccine from the U.S. Government.

Chief competitors for the Russian and European polio vaccines had occurred. A low incidence prevailed for the balance of the year.”

The results were so spectacular that the Japanese Government decided to extend the program to older children and continue it during the winter of 1962. Requiring some 17,000,000 additional doses, the Japanese Government issued invitations to tender competitively.

*Globe & Mail, Feb 20, 1965*



Sanofi Pasteur Canada Archives



*Globe & Mail, 1961 uncertain*



## Preventing Persistent Polio: From Salk IPV to Sabin OPV

- Several provinces, and most of the United States, soon switched to OPV, although the Salk vaccine was preferred in Ontario and Nova Scotia



Sanofi Pasteur Canada Archives

# *Canadian Journal of* **PUBLIC HEALTH**

VOLUME 53

APRIL 1962

NUMBER 4

## Live Poliovirus Vaccine for Oral Use

J. K. W. FERGUSON,<sup>1</sup> M.D.

SINCE 1958 poliomyelitis vaccines for oral administration have been used with satisfactory results in many countries. They are known as *attenuated live poliovirus vaccines*. Attenuated polioviruses are specially selected strains which have almost no capacity to cause paralytic disease even when injected directly into the brains of monkeys. They retain, however, the capacity to multiply in the human alimentary tract. Several different strains of attenuated poliovirus have been developed and tried extensively as vaccines. Only the strains introduced by Dr. Albert B. Sabin of Cincinnati, U.S.A., have been approved as yet for use in a large number of countries including Canada, Great Britain, and the United States of America (1, 2, 3, 4).

### *Mode of Action*

Each dose of Sabin vaccine contains thousands of particles of living but harmless virus. When these are swallowed they multiply in the wall of the digestive tract where they cause an infection but no illness. In response to this infection, antibodies against poliovirus develop in the body and circulate in the blood stream. Circulating antibodies act as a barrier to prevent virulent poliovirus from passing from the digestive tract by way of the blood stream to the central nervous system. In this way circulating antibodies prevent paralytic poliomyelitis. It is thought that attenuated live poliovirus vaccine acts also by another mechanism. It seems probable that it induces local immunity in the digestive tract which prevents multiplication of poliovirus in the digestive tract. By this means it can reduce the number of carriers of poliovirus infection in the community.

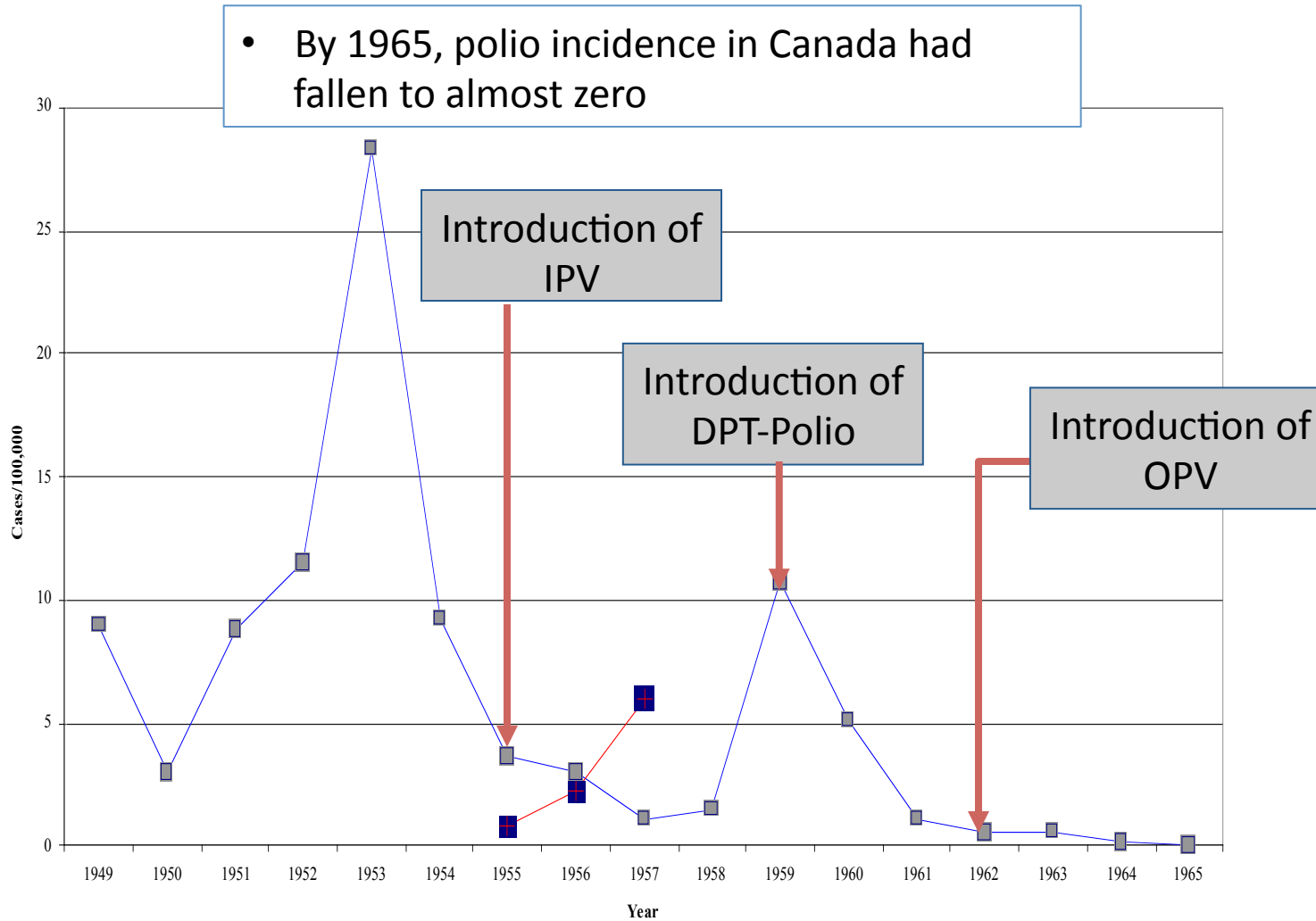
### *Advantages of Oral Poliovirus Vaccine*

Oral vaccine can be given more easily to large numbers of persons because no needles or syringes are used. The cost of this equipment and of sterilizing it is eliminated.

<sup>1</sup>Director, Connaught Medical Research Laboratories, University of Toronto, Toronto 4, Ontario.



# Preventing Persistent Polio: From Salk IPV to Sabin OPV

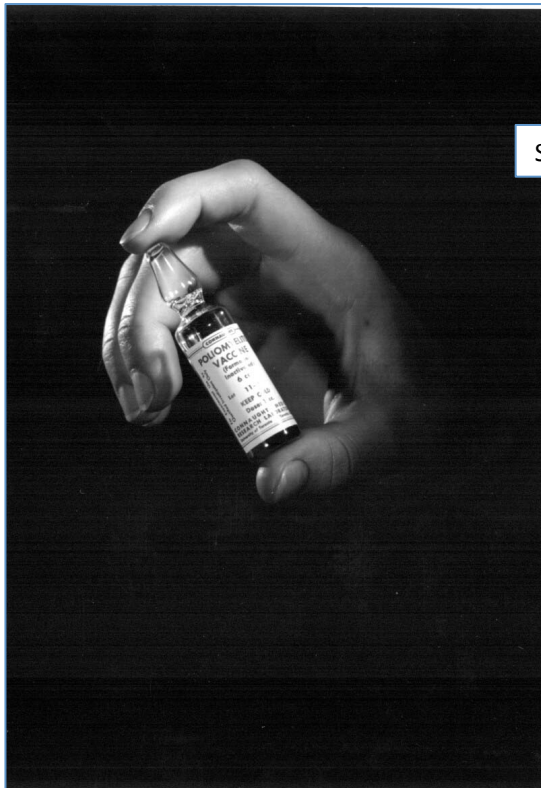


## Preventing Polio: New Generation of Salk Vaccine

- **1965** – While OPV was being introduced, Connaught developed a new generation of purified and concentrated Salk polio vaccine



Sanofi Pasteur Canada Archives



*The Medical Post Feb 15, 1966*

### CONNAUGHT DEVELOPS NEW SALK VACCINE

**TORONTO** — Hilda Macmorine, Ph.D. and her associates at the Connaught Medical Research Laboratories have developed a new form of Salk vaccine. Full name of the new form is Trivalent Purified Poliomyelitis Vaccine.

The three types, 1, 2 and 3, of poliovirus are grown separately as previously and then inactivated with formaldehyde. The suspensions of each type are then concentrated and purified to remove most

of the extraneous protein. When it is reconstituted each final dose contains 2 1/3 times as much type 1 viral antigen as before, the same amount of type 2 antigen and 1 1/2 times as much as type 3 antigen.

J. K. W. Ferguson, M.D., director of the CMRL, told *The Medical Post* that experience has shown antibody response to type 2 antigen has always been more than adequate so no larger dose is needed. Increased dosage of type 1 and 3 antigen is de-

signed to provide added protection, particularly against type 1 poliovirus which has usually been the most virulent and the commonest cause of epidemics of paralytic poliomyelitis.

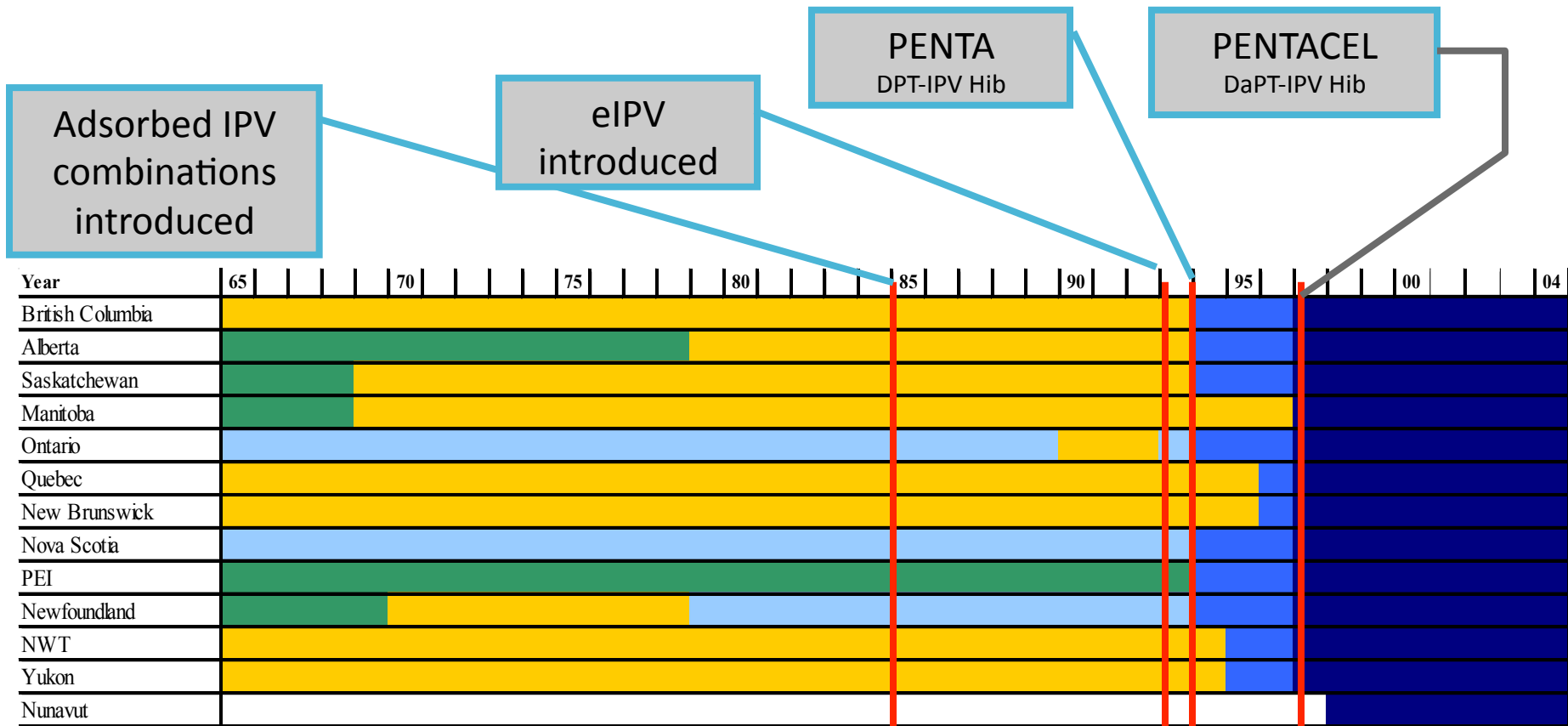
The new form of Salk vaccine was made possible by a new method of purification and concentration of the viral antigens. Dr. Macmorine and her associates also devised a method of measuring the viral antigens with greater accuracy than previously possible.



# Preventing Polio: Canadian Leadership

- Canada would remain the only country to effectively use both types of polio vaccines for the next 30 years...

OPV + IPV	Green
OPV	Yellow
IPV (DPT-Polio)	Light Blue
IPV (Penta)	Blue
IPV (Pentacel)	Dark Blue



## Smallpox Again...

- Aug 1962** – Just as immunization programs with OPV were rolling out, and polio seemed very much under control in Canada, 14-year-old Jimmie Orr arrived on a train at Toronto's Union Station not feeling well and with the first characteristic pock marks of smallpox emerging on his face
- Aug 11** - He had been feeling unwell when he left Brazil with his family on a flight to New York City, and after clearing customs and a medical check, boarded an overnight train for a milk-run trip to Toronto



Sanofi Pasteur Canada Archives

Globe & Mail, Aug 20, 1962, p. 1

## Smallpox Case Found in Toronto Sets Off Search

A case of smallpox diagnosed in Toronto has touched off an international alarm for travelers who might have come in contact with the 14-year-old victim or his family on their recent trip from Brazil.

James William Orr was admitted to Riverdale Isolation Hospital at 6 p.m. Saturday after being bedridden for nearly a week in an unidentified doctor's home in the east end.

Ontario Health Minister Matthew Dymond said yesterday it is virtually certain it is smallpox, results of laboratory tests are expected to confirm it today.

The boy's father, Rev. James Robert Orr, a Baptist missionary, is quarantined at the West Lake Ave. home of a long-time friend Ernest Ranney.

In these unfortunate circumstances," said Mr. Ranney, "we will look after James Orr just as long as he needs assistance. He is welcome in our house."

The missionary and his family are members of High Park Baptist Church in Toronto, which contributes to his work in South America.

Mrs. Orr, another son, Joseph, 23, and a daughter, Dorothy, 9, also on the trip from Brazil earlier this month, are quarantined in the family home in Three Hills, Alta., with the victim's grandmother. They were among the dozen persons vaccinated by public health officials as a precautionary measure.

Also vaccinated were members of a family that met Mrs. Orr and her children when they arrived at Three Hills by train Friday night and members of a family living next door to Mrs. Orr's mother.

Dr. Dymond said it was the first smallpox case in Toronto in 30 years. The last case in the province was in Windsor, 28 years ago, he added.

Dr. Dymond said the boy had been vaccinated within the past seven years, which accounts for his improving condition. Immunity begins to wear off three

July paid circulation 340,336 copies per day

**TORONTO DAILY STAR**

MONDAY, AUGUST 20, 1962 44 PAGES 10¢ PER COPY 60¢ PER WEEK HOME DELIVERY

METRO WEATHER: Warm, humid, thunder-showers. High today 88, low tonight 62. Humidity index, 69. Details on Page 2.

**A Family Home From Brazil Brings ...**

**Doctor Dymond's Statement**

Here is the statement issued by Ontario Health Minister Dr. Matthew Dymond following discovery of Toronto's first smallpox case in 30 years.

"Any person travelling on the CPR train No. 324 from New York to Toronto via Fort Erie on the evening and night of Aug. 11, and the morning of Aug. 12, should contact his physician as soon as possible. There is not in our opinion any cause for alarm, and neither is there any fear of an epidemic at the present time."

**METRO SMALLPOX ALERT AFTER BOY IS STRICKEN**

SMALLPOX VICTIM JIMMY ORR, 14  
He's in isolation wing of Riverdale hospital.



## Smallpox Again...

- At the Canadian border Jimmie had cleared customs and another medical check
- **Aug 12** – Soon after arriving in Toronto, Jimmie's father asked a physician friend have a closer look at Jimmie; he confidently diagnosed chicken pox
- **Aug 17** – Jimmie's condition worsened and smallpox was suspected



Sanofi Pasteur Canada Archives

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**METRO SMALLPOX ALERT AFTER BOY IS STRICKEN**

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He's in isolation wing of Riverdale hospital.

## Smallpox Again...

- **Aug 20, 1962** – A smallpox diagnosis was confirmed, sparking media alerts, first in Toronto and New York City, and an international public health effort to track down and vaccinate all of Jimmie's, and his parent's, possible contacts in a desperate effort to prevent a potential smallpox epidemic
  - Jimmie's relatively mild case of smallpox, and how it sharply revealed the international vulnerability to the disease, especially in North America, sparked the WHO to launch a global smallpox eradication campaign
- That story, however, will be the main focus of Class #7...



Sanofi Pasteur Canada Archives

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