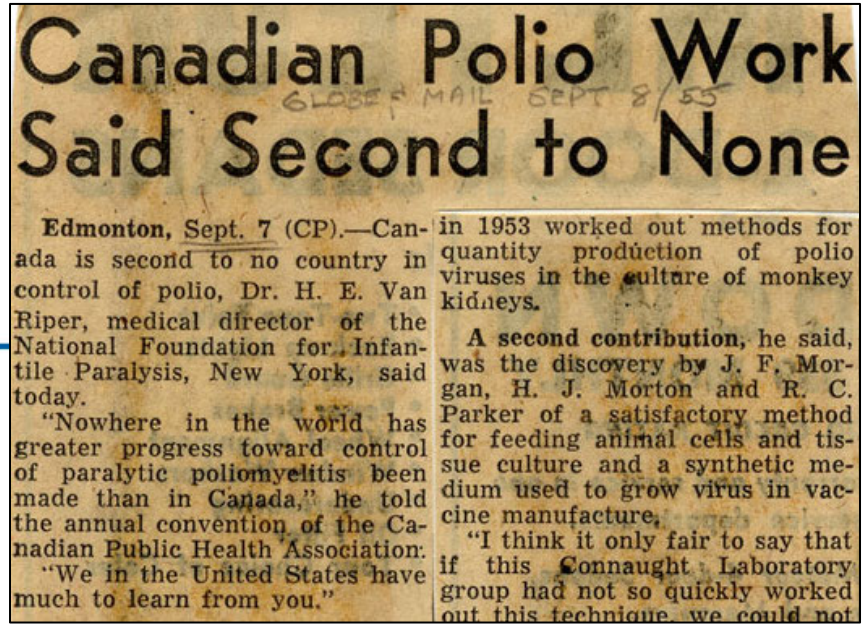


Canadian Polio Work Said Second to None

GLOBE & MAIL SEPT 8/55

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 Connaught Laboratory group had not so quickly worked out this technique, we could not

Canada & The Polio Vaccine Story

By Christopher J. Rutty, Ph.D.

hhrs@healthheritageresearch.com

Professional Medical & Public Health Historian;

Adjunct Professor,

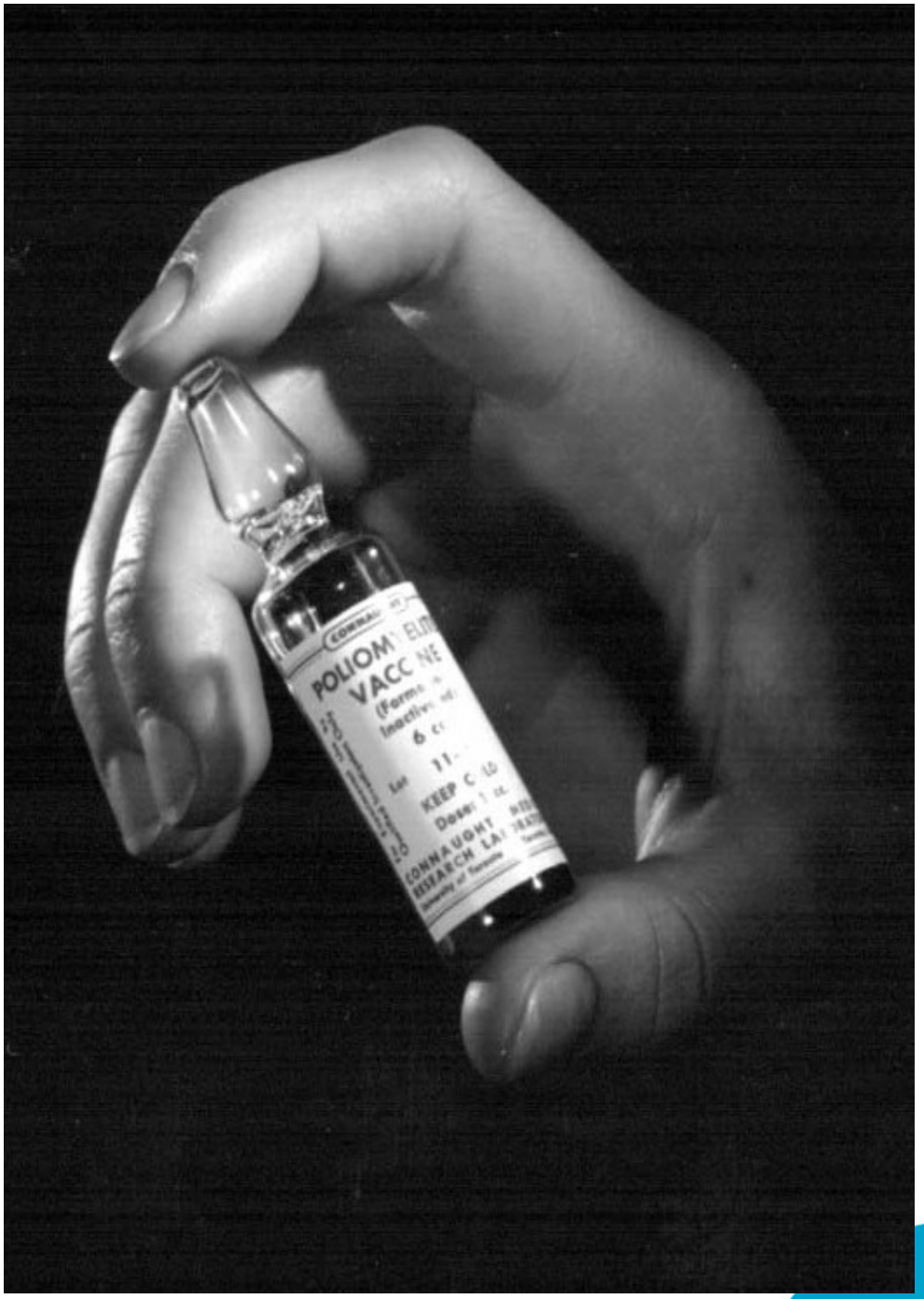
Dalla Lana School of Public Health, University of Toronto

Presentation for the

Rotary Club of Milton

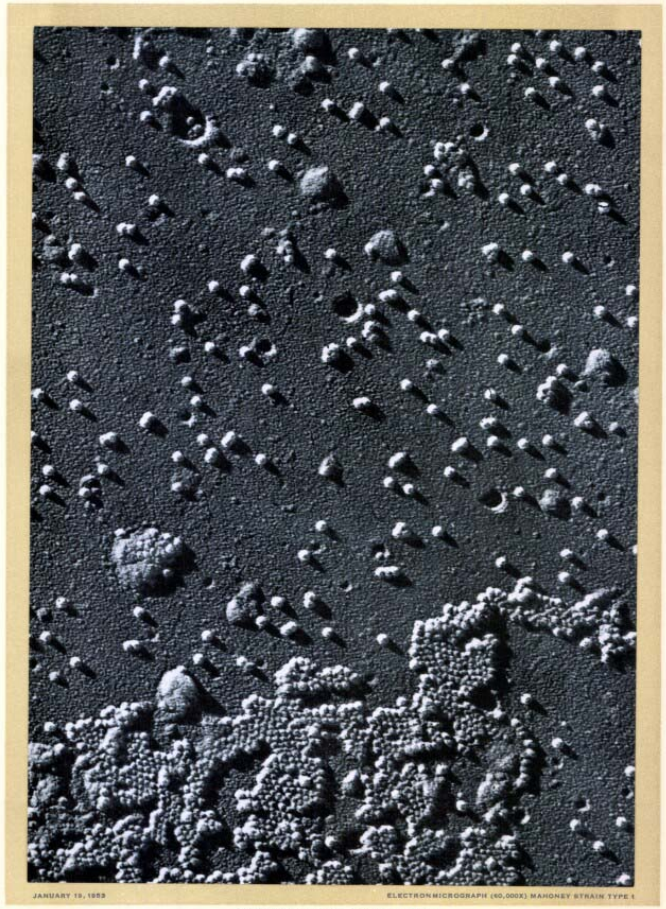
March 1, 2021

Via Zoom



Polio: “The Middle-Class Plague”

- Polio caused by one of the smallest known viruses that can damage the motor-neurons in the spinal cord, leading to muscle weakness or paralysis
- No two cases of paralytic polio alike; virus could cause weakness/ paralysis of a finger, to a leg, arms, or chest muscles (requiring an “iron lung”)
- Prior to late 19th century the poliovirus 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, or endemic
- Over time, more children, and increasingly older age groups, thus grew vulnerable to paralytic infection if the virus was able to invade the nervous system; "infantile paralysis" common name of disease
- Polio outbreaks and epidemics increased until polio vaccines were available; the middle class was particularly vulnerable

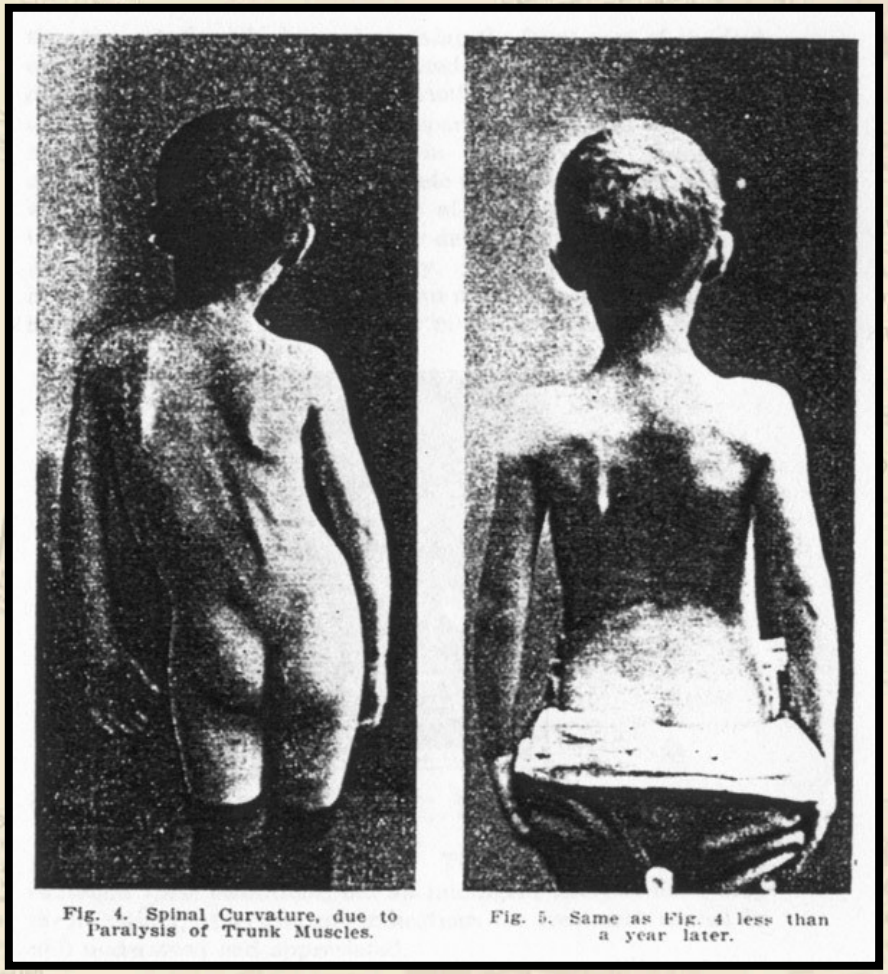


Fig. 4. Spinal Curvature, due to Paralysis of Trunk Muscles.

Fig. 5. Same as Fig. 4 less than a year later.

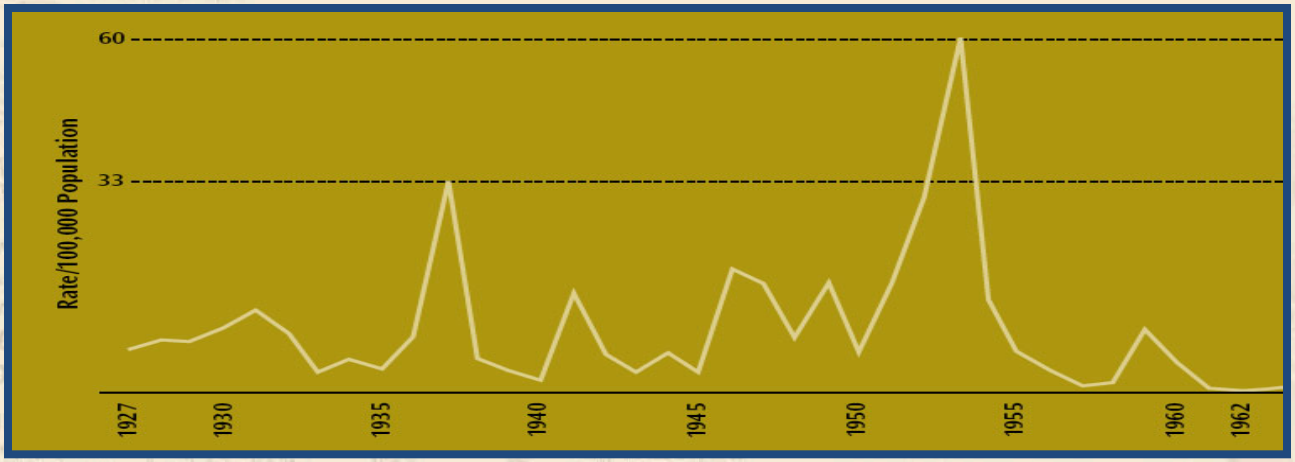
Canadian Journal of Medicine & Surgery, Jan 1911, p. 9

Polio: “The Middle-Class Plague”

- Canada was among the nations hardest hit by major polio epidemics

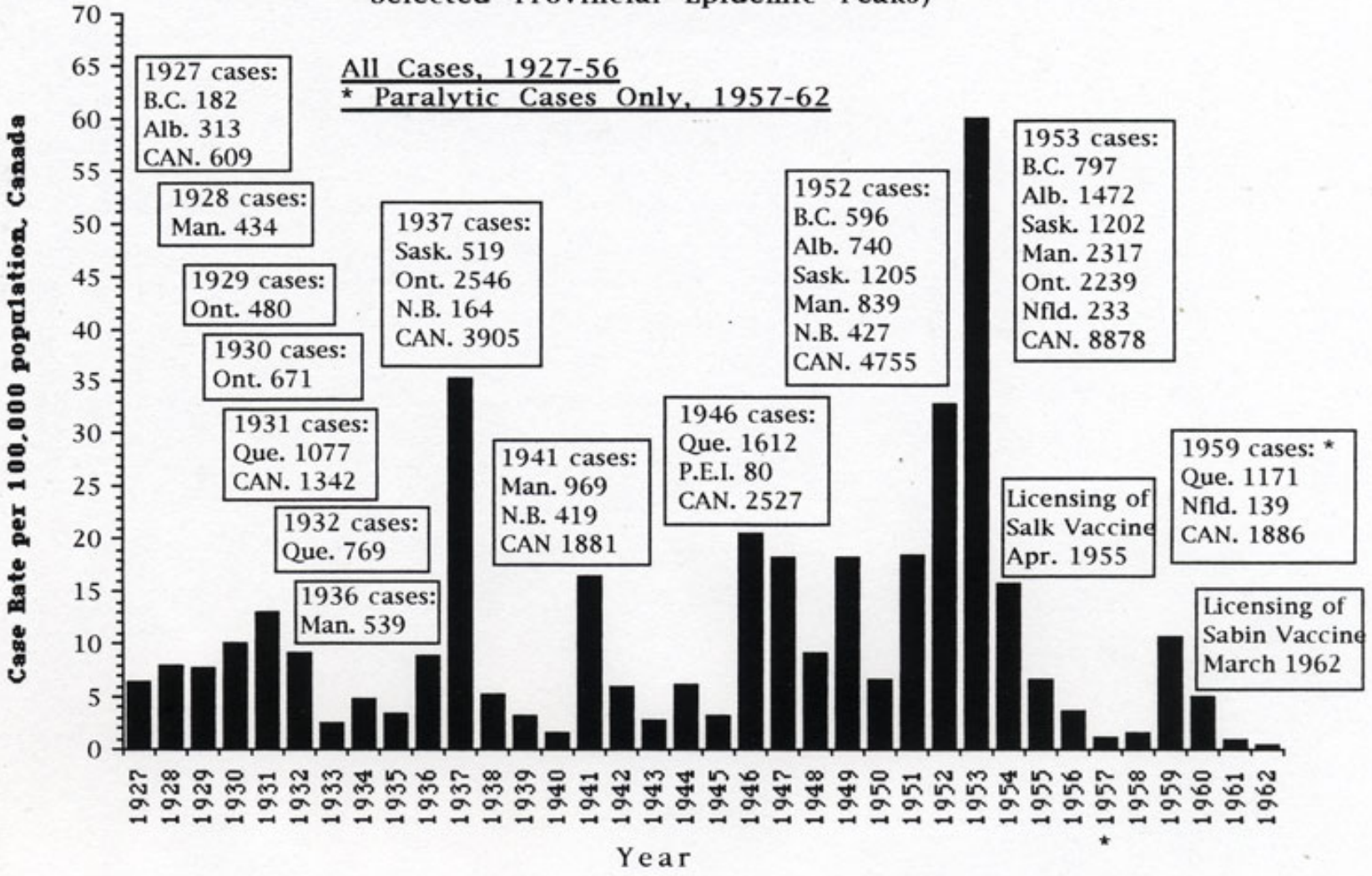
- Some 50,000 Canadians, mostly children, were affected by paralytic polio between 1927 and 1962

- Canada suffered through 4 major epidemic waves which resulted in 4,000 deaths



Poliomyelitis Incidence in Canada, 1927-1962

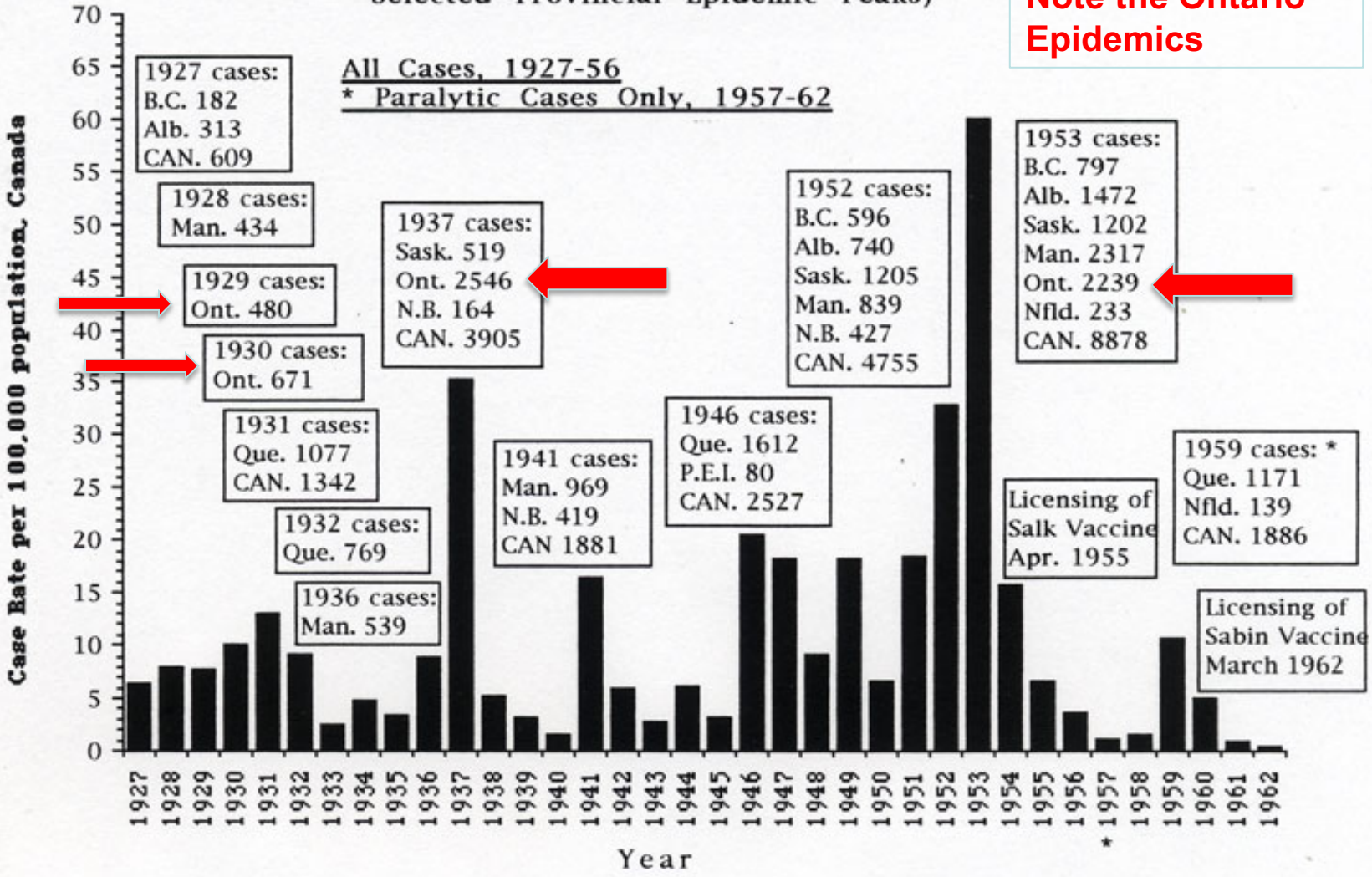
(Case Rates per 100,000 Population & Selected Provincial Epidemic Peaks)



Poliomyelitis Incidence in Canada, 1927-1962

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

Note the Ontario Epidemics



National Foundation for Infantile Paralysis – "The March of Dimes"

- 1921 – Franklin D. Roosevelt stricken with polio while vacationing in New Brunswick
- 1938 – As U.S. President, Roosevelt founded the National Foundation for Infantile Paralysis (or US "March of Dimes") to sponsor polio research and provide support to polio victims
- 1948 - Inspired by the NFIP success, the Canadian Foundation for Poliomyelitis founded; later restructured into provincial bodies like the Ontario March of Dimes

Paul Martin Sr.
– Minister of National Health & Welfare, 1946-1957

ith Louis St Laurent, Canada's minister of external affairs at Hyde Park, the ho
Irs Eleanor Roosevelt, 3 November 1946.

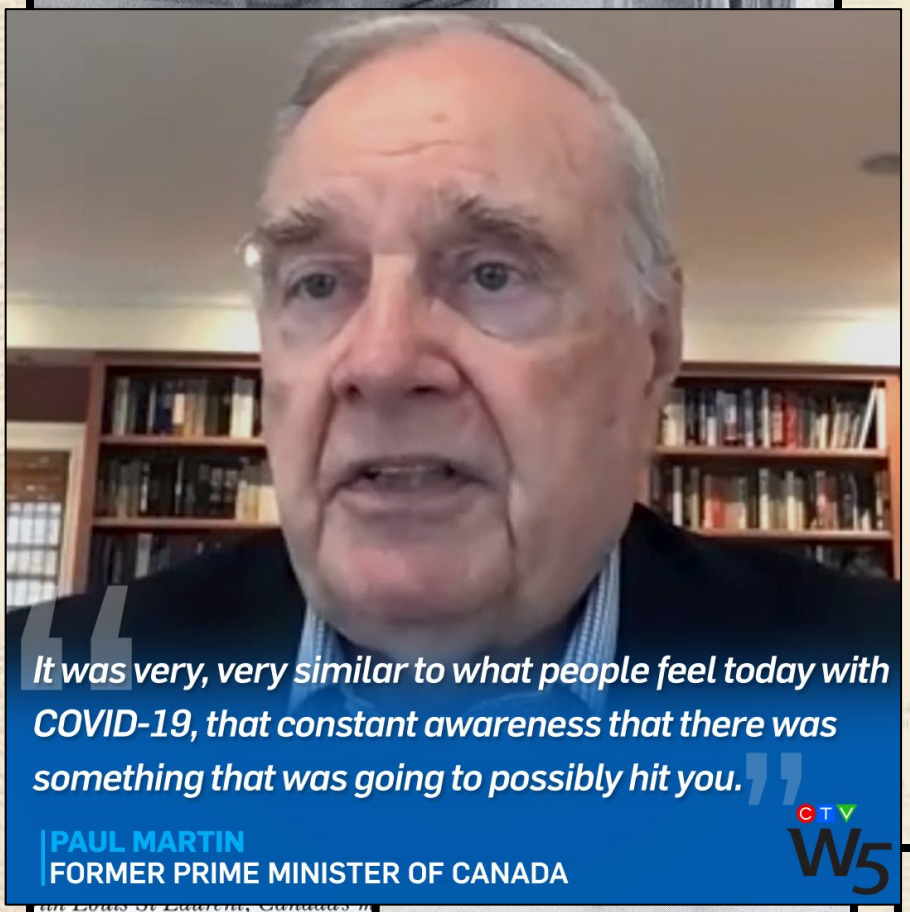
- Worsening polio epidemics, especially after WWII, put a huge strain on the Canadian public health and hospital infrastructure
- The ability of provincial governments to pay for specialized polio care services became acute
- In 1948 federal health minister, Paul Martin, introduced annual Federal Health Grants of $30 million to boost provincial health services

Paul Martin Sr. - knew polio personally
– Minister of National Health & Welfare, 1946-1957

- Martin had personal experience with polio
  - Himself in 1907 and
  - his son, Paul Martin Jr., in the summer of 1946 in Windsor
- This helped to catalyze the inclusion of expanded public health research into polio in the new health grants program

Nell Martin with her son Paul Jr.

Paul Martin Sr. - knew polio personally
– Minister of National Health & Welfare, 1946-1957



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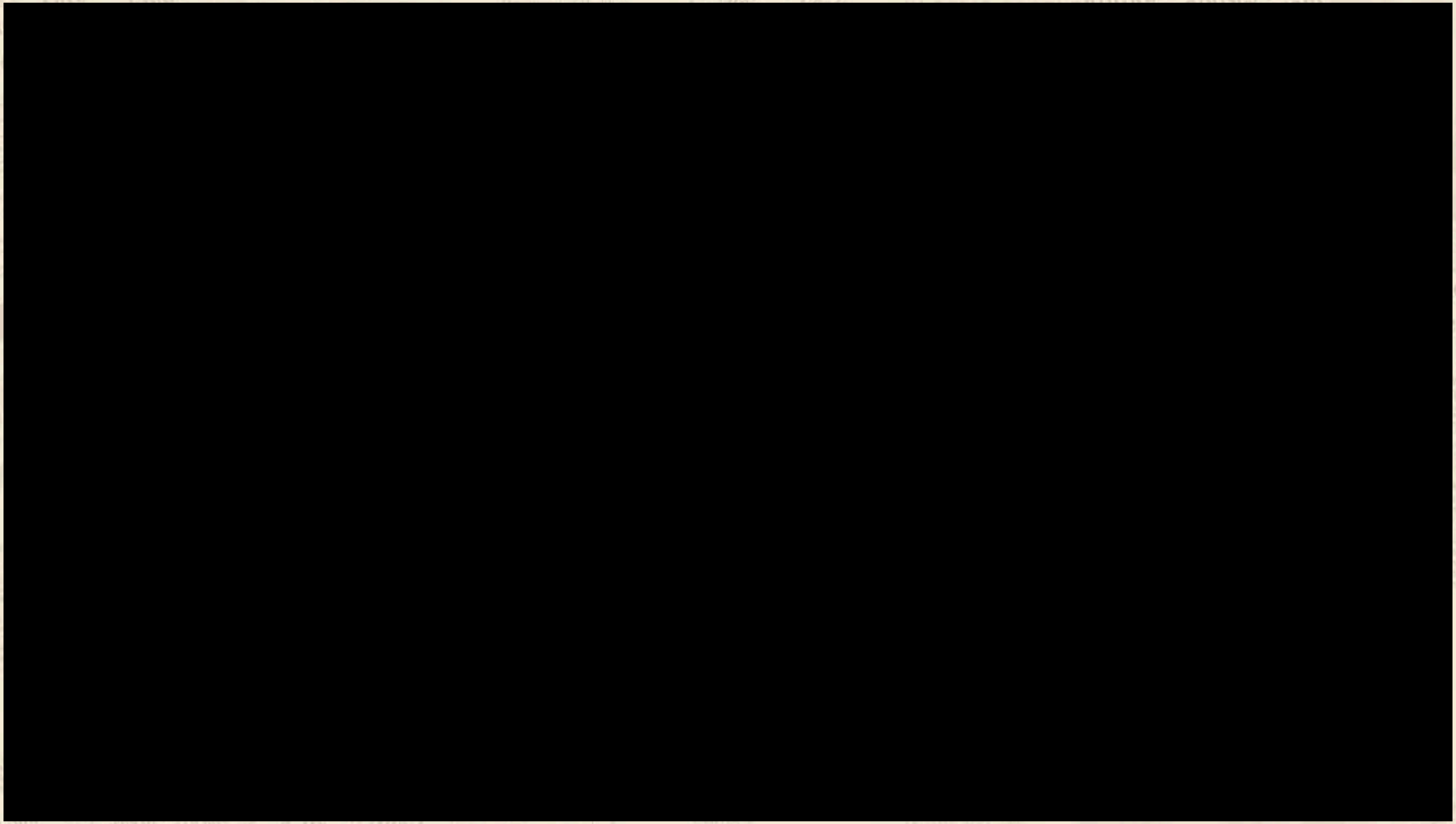


CTV News “W5”, Nov. 28, 2020, Promo,

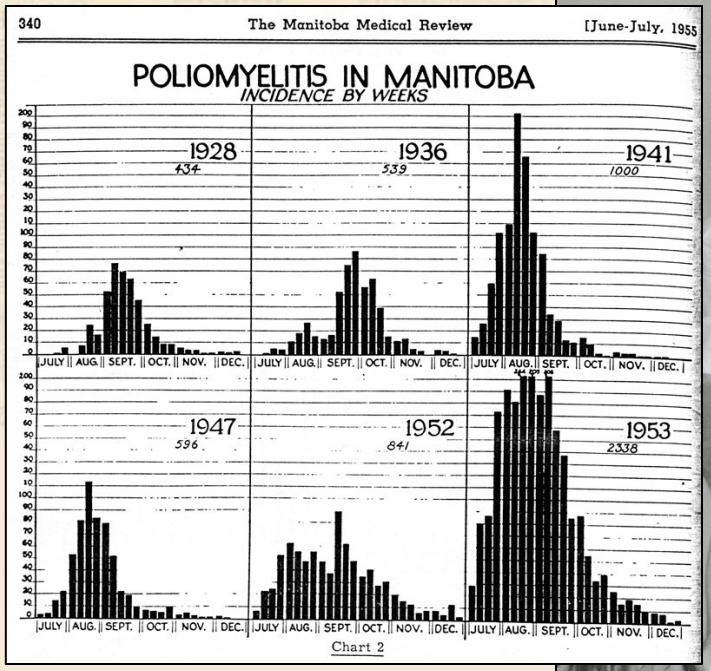
“The Polio Parallel: Is the Coronavirus the New Polio?”

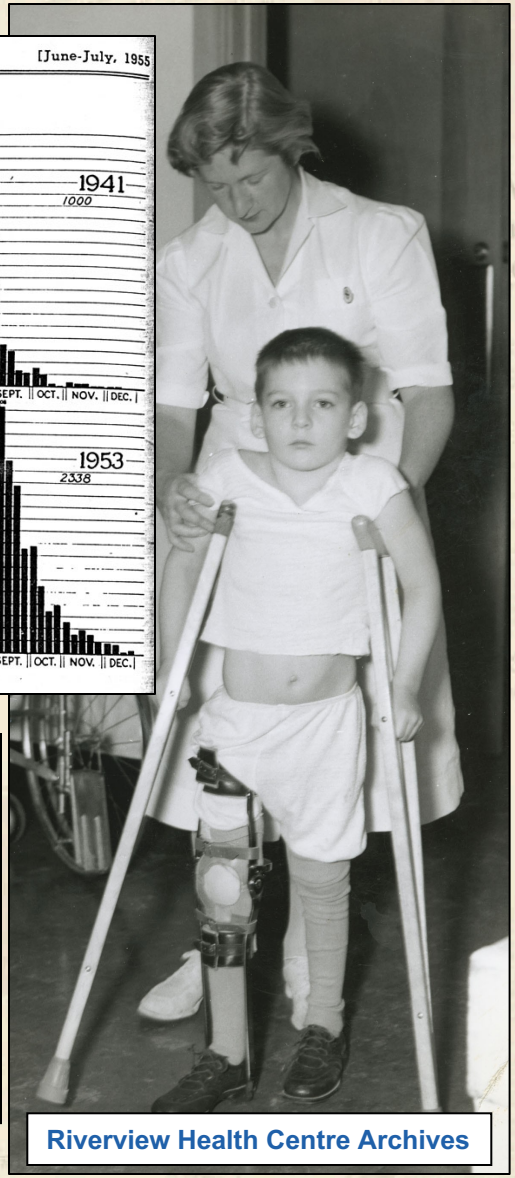
Watch via YouTube:

https://www.youtube.com/watch?v=YU2d-1fjPt4&t=3s

The Great Canadian Polio Epidemic of 1953

- Polio incidence grew alarmingly after WWII, and especially during the early 1950s, fuelled by the baby boom, with western Canada hit particularly hard in 1952 and even harder in 1953
- 9,000 cases and 500 deaths reported across Canada in 1953, affecting Ontario and all provinces, but with Manitoba worst hit
- Most alarming were the numbers of bulbar polio cases, especially among adults





Riverview Health Centre Archives

THE B. SUN. 28-11-53

Manitoba Had Heaviest Polio Epidemic In World History

WINNIPEG (CP) — This year's polio epidemic in Manitoba which struck nearly 2,300 persons and caused 82 deaths is believed to

technical advisory committee said "we know of no polio epidemic in the world of similar magnitude." The 2,300 cases were 120 per cent more than in Manitoba's lar-

Iron Lung Crisis: Winnipeg, 1953

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

FP 5.9.53 p1.

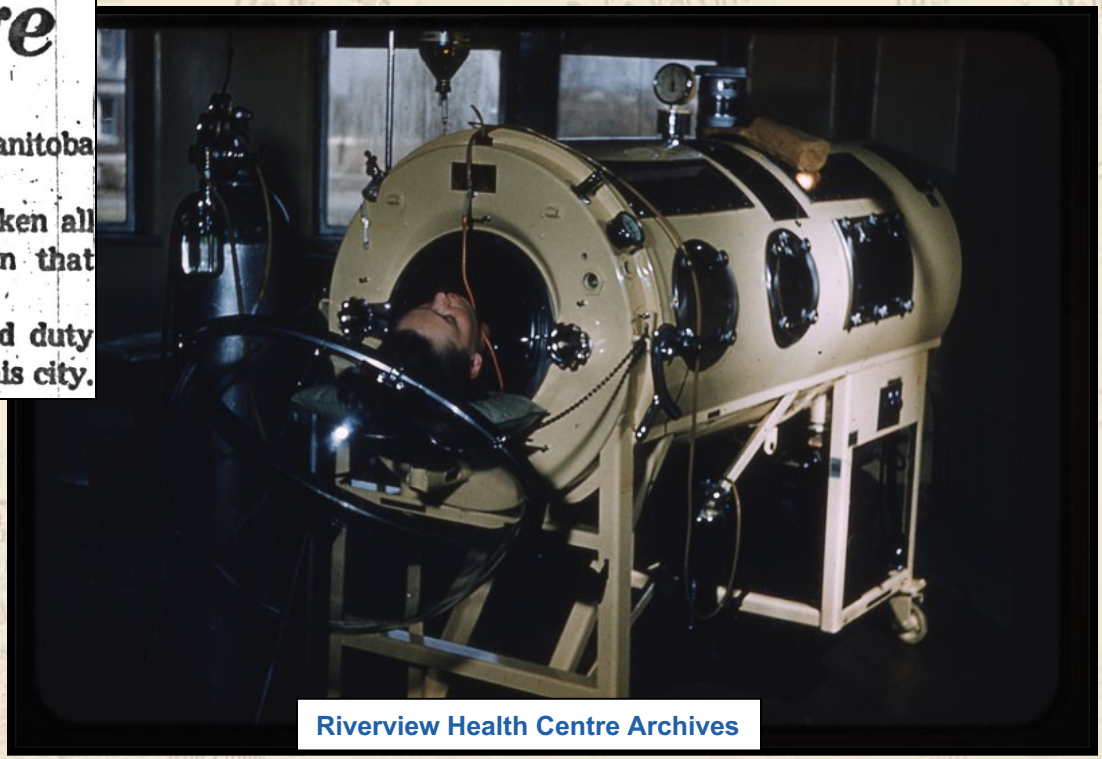
BY LYN CHANDLER

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.

- The 1953 polio crisis prompted emergency flights of iron lungs by the Royal Canadian Air Force.



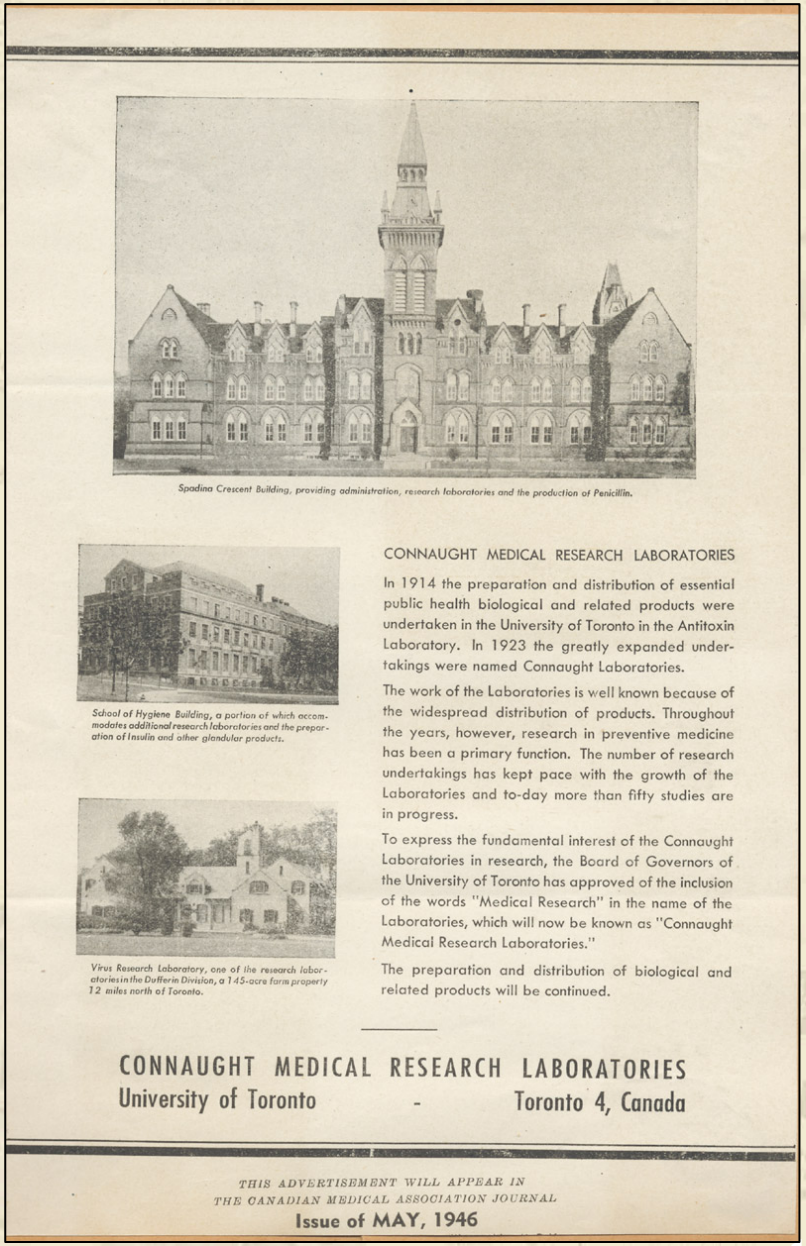
Riverview Health Centre Archives

- At the peak of the polio crisis an overwhelming 72 cases were dependent on iron lungs at Winnipeg's King George Hospital.

- There were similar polio sieges in other Canadian hospitals in 1953, especially in western Canada.

Connaught Medical Research Laboratories University of Toronto

- 1914 – Established as a self-supporting part of University of Toronto to provide essential public health products
- 1920s – Played key role in development and production of insulin
- 1920s-40s – Played major role in development and production of diphtheria toxoid, heparin and penicillin
- 1972 – Sold by UofT and today known as Sanofi Pasteur Canada



Spadina Crescent Building, providing administration, research laboratories and the production of Penicillin.

School of Hygiene Building, a portion of which accommodates additional research laboratories and the preparation of Insulin and other glandular products.

Virus Research Laboratory, one of the research laboratories in the Dufferin Division, a 145-acre farm property 12 miles north of Toronto.

CONNAUGHT MEDICAL RESEARCH LABORATORIES

In 1914 the preparation and distribution of essential public health biological and related products were undertaken in the University of Toronto in the Antitoxin Laboratory. In 1923 the greatly expanded undertakings were named Connaught Laboratories.

The work of the Laboratories is well known because of the widespread distribution of products. Throughout the years, however, research in preventive medicine has been a primary function. The number of research undertakings has kept pace with the growth of the Laboratories and to-day more than fifty studies are in progress.

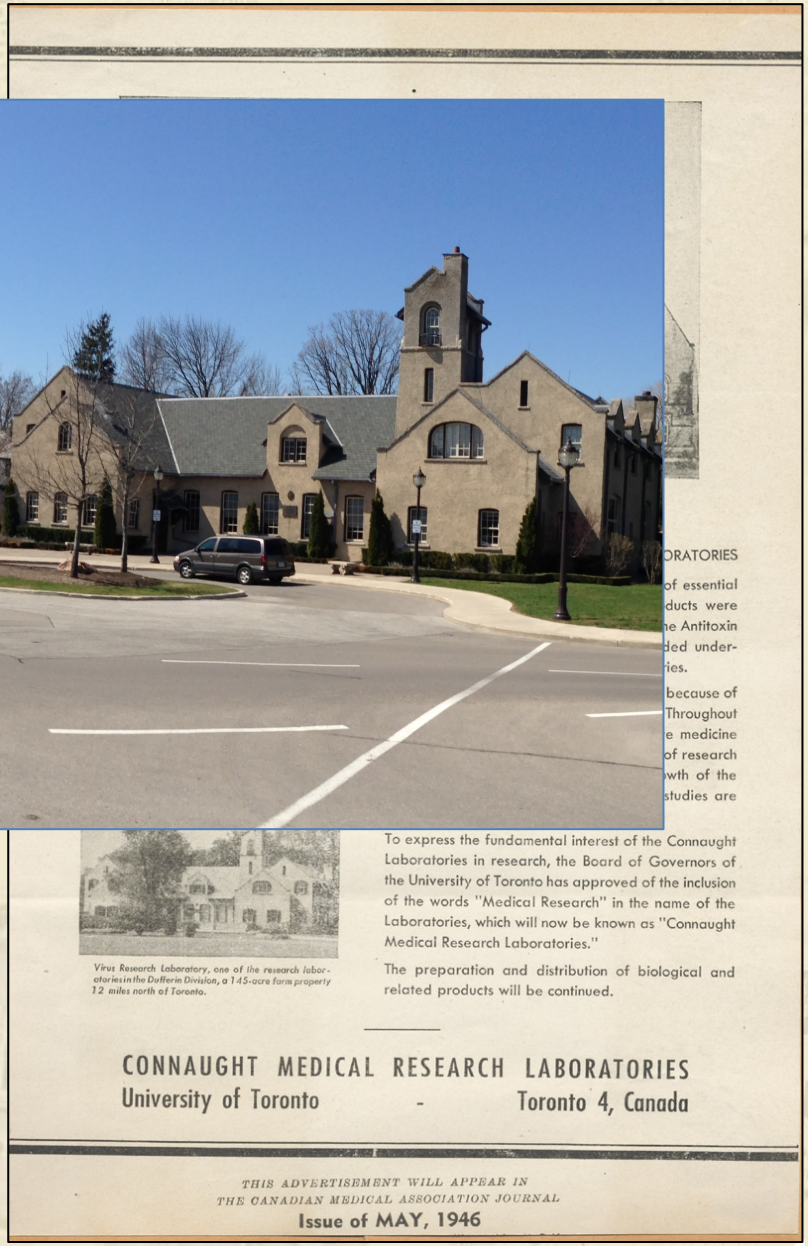
To express the fundamental interest of the Connaught Laboratories in research, the Board of Governors of the University of Toronto has approved of the inclusion of the words "Medical Research" in the name of the Laboratories, which will now be known as "Connaught Medical Research Laboratories."

The preparation and distribution of biological and related products will be continued.

CONNAUGHT MEDICAL RESEARCH LABORATORIES
University of Toronto - Toronto 4, Canada

THIS ADVERTISEMENT WILL APPEAR IN
THE CANADIAN MEDICAL ASSOCIATION JOURNAL
Issue of MAY, 1946

Connaught Medical Research Laboratories University of Toronto



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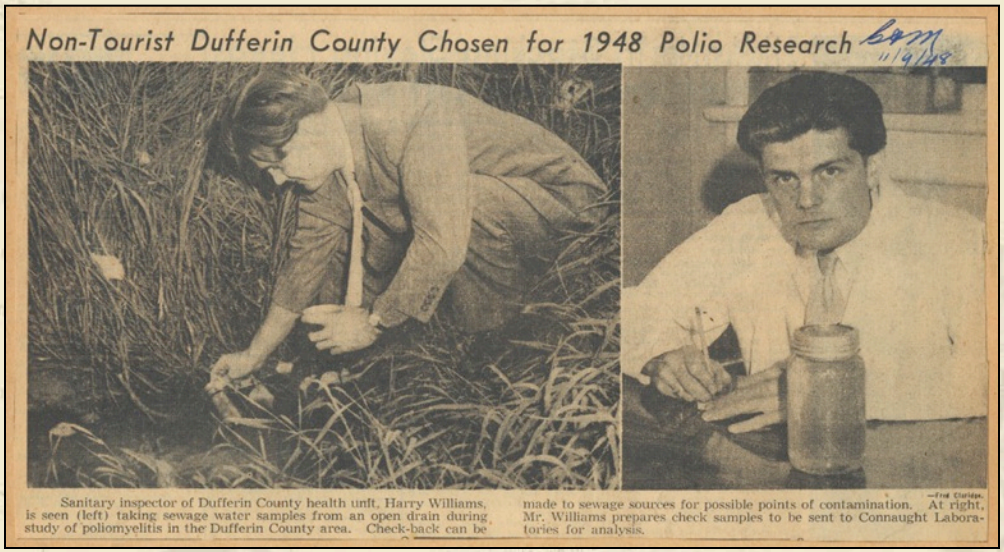
- **1972 – Ultimately, Connaught sold by UofT and today its legacy continues as Sanofi Pasteur Canada**

Connaught & Polio Vaccines:
Key Global & Canadian Research Foundations

- **1947 - Dr. A.J. Rhodes (right) launches a comprehensive research program at Connaught Laboratories to investigate the virology, epidemiology, immunology and clinical diagnosis of polio**
- **1949 - Hopes for a vaccine raised when a research team in Boston, led by Dr John Enders, discovered a way to grow poliovirus in test tubes**



Non-Tourist Dufferin County Chosen for 1948 Polio Research

Sanitary inspector of Dufferin County health unit, Harry Williams, is seen (left) taking sewage water samples from an open drain during study of poliomyelitis in the Dufferin County area. Check-back can be made to sewage sources for possible points of contamination. At right, Mr. Williams prepares check samples to be sent to Connaught Laboratories for analysis.

Research Grant
Ottawa Aids Doctor Study Polio Cause

Key Poliovirus Studies, 1949: Arctic Polio

- Winter 1948-49 – One of Rhodes' most significant projects involved investigating a highly unusual polio epidemic that struck Chesterfield Inlet on the western shore of Hudson Bay, with the Inuit community severely affected; 60 cases and 13 deaths among a population of 275, with many adults stricken

- Very little about this outbreak fit what was known about polio at the time, especially it striking so far north in the middle of an Arctic winter

The Canadian Medical Association Journal

Vol. 61 OCTOBER, 1949 No. 4

POLIOMYELITIS IN THE ARCTIC*

J. D. Adamson
Director, Department of Medicine, University of Manitoba; Director, Department of Medicine, Deer Lodge Hospital (Department of Veterans' Affairs)

J. P. Moody
Field Medical Officer, Eastern Arctic, Indian Health Services

A. F. W. Peart
Chief, Division of Epidemiology, Department of National Heath and Welfare

R. A. Smillie
Major, R.C.A.M.C., Command Hygiene Officer

J. C. Wilt
Assistant Pathologist, Winnipeg General Hospital

and

W. J. Wood
Regional Superintendent, Indian Health Services

DURING the autumn of 1948 and the winter of 1949 a widespread epidemic of acute anterior poliomyelitis occurred in the Eastern Arctic of Canada. This epidemic has attracted much attention since it was at its height during the winter in an isolated district, sparsely settled by Eskimos who had previously had no poliomyelitis. Thorough investigation was undertaken by Indian Health Services in the Federal Department of Health and Welfare, to whom this report is accordingly submitted.

Two trips in ski-equipped aircraft were arranged by the Royal Canadian Air Force, the first in the first week of March and the second in the first week of May. The party received most valuable assistance from members of the white settlement at Chesterfield. Without their general knowledge of the Eskimo and familiarity with local conditions the important features of the epidemic could not have been discovered.

* This study was conducted under the direction of the Department of National Health and Welfare.

THE LOCALE

Reference to the map will show the area affected to be between 60 and 65° N. and between 90 and 100° W. Chesterfield Inlet is a thousand air miles north of Winnipeg. This is one of the most northerly epidemics of polio-

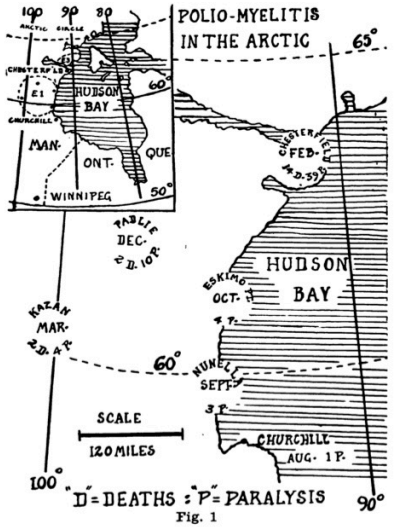


Fig. 1

myelitis on record and among the very few known to have occurred in Eskimos. Arne Hoygaard[1] refers to an epidemic in August-November, 1925, at Angmagssalik, East Greenland (65° N.) which caused 27 deaths among 800 Eskimos. He also refers to a report of an epidemic in West Greenland by A. Bertelson[2] in 1935.

It will be seen that the epidemic occurred during the coldest part of an unusually cold

Key Poliovirus Studies, 1949: Arctic Polio

- You can read more about the Arctic Polio story in my article, "Mercy Mission," which was published in *Canada's History Magazine* (Feb-March 2018).
- The article is available at,
- http://healthheritageresearch.com/clients/docs/Arctic-Polio/

MERCY MISSION

WHEN POLIO STRUCK THE INUIT COMMUNITY AT CHESTERFIELD INLET IN THE LATE 1940S, IT LED TO A TRAGEDY THAT SHOCKED THE COUNTRY.

BY CHRISTOPHER J. RUTTY

Susie, an Inuk girl with polio, en route from Chesterfield Inlet (Igluligaarjuk), Keewatin District, to Winnipeg, circa 1949.

CONSTANCE BEATTIE WAS THE ONLY real choice to answer a distress call issued by the Department of Indian Affairs in late March 1949. A physiotherapist was urgently needed to help treat Inuit polio victims in the Arctic settlement of Chesterfield Inlet on the west coast of Hudson Bay. It would be an unprecedented mission in response to an unprecedented and especially tragic polio epidemic that struck during the winter of 1948–49, seemingly seeking out a large proportion of the immunologically vulnerable Inuit population. There were about 275 Inuit, along with 25 non-Inuit, living in and around the outpost.

Connie was twenty-four years old. She grew up in Brockville, Ontario, and graduated from the University of Toronto's physiotherapy program in 1945 before serving in the Royal Canadian Army Medical Corps. In 1948 she joined Toronto East General Hospital's physiotherapy department and very quickly became its head. She was also president of the Toronto branch of the Canadian Physiotherapy Association, which was where officials from the Department of Indian Affairs started their search.

Connie wasted little time in volunteering her services. "It will be a thrilling adventure and a chance to help those un-

30 FEBRUARY-MARCH 2018 CANADASHISTORY.CA FEBRUARY-MARCH 2018 31

Post War Polio Progress:

Vaccine Door Opening

- 1949 – Rhodes' Arctic polio investigations ultimately brought questions not of climate or Inuit food habits, but of human immunity, to the fore, underscoring how the poliovirus was widely distributed globally, even into the Arctic
- Yet this distribution had significant demographic and geographic gaps in countries with the most advanced public health infrastructures, and it was in such gaps that polio epidemics could be generated in any community
- This advance in understanding the disease was a critical step towards the development of polio vaccines

Canadian Journal of Public Health, Oct. 1949, p. 418

An Outbreak of Poliomyelitis in Canadian Eskimos in Wintertime

LABORATORY INVESTIGATIONS*

A. J. RHODES, M.D., F.R.C.P., Ed.[1]
EINA M. CLARK, B.Sc., M.A.[1]
ALICE GOODFELLOW, B.A., M.D.[2]
AND
W. L. DONOHUE, M.A., M.D.[2]

TECHNICAL METHODS

SEVERAL pathological specimens were obtained from Eskimos involved in an epidemic of poliomyelitis at Chesterfield Inlet which has been described elsewhere. The specimens were shipped by aeroplane in the frozen state, and were received in good condition; they were stored in the carbon dioxide ice chest until the time of examination. Some nervous tissue was also received in glycerol, and this was stored in the cold room.

It was decided to examine sufficient specimens by monkey inoculation to confirm the clinical diagnosis of poliomyelitis beyond reasonable doubt. Accordingly, the following 7 samples were selected as most suitable: preparations of brain and cord from 2 cases; stools from 3 cases; and throat washings from 2 cases.

Nervous tissue was prepared for inoculation by grinding in a mortar to constitute a 20 per cent suspension in broth. Penicillin (1,000 units per ml) and streptomycin (5 mg. per ml) were added, and the inoculations performed in rhesus monkeys by the cerebral route; the suspension was allowed to stand at room temperature for about 30 minutes before inoculation, to allow the antibiotics to act.

Bacteria-free extracts of 2 of the stool samples were prepared by shaking repeatedly with ether, without concentration of the contained virus. In the third case, virus in an aqueous suspension of stool was concentrated in the ultracentrifuge at approximately 39,000 r.p.m. Inoculations were made cerebrally and peritoneally in rhesus monkeys.

The throat washings were treated with penicillin and streptomycin without concentration of the virus, and inoculated cerebrally and peritoneally.

Monkeys were examined daily, and were killed when paralysis developed. Monkeys that did not develop paralysis were killed 4 weeks after inoculation. All animals were examined histologically.

*Aided by a grant from the Department of National Health and Welfare, Ottawa.
[1]Connaught Medical Research Laboratories, University of Toronto.
[2]Department of Pathology, Hospital for Sick Children, Toronto.

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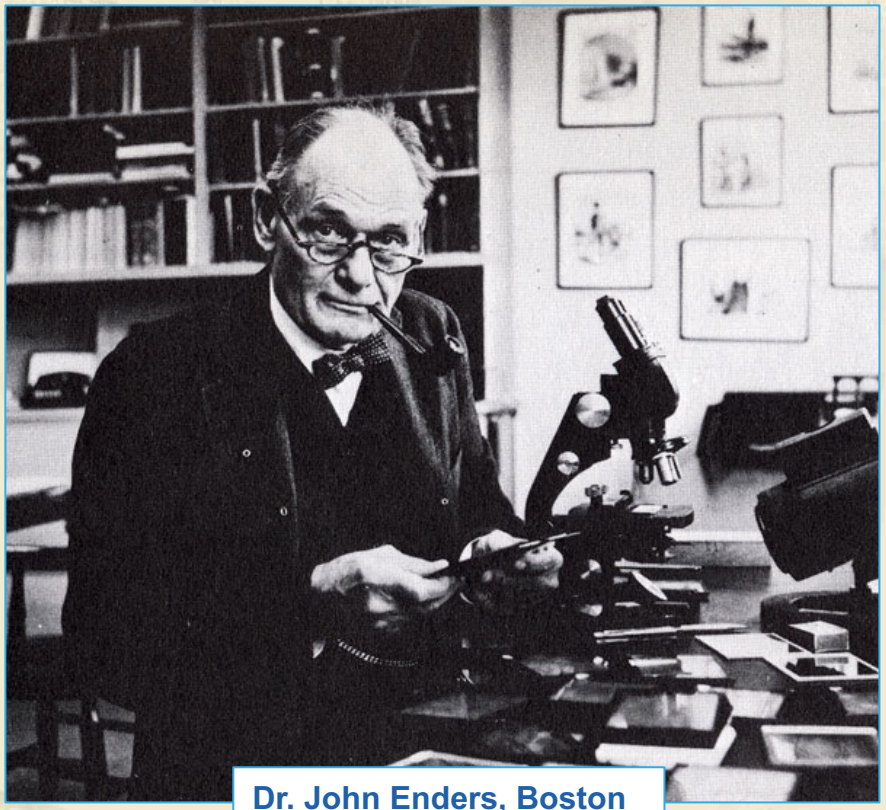
Post War Polio Progress:

Vaccine Door Opening

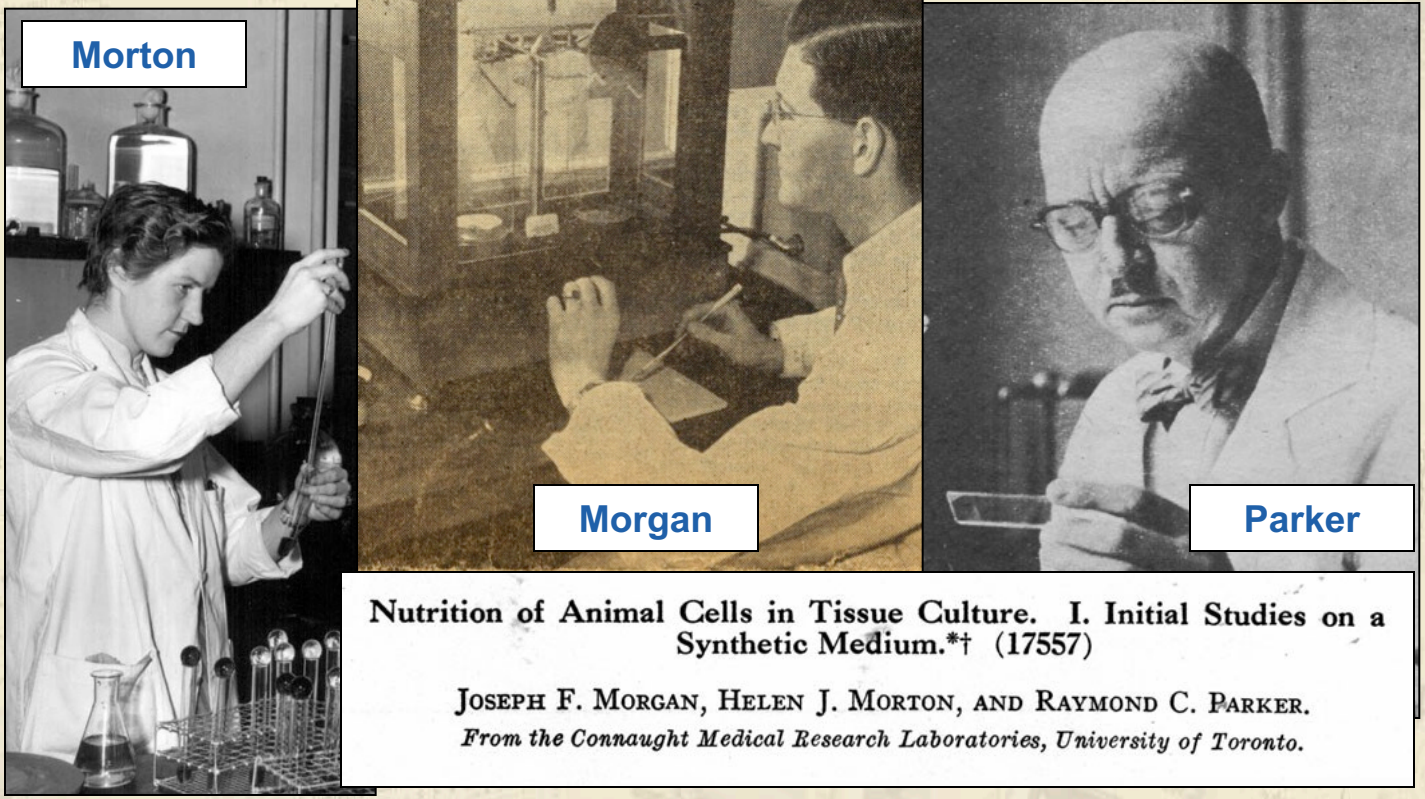
- 1949 - Hopes for a polio vaccine were also raised significantly when a research team in Boston, led by Dr. John Enders discovered a way to grow poliovirus in test tubes using non-nervous tissues
- This discovery earned the Nobel Prize
- A further advance was discovering the poliovirus in the bloodstream, in addition to the gastrointestinal track, pointing to two systems where a vaccine could be targeted



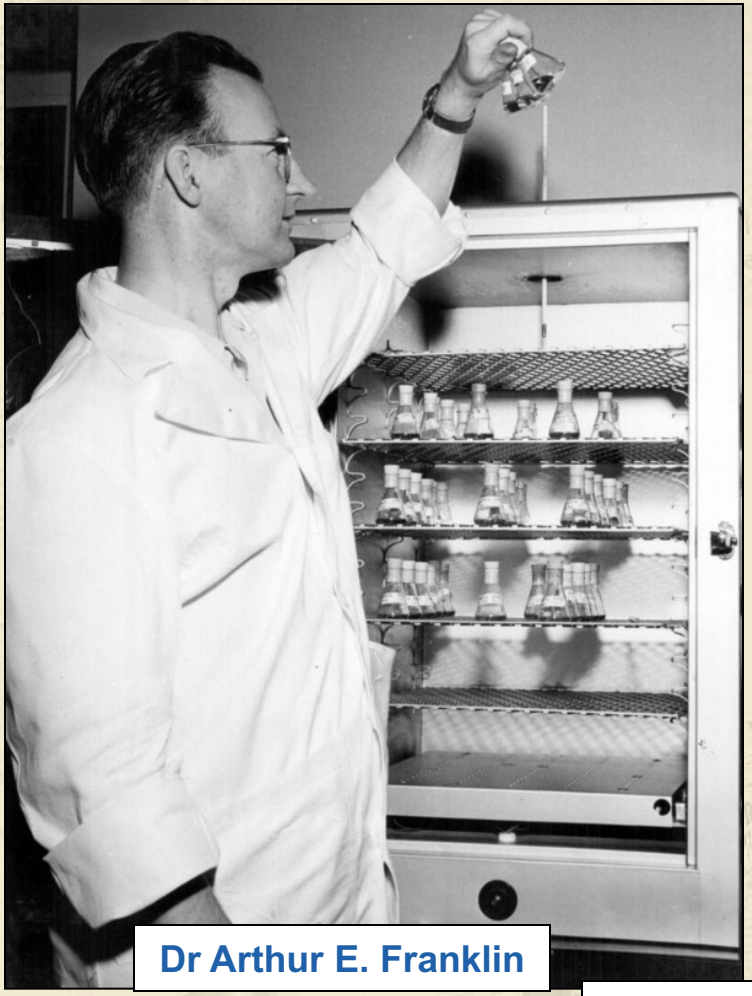
Dr. John Enders, Boston Children's Hospital

"Medium 199": *The 1st Synthetic Medium & Connaught's Breakthrough Coincidence*

- **1949 – Meanwhile, a Connaught research team led by Dr. Raymond Parker develops "Medium 199," the first chemically defined tissue culture medium, originally for nutritional studies of cancer cells**



"Medium 199"
The Key to Poliovirus Growth



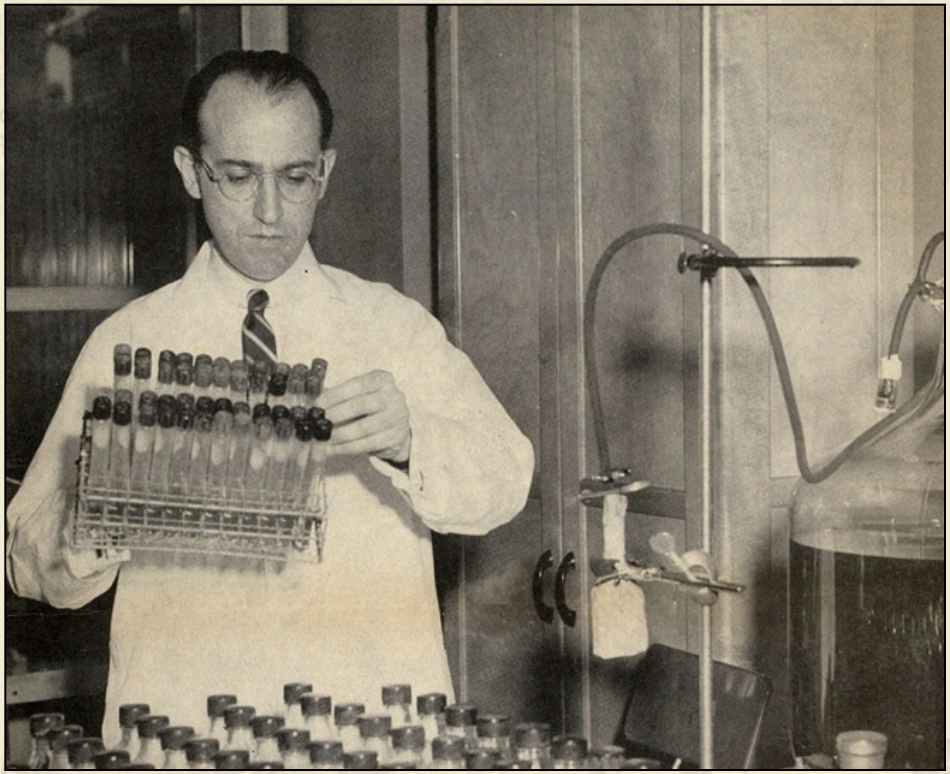
Dr Arthur E. Franklin

Sanofi Pasteur Canada Archives

- 1950-51 – Rhodes was growing poliovirus in test tubes using Enders' methods, but was reliant on traditional animal-based tissue culture sera
- 1951 - Through his friendship with Dr. Morgan of the "Medium 199" group, a member of Rhodes' research team, Dr. A.E. Franklin, tried the new synthetic medium for cultivating poliovirus in tissue cultures
- The use of this medium vastly improved the yields and purity of poliovirus cultures.

Dr. Jonas E. Salk:
Vaccine Pioneer @ University of Pittsburgh

- **1951 - In the meantime, Dr. Jonas Salk had shown that an inactivated poliovirus vaccine could prevent polio in monkeys**
- **News of Connaught's serum-free "Medium 199" and its use for poliovirus cultivation opened the door for Salk to develop an inactivated poliovirus vaccine that was safe to test in humans**
- **However, Salk could only make his vaccine on a small scale**



1952-53 – Key Poliovirus Studies

- 1952 - 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
- 1953 - Recognizing Connaught's experience in developing large scale vaccine and biologicals production technologies, the National Foundation for Infantile Paralysis (NFIP/U.S. March of Dimes) 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 vaccines

Sanofi Pasteur Canada Archives

1952-53 – Key Poliovirus Studies: The Toronto Method

The New York Times

CANADA LETTER

Canada's Key Role in Creating a Once Awaited Vaccine

An American researcher created the polio vaccine, but a Toronto lab and a pioneering female scientist made its mass production possible.

By Ian Austen

July 31, 2020

Canadians don't have to go back to 1918 and the start of the Spanish flu pandemic to find an analogy to today. For decades, waves of polio outbreaks gripped the country with fear, death and uncertainty, as recently as the 1950s.

Toronto Edition
CHANGE LOCATION

TORONTO STAR

HOME GTA CANADA POLITICS WORLD OPINION LIFE SPORTS ENTERTAINMENT BUSINESS STAR INVESTIGATIONS

Readers' Choice Awards

GTA

Making a vaccine is not the same as mass-producing it. This Canadian scientist solved the problem for the polio vaccine — then she was largely forgotten

KB By **Karen Black** Special to the Star
Sun., Nov. 29, 2020 | 7 min. read

Article was updated Nov. 28, 2020

When American scientist Jonas Salk announced he had discovered a vaccine that could prevent polio he was hailed as a hero on front pages around the world. Parents had lived in terror of "the crippler," which swept through Canada and the U.S. in waves during the first half of the 20th century, striking children and causing paralysis, permanent disability and death.

The promise of a vaccine even put "Polio Fighter" Salk's face on the cover of Time magazine in 1954, and a year later the vaccine's licensing would cement his scientific legacy. And yet Salk's promise may have gone unfulfilled were it not for the groundbreaking work of Canadian scientist Leone Farrell toiling in obscurity at Toronto's Connaught Laboratories.

1952-53 – Key Poliovirus Studies: The Toronto Method

Sanofi Pasteur Canada Archives

- 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
- 1939-40 – She 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

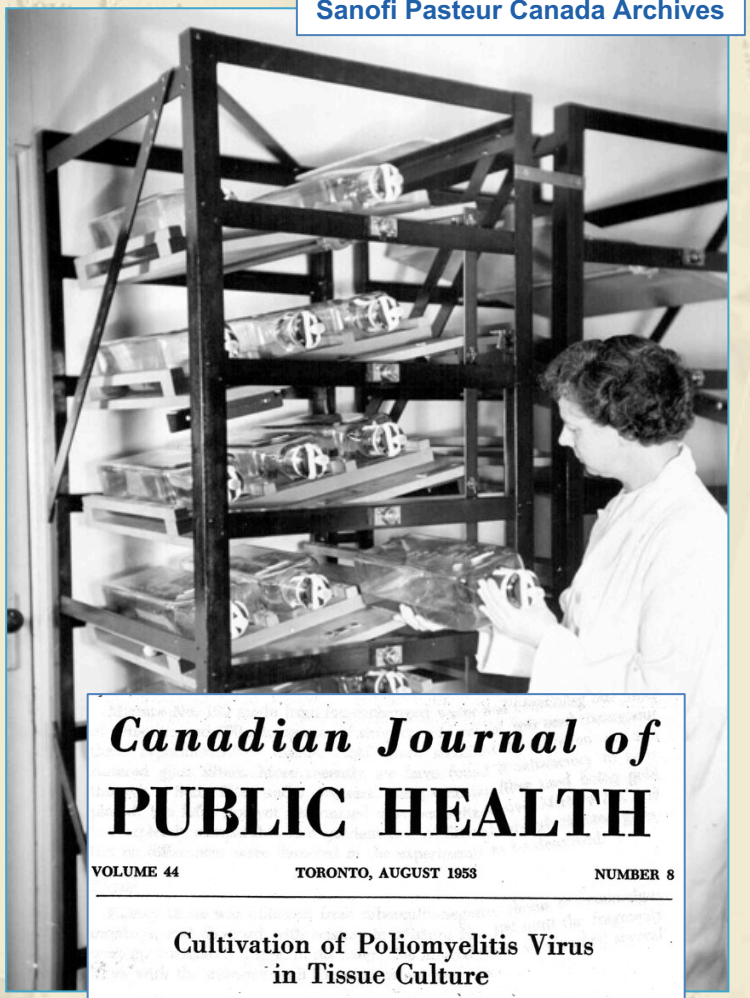
1953 – Key Poliovirus Studies: The Toronto Method

- 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…

Sanofi Pasteur Canada Archives



Canadian Journal of
PUBLIC HEALTH

VOLUME 44 TORONTO, AUGUST 1953 NUMBER 8

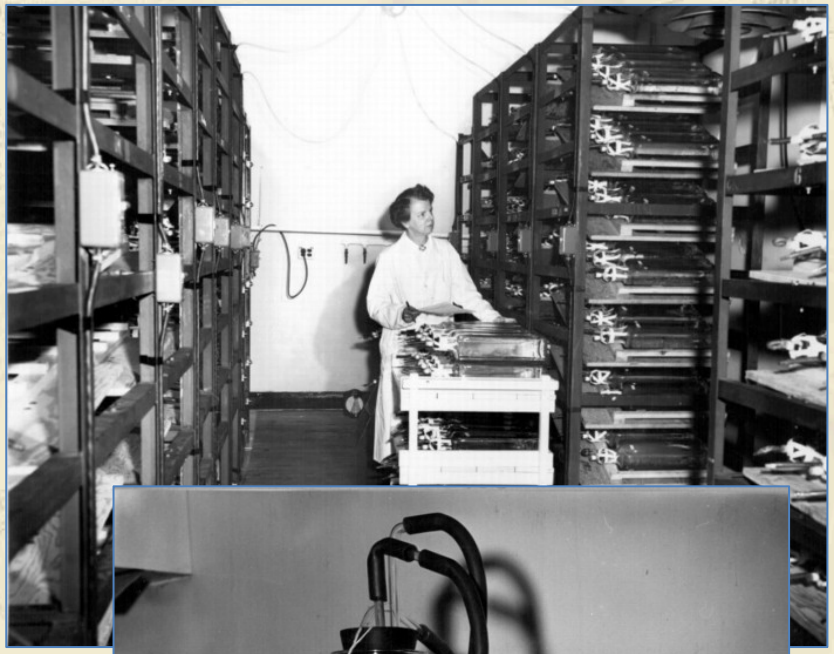
Cultivation of Poliomyelitis Virus in Tissue Culture

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

1953-54: 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

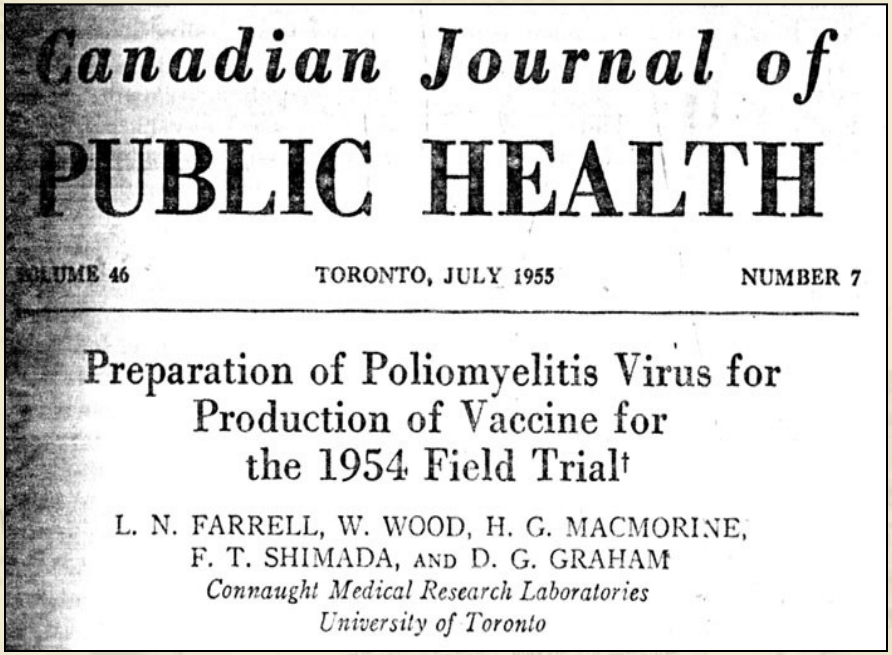


- The poliovirus fluids were shipped to two U.S. pharmaceutical firms by station wagon for inactivation and processing into the finished vaccine in time for immunizations to start in April 1954

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

April 24, 1954:
Launch of Salk Vaccine Field Trial

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



Canadian Journal of

PUBLIC HEALTH

VOLUME 46 TORONTO, JULY 1955 NUMBER 7

Preparation of Poliomyelitis Virus for Production of Vaccine for the 1954 Field Trial†

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

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

Sanofi Pasteur Canada Archives

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 rediscover 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

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

April 12, 1955: "V-Day"
Salk Vaccine Trial Results Announced

- April 12, 1955 – Unprecedented media attention to announcement of field trial results
- Salk vaccine 60-90% effective against the three types of poliovirus
- Vaccine immediately licensed in U.S. and Canada
- In Canada, Salk vaccine distributed through unique 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?

Globe & Mail, April 28, 1955, p. 1

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

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. out-

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 [illegible] in the vaccine evolved by Salk, 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 biologics control laboratory, and Dr. Karl Habel, polio expert, to Berkeley. They will work with

RECALL—Page 2

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 16. The incubation period in polio is from three to 30 days, with the average around 14.

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
Ottawa, All Provinces Sure

Toronto Star 1955 May

“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. Pequegnat, 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. Pequegnat.

Canada has barred the entry of U.S.-produced Salk vaccine until the U.S. government releases its

(Continued on Page 13, Col. 3)

—Star Photo by Douglas Cronk

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

Toronto Star, May 1955

"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:

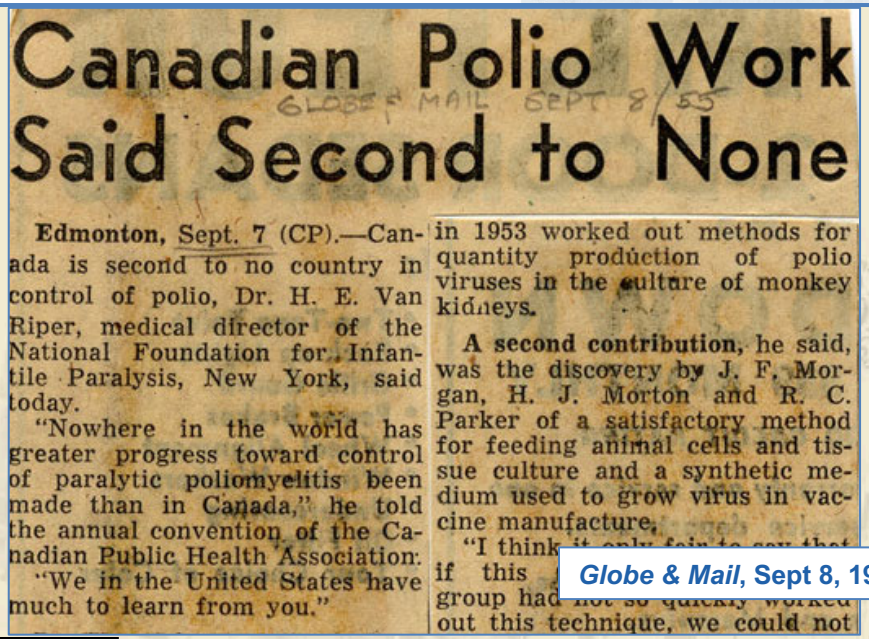
"We in the United States have much to learn from you (in Canada)"

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

GLOBE & MAIL SEPT 8/55

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**

Canada Produces Salk Vaccine for the World

- 1957 – Connaught exports Salk vaccine to Czechoslovakia and Great Britain
- Connaught was soon exporting Salk vaccine to 44 other countries that were without protection against polio's growing global threat

Sanofi Pasteur Canada Archives

Preventing Persistent Polio

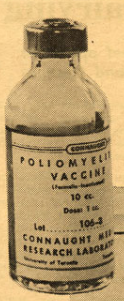
- Despite the successful introduction of the Salk polio vaccine in Canada, it took time for all age groups to be immunized and time for polio outbreaks to end

- 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

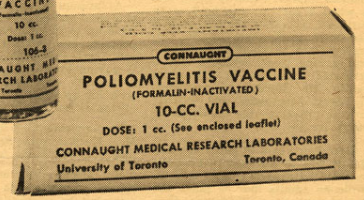
Financial Post, Jan 11, 1960

Polio Score

	Cases 1959	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



THIS VIAL MAY SAVE YOUR LIFE



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

ONTARIO DEPARTMENT OF HEALTH

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

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

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:

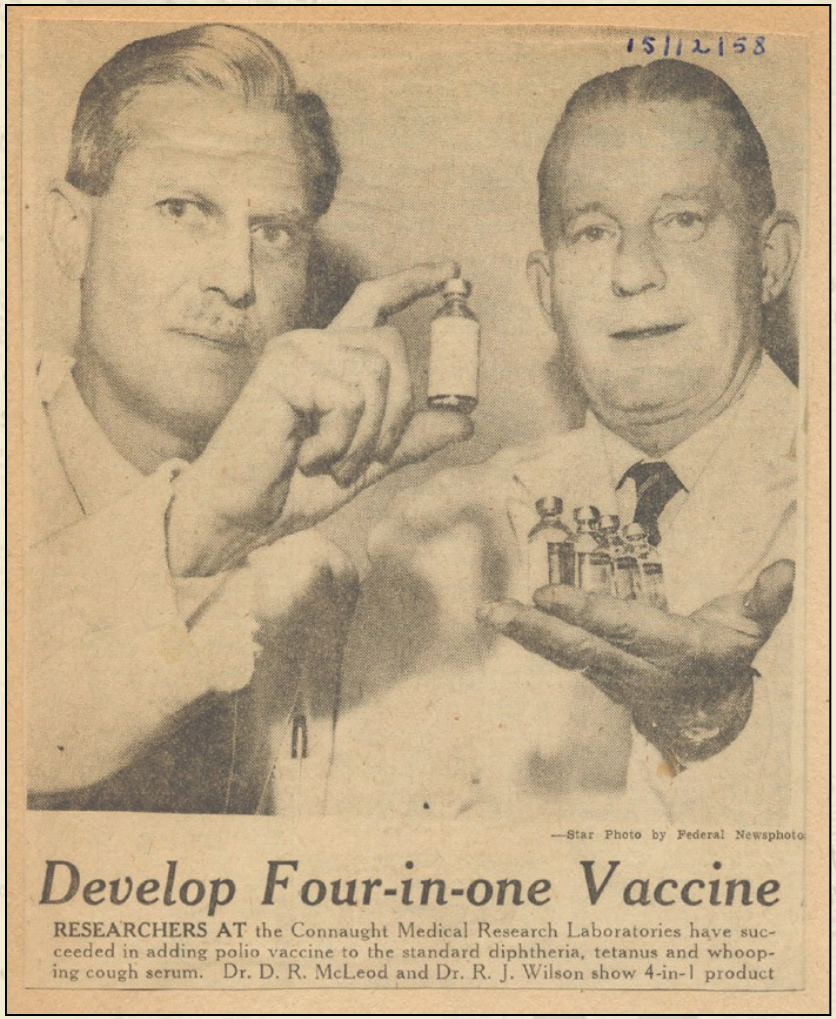
New Brunswick 28 (1); Prince Edward Island 2 (0); Manitoba 17 (60); Saskatchewan 16 (0); Alberta 22 (17); British Columbia 20 (8); Yukon 1 (0); North-

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 the age group under 20 years.

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

DPT-Polio: *The Key to Polio Control in Canada*



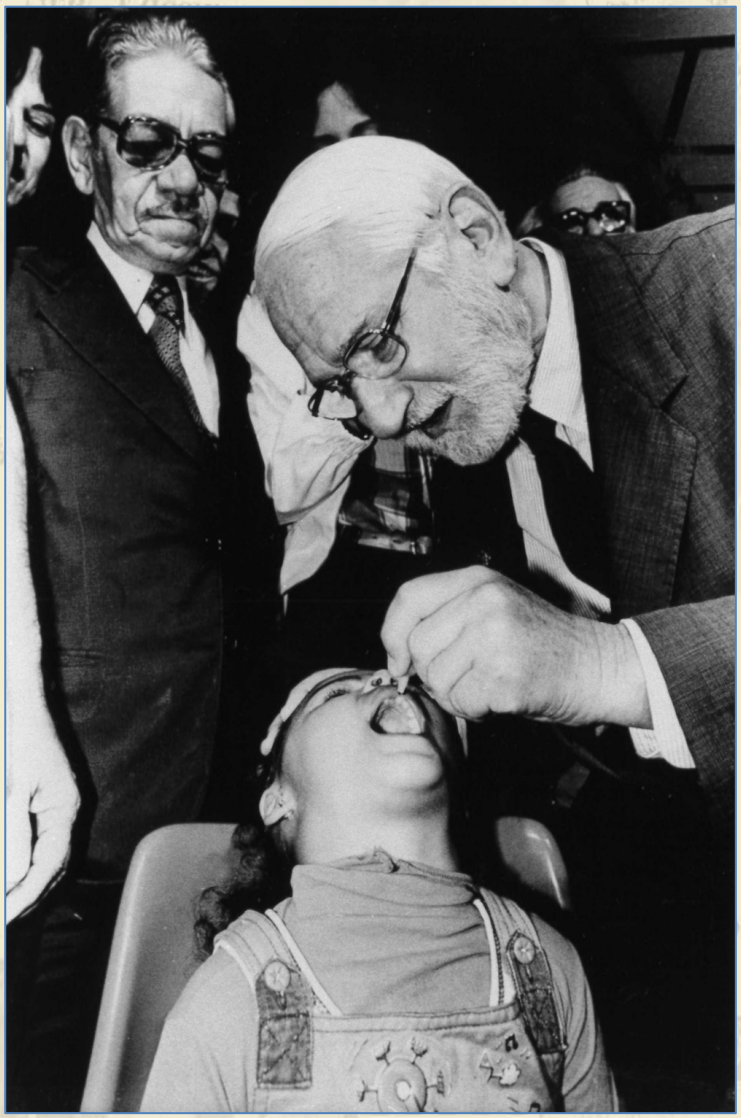
- **1959 – Building on the DPT model designed to minimize injections, Connaught pioneered a new generation of combined vaccines that include Salk polio vaccine -- DPT-Polio, DT-Polio, T-Polio**

- **1955-62 - Canadian polio incidence falls dramatically, although not without some significant polio outbreaks where immunization rates among adults and young children were low**

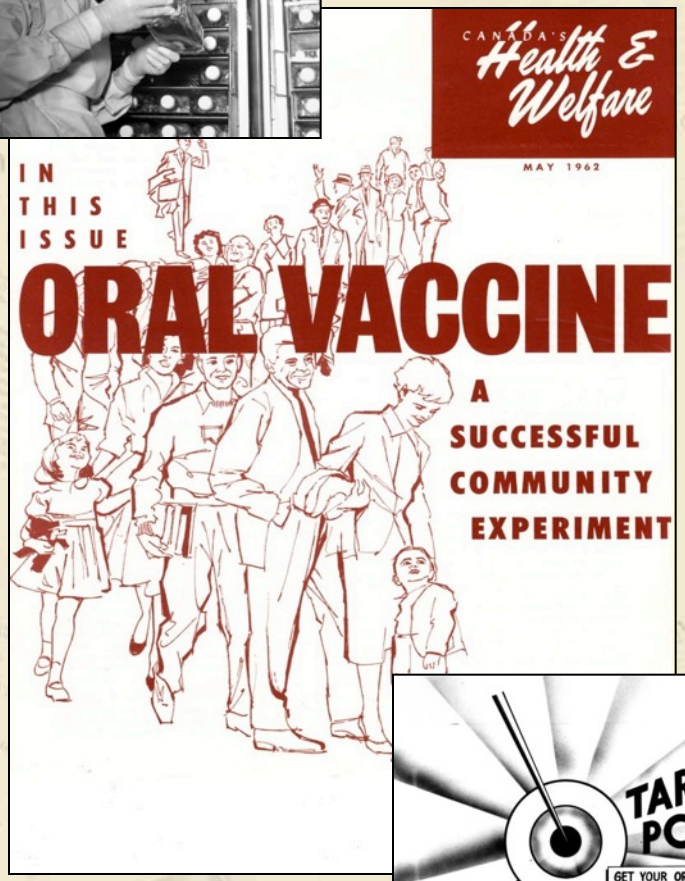
Sanofi Pasteur Canada Archives

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 stimulated 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



Connaught & Polio Vaccines:
Leadership in Oral Polio Vaccine Development

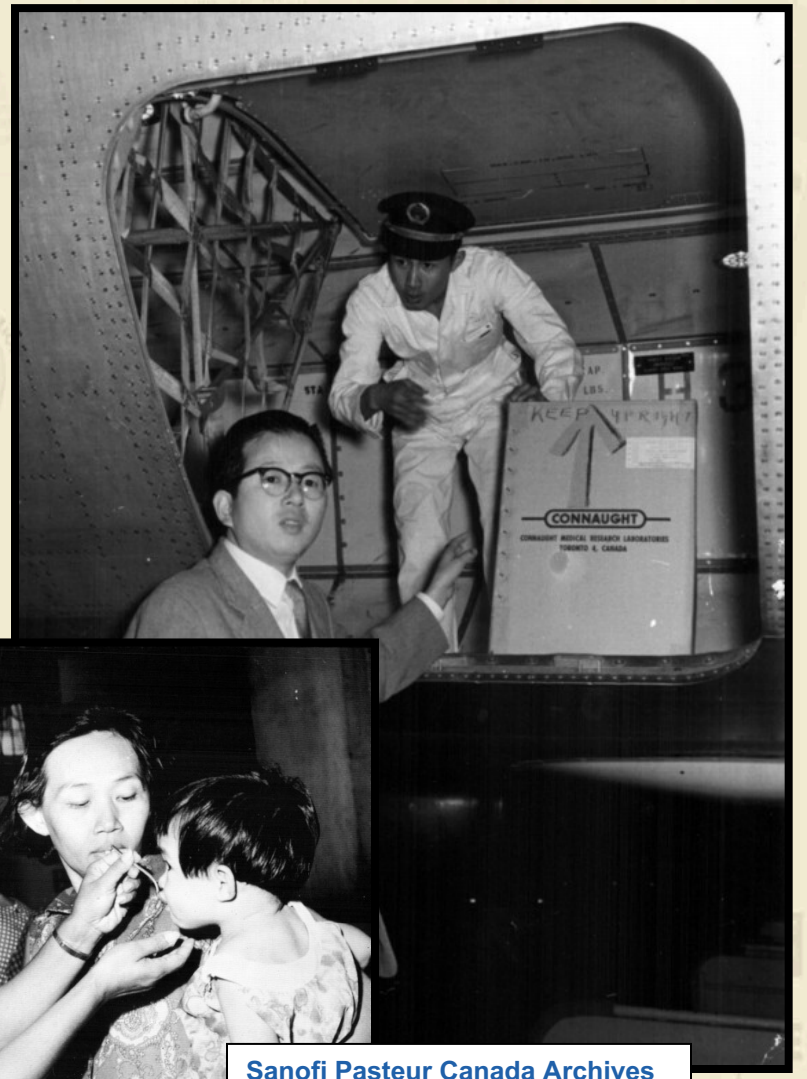


Sanofi Pasteur Canada Archives

- 1959 - Seed pools were provided by Dr Albert B. Sabin of the University of Cincinnati
- 1960-61 - OPV "Field Demonstrations" were conducted in Nova Scotia, Quebec and Saskatchewan
- March 1962 – Connaught's trivalent Sabin Oral Polio Vaccine licensed in Canada

Canadian OPV Helps Battle Polio Overseas

- 1961 – Connaught supplies 3 million doses of OPV to Japan to bring a polio epidemic under control
- Connaught began to export OPV to other countries, becoming a world leader in the battle against polio around the world



Sanofi Pasteur Canada Archives

Reveal Canadian Aid Halted Japanese Polio

Globe & Mail Feb 20, 1963

The story of how Canada helped to check a serious outbreak of polio in Japan during the late summer of 1961 was

myelitis had occurred. A low incidence prevailed for the balance of the year."

The results were so spectacular that the Japanese Gov-

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
- By 1994, all provinces had switched back to use of the Salk vaccine; new enhanced potency version in a new combination, DPT-Polio-Hib

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,[1] 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.

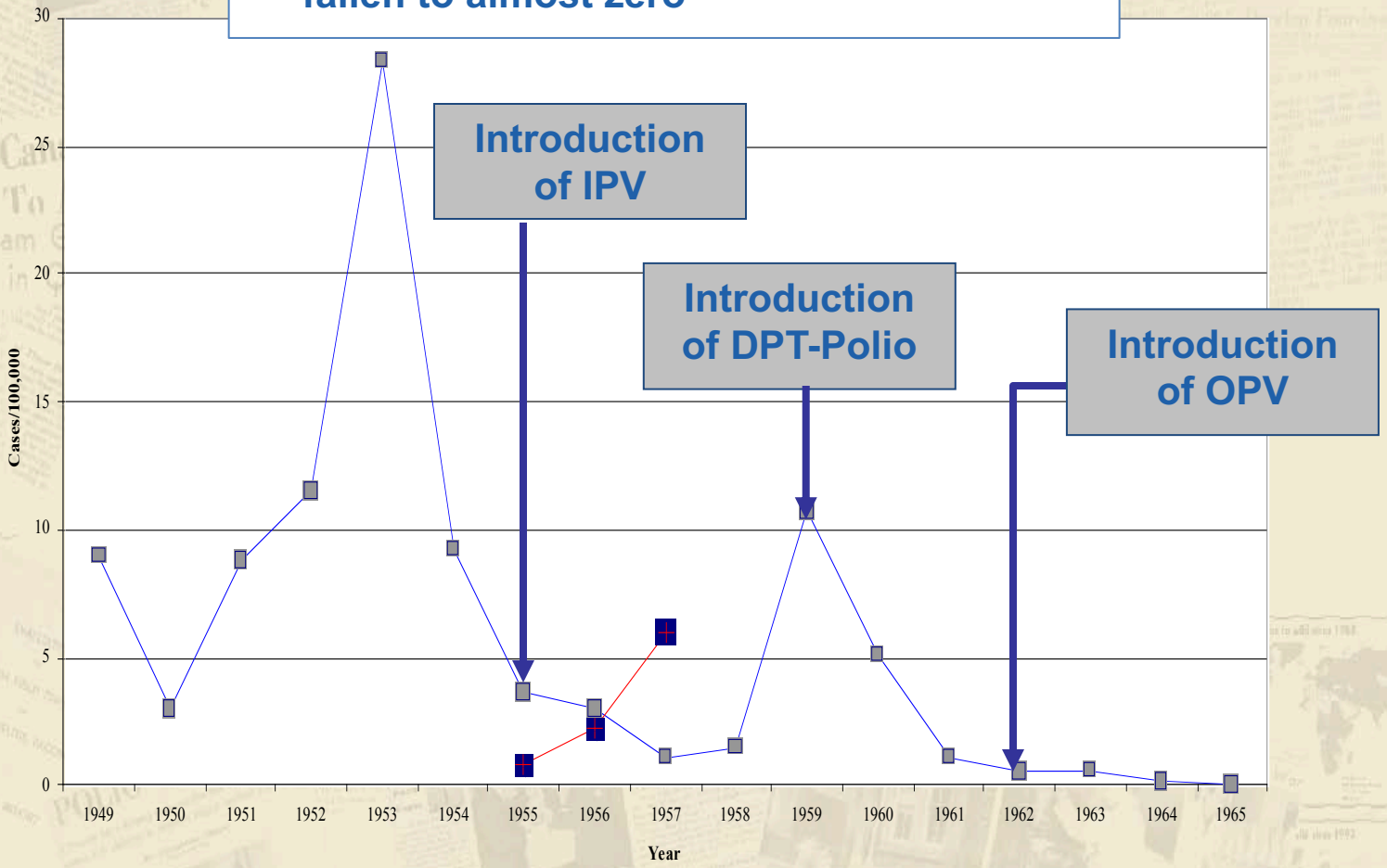
Advantages of Oral Poliovirus Vaccine

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.

[1]Director, Connaught Medical Research Laboratories, University of Toronto, Toronto 4, Ontario.

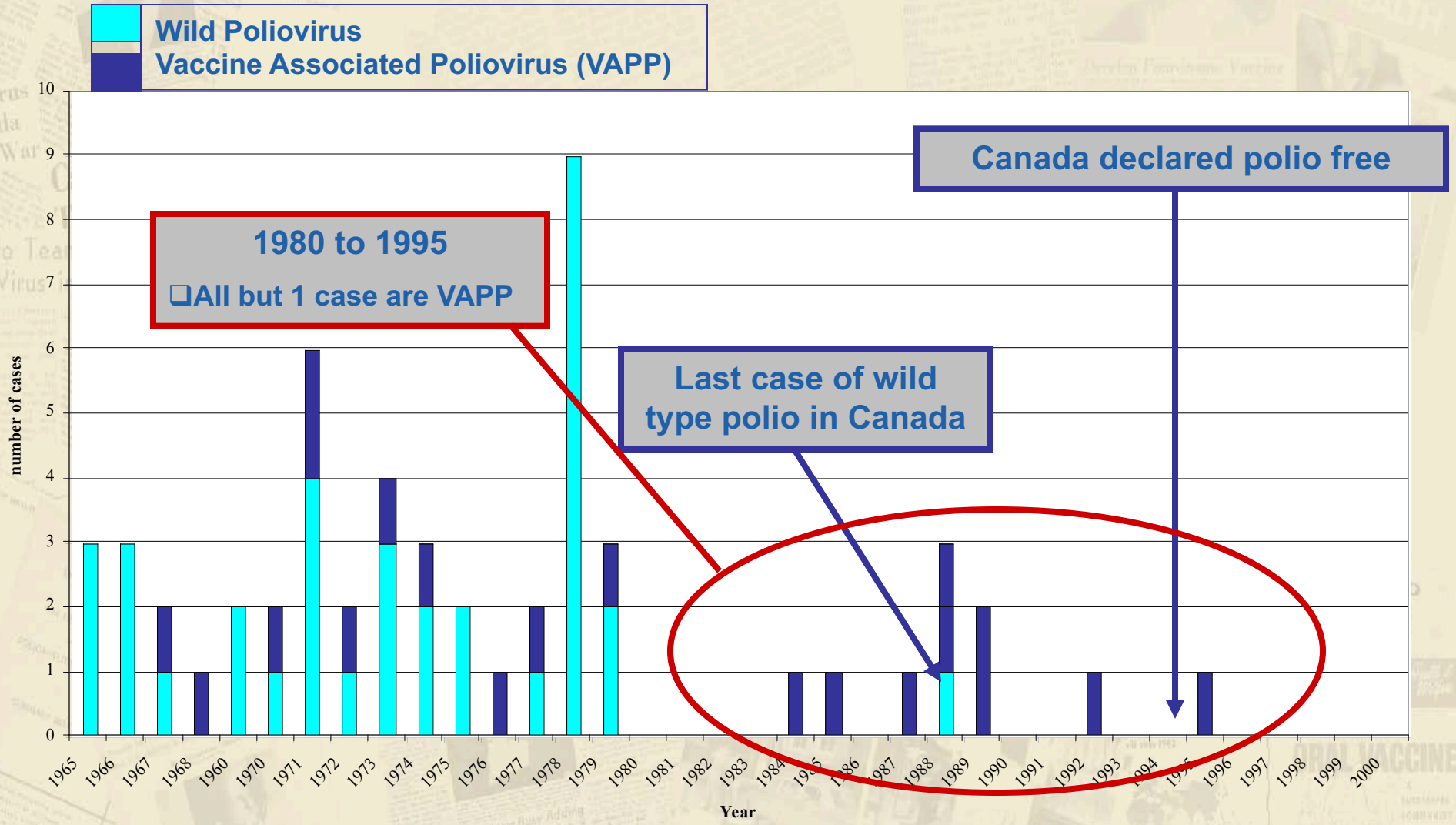
Preventing Persistent Polio:
From Salk IPV to Sabin OPV

- By 1965, polio incidence in Canada had fallen to almost zero



Polio Epidemiology in Canada – 1965 to 2000

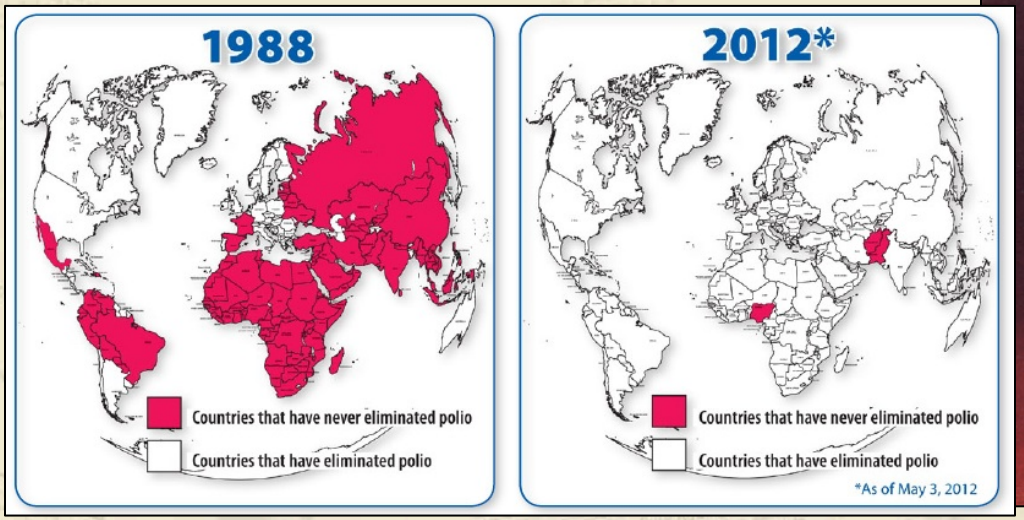
Wild Poliovirus, Imported outbreaks and VAPP Polio Cases

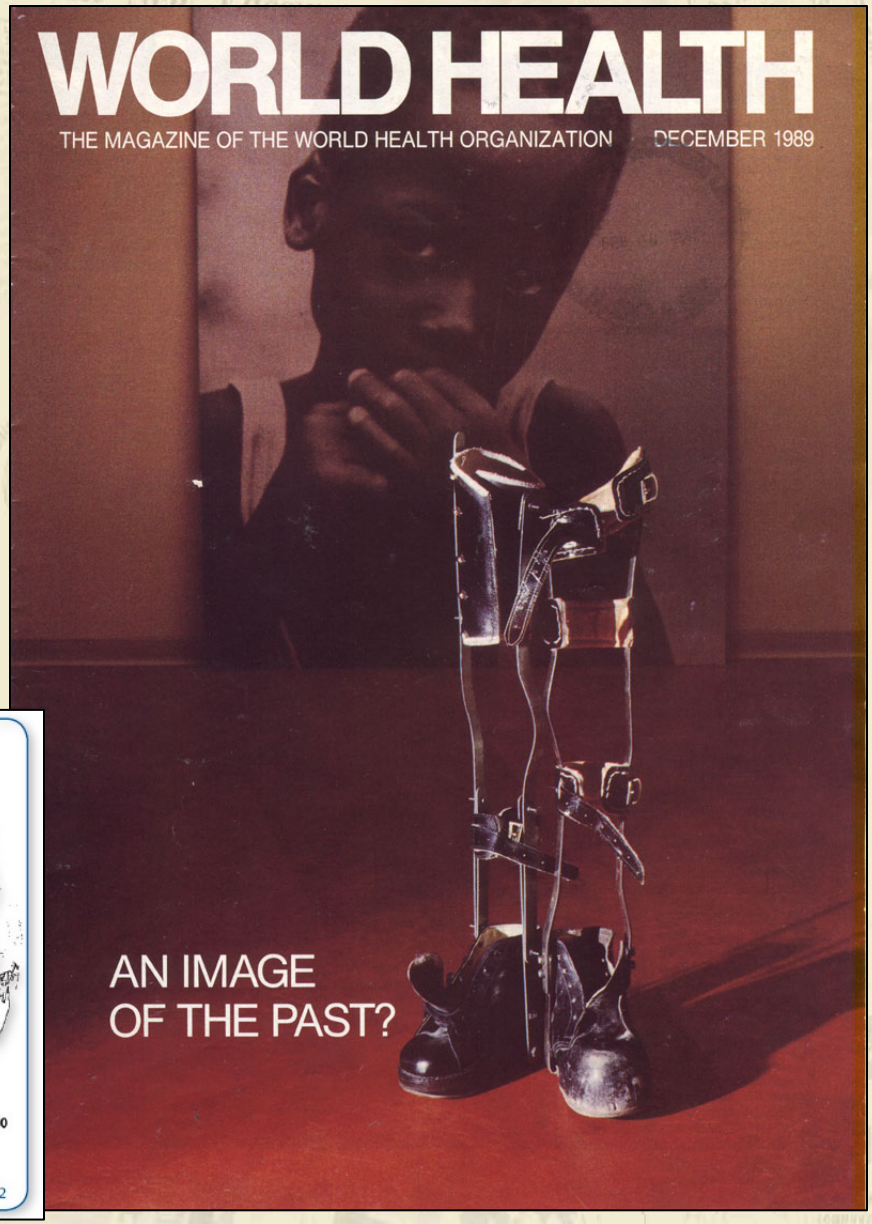


Polio's Persistence

- 1988 – Despite wide international use of both types of polio vaccine, the disease remained endemic in most of the world, with some 300,000 cases per year.

- While incredible progress has been made since the WHO's polio eradication program began in 1988 – thanks in large part to Rotary International and Canadian support - polio remains a persistent and expensive global threat if polio immunization levels lapse.



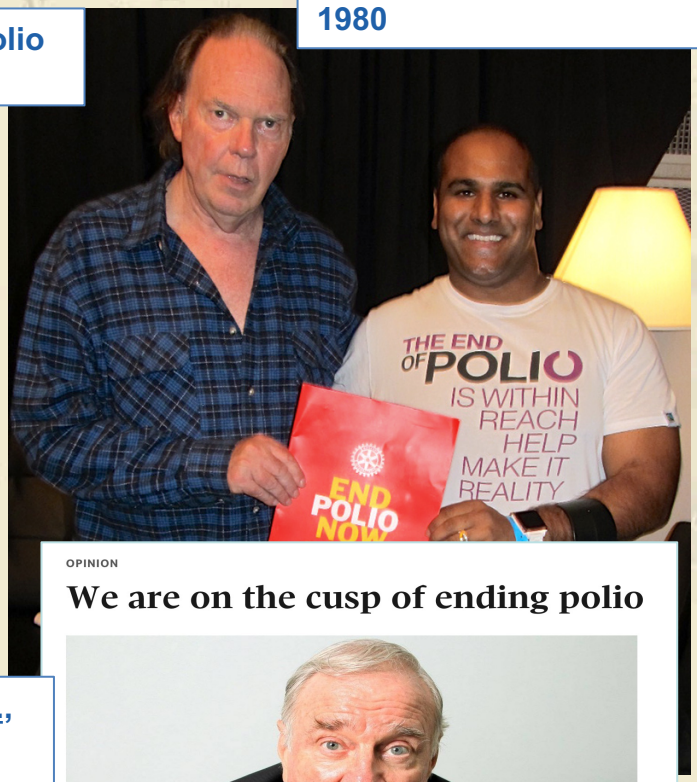


Polio Eradication:
Lessons & Legacies

- **Despite many setbacks and challenges, the Canadian government has remained a strong supporter of the polio eradication program; further supported by notable Canadians with direct polio experience, ie: Neil Young, Paul Martin, Jr. and Ramesh Ferris**
- **1985-2002 – Canada contributed $27.19 million**
- **2003-2005 - $102.53 million**
- **2006-2016 - $452 million**
- **June 2017 – Canada commits another $100 million over 3 years**

Neil Young, polio survivor, 1951

Ramesh Ferris, polio survivor, 1980



Paul Martin, Jr., polio survivor, 1946 ***(Paul Martin Sr., polio survivor 1907, later served as Minister National Health & Welfare, 1946-57, led Canadian polio vaccine introduction, 1954-55)***

OPINION

We are on the cusp of ending polio

Former prime minister Paul Martin

YVONNE BERG/THE GLOBE AND MAIL

PAUL MARTIN
CONTRIBUTED TO THE GLOBE AND MAIL
PUBLISHED OCTOBER 24, 2011
UPDATED APRIL 10, 2018

Few Canadians remember a time when polio struck children across the country at whim. Yet, it is important to remember that this devastating disease continues to cripple children in countries such as India, Afghanistan, Nigeria and Pakistan.

But on this World Polio Day, we are on the verge of an incredible opportunity: the eradication of polio. Over the past two decades, polio cases have decreased by 99 per cent, dropping from 350,000 cases each year to fewer than 1,500 cases in 2010. Now is our chance to finally eliminate polio so no child ever has to suffer from this [illegible] again. If we are successful, it would be a historic achievement. Finishing the [illegible]uld make polio only the second disease, after smallpox, to be eliminated.

***Globe & Mail*, Apr. 18, 2018**

Polio Eradication:
Lessons & Legacies

- **Indeed, Canada has been the 4th highest contributing nation to the polio eradication initiative; only below the US, UK and Germany**

- **1985-2019 - $600+ million total**

Twitter, Nov. 19, 2019

Tweet

You Retweeted

Development Canada
@CanadaDev

2.5+ billion children have been vaccinated through the Global Polio Eradication Initiative #GPEI – and 🇨🇦 has been there from the start.

Remarkable progress has been achieved, but the fight is not over. Even one case puts everyone at risk.

Together, let's #EndPolio.

Contributions and Pledges to the Global Polio Eradication Initiative, 1985-2019

All figures in USD million.

	1985-2002	2003-2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total for 1985-2019
G7 Countries & European Commission																	
USA[1,10]	694.80	396.180	132.40	133.05	133.50	133.20	133.80	133.53	150.79	150.59	205.00	217.78	228.00	233.00	235.00	-	3,310.62
United Kingdom[2]	354.88	254.630	59.74	56.87	42.67	37.71	24.65	107.84	63.15	177.91	83.52	101.53	53.62	88.73	66.40	43.53	1,617.38
Germany[3]	46.07	56.370	13.77	28.78	81.51	136.51	25.39	2.54	26.61	58.87	35.82	10.94	22.28	69.82	34.72	-	650.00
Canada[4]	27.19	102.533	42.45	9.07	32.56	29.27	29.63	23.96	40.52	77.39	35.93	37.48	41.94	25.67	43.12	1.93	600.64
Japan[5]	209.38	90.050	14.09	20.32	21.12	21.44	26.35	24.00	33.35	9.24	16.14	5.75	11.79	47.80	12.35	-	563.17
European Commission	27.74	89.980	28.18	37.27	8.22	0.90	1.05	23.21	7.39	3.05	10.87	12.63	-	16.11	17.18	-	283.78
Italy	4.30	7.230	1.39	11.00	11.79	2.10	1.35	0.60	-	-	-	-	-	5.55	2.41	-	47.72
France	-	23.820	12.80	-	-	2.65	-	-	-	-	-	-	-	-	-	-	39.27
Subtotal:	1,364.36	1,020.79	304.82	296.36	331.37	291.66	242.21	315.68	315.18	425.29	331.25	265.60	248.66	373.44	287.97	43.80	6458.44

http://polioeradication.org/financing/donors/historical-contributions/

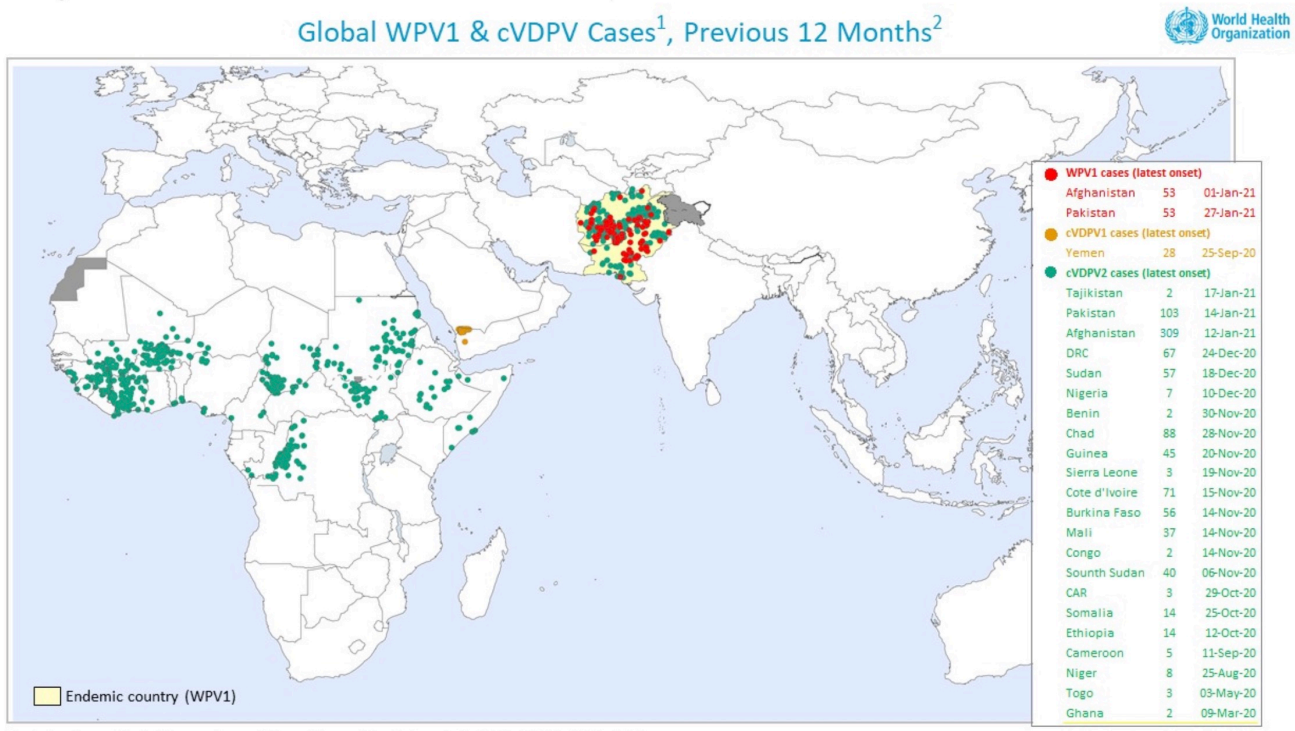
Current Global Polio Incidence (latest statistics)

Feb. 23, 2021

- **As wild poliovirus is eliminated, new challenges persist, such as circulating live vaccine virus and the risks of its reversion to virulence**
- **Today, more polio cases due to cVDPV than wild poliovirus**

Polio Now

A map showing the latest number of WPV1 and cVDPV cases in each affected country



[1]Excludes viruses detected from environmental surveillance; [2]Onset of paralysis: 24 Feb. 2020 to 23 Feb. 2021

Data in WHO HQ as of 23 Feb. 2021

http://polioeradication.org/polio-today/polio-now/

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Feb. 23, 2021

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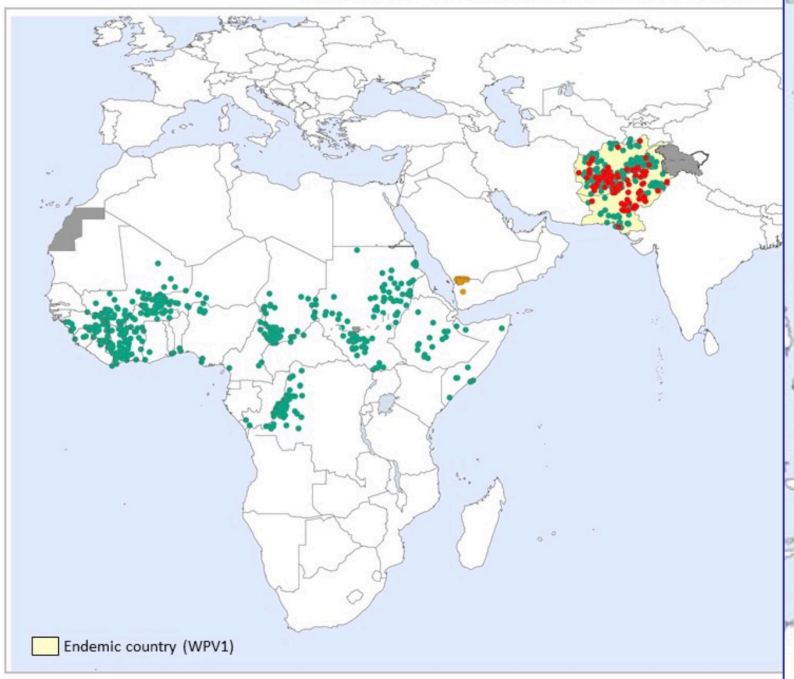
Global WPV1 & cVDPV Cases[1], Previous



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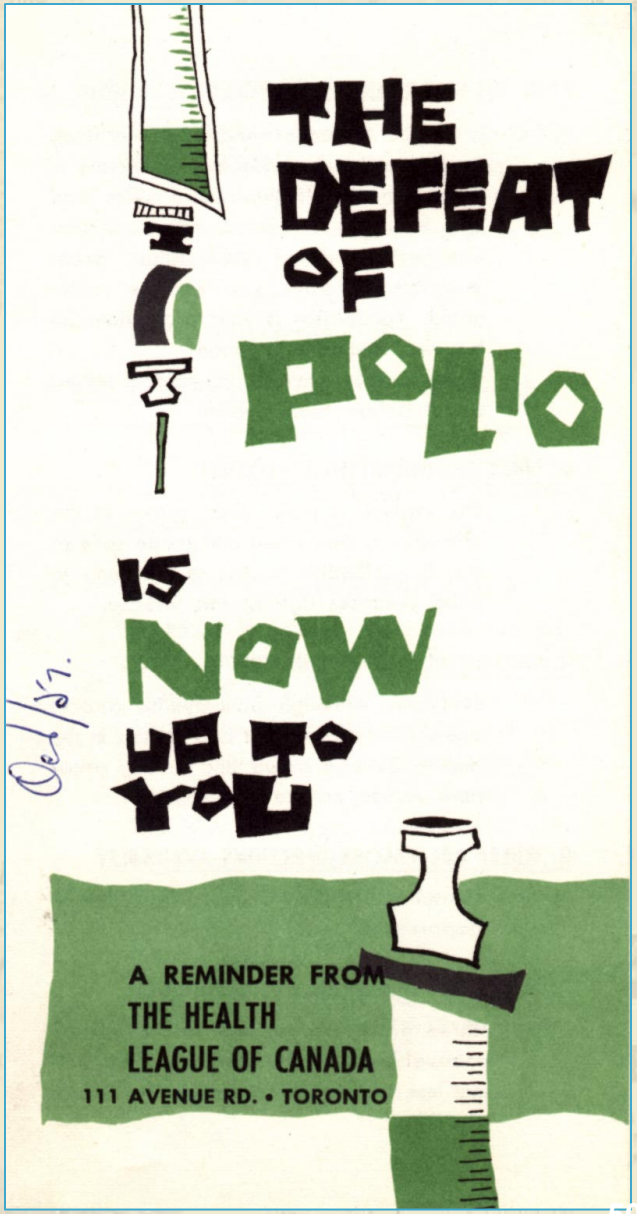
http://polioeradication.org/polio-today/polio-now

WPV1 cases (latest onset)		
Afghanistan	53	01-Jan-21
Pakistan	53	27-Jan-21
cVDPV1 cases (latest onset)		
Yemen	28	25-Sep-20
cVDPV2 cases (latest onset)		
Tajikistan	2	17-Jan-21
Pakistan	103	14-Jan-21
Afghanistan	309	12-Jan-21
DRC	67	24-Dec-20
Sudan	57	18-Dec-20
Nigeria	7	10-Dec-20
Benin	2	30-Nov-20
Chad	88	28-Nov-20
Guinea	45	20-Nov-20
Sierra Leone	3	19-Nov-20
Cote d'Ivoire	71	15-Nov-20
Burkina Faso	56	14-Nov-20
Mali	37	14-Nov-20
Congo	2	14-Nov-20
Sounth Sudan	40	06-Nov-20
CAR	3	29-Oct-20
Somalia	14	25-Oct-20
Ethiopia	14	12-Oct-20
Cameroon	5	11-Sep-20
Niger	8	25-Aug-20
Togo	3	03-May-20
Ghana	2	09-Mar-20

Conclusions: Canada's Polio Experience

- Polio was, and certainly remains, an enigma.
- Canada's polio experience was distinctive in it's severity, in how it helped shape Canada's public health system, and in the critical role Canadian science and biotechnology, played in understanding, controlling and ultimately eradicating "The Crippler."



Conclusions: Canada's Polio Experience

- **On many levels the polio epidemics and vaccine story resonates today in the COVID-19 pandemic**

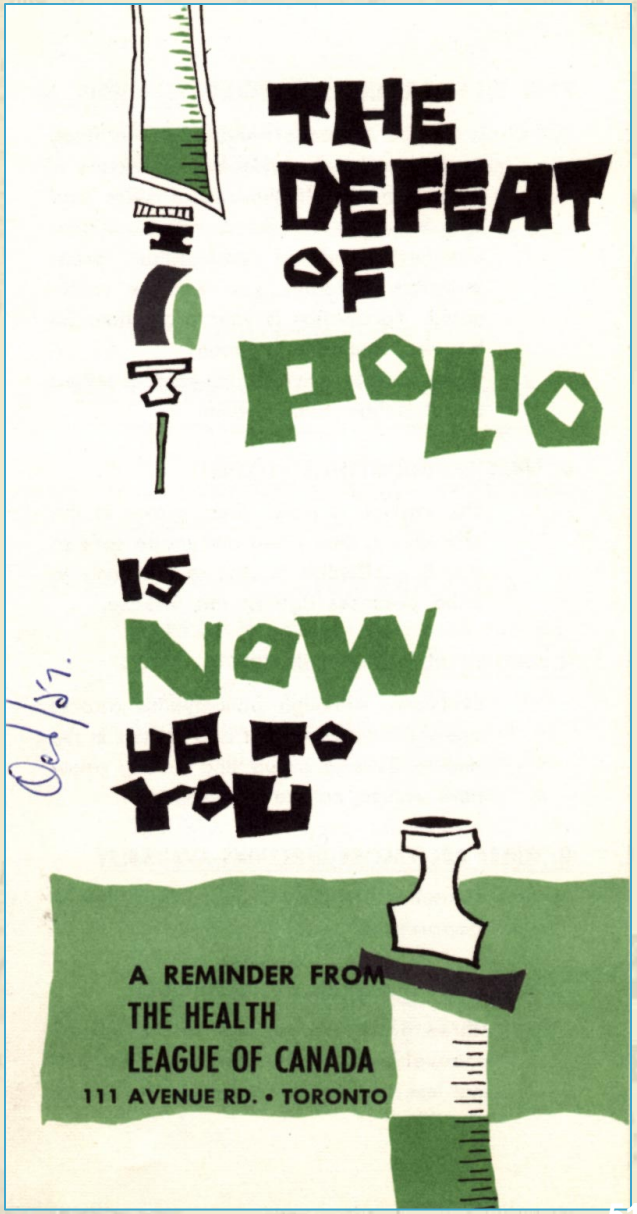
CORONAVIRUS | News

Looking back at Canada's polio epidemic through a COVID-19 lens

Alexandra Mae Jones CTVNews.ca writer
@AlexandraMaeJ | Contact

Published Friday, April 17, 2020 10:12PM EDT

Preparing poliovirus fluids in "Medium 199," Connaught Laboratories, 1953-54. (Sanofi Pasteur Canada / Museum of Healthcare)



Thank You

Direct any questions and comments to Christopher J. Rutty:
hhrs@healthheritageresearch.com

Also active via: http://twitter.com/cjrutty

Useful resources on the history of polio and polio vaccines in Canada:

- **http://www.museumofhealthcare.ca/explore/exhibits/vaccinations/polio.html**
- **http://connaught.research.utoronto.ca/history/ (Articles #7 & #8)**