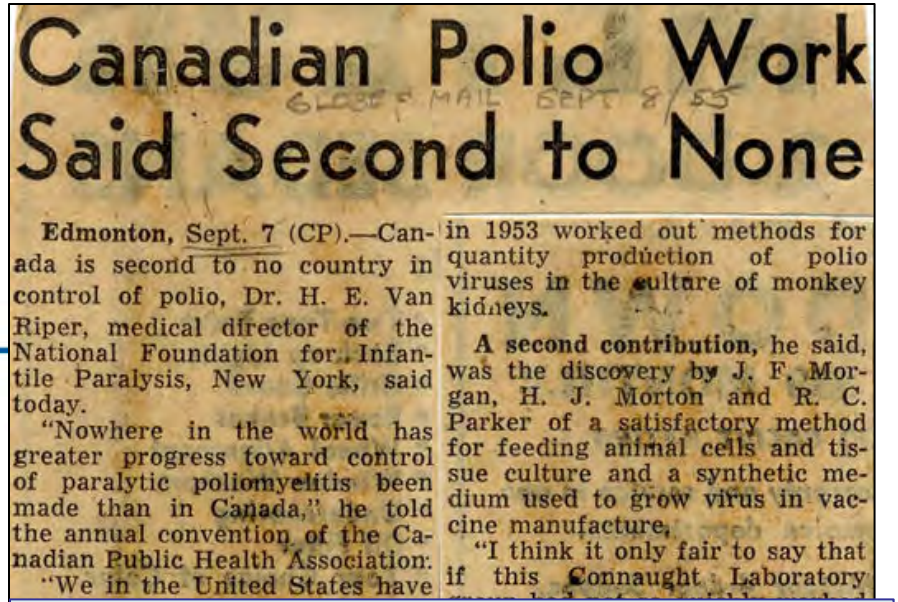


Canadian Polio Work Said Second to None

GLOBE & MAIL SEPT 8/53

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 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

The Middle-Class Plague: Canada, the Polio Years & COVID-19 Links

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 Guelph Trillium

October 21, 2020

Via Zoom

Oct. 1937

THE HORIZON

ARCHIVES
THE HOSPITAL FOR SICK CHILDREN

973.38.1

"IRON LUNGS" SAVE CHILDREN'S LIVES

One of the 28 "Iron Lungs" made at the Hospital for Sick Children, Toronto, for use in the infantile paralysis epidemic.

VOL. 2
NO. 6

OCTOBER, 1937

PRICE
10 CENTS

Linking the Polio Years to COVID-19 Pandemic & Beyond

- As the COVID-19 pandemic has grown, I've been asked by various media organizations to provide some historical perspectives

- Initial interest in comparing the great 1918 "Spanish" influenza pandemic with COVID-19

- But, as I'll highlight here, the closer comparison is with the polio epidemic years of the 1910s through 1950s, particularly in Canada

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)

SHARE 2K

TORONTO – As COVID-19 spreads across the world, causing shutdowns, economic strife and widespread fear, many are looking back at how Canada handled a similar crisis: waves of polio outbreaks that peaked in the mid-20th century.

Although polio is significantly different from the novel coronavirus, some of the similarities between the two outbreaks, especially when looking at the height of the polio issue in Canada, are striking.

Polio was thought to only affect a specific age group at first, but then spread to infect patients of all ages.

LIVE COVERAGE
CTV NEWS.CA
WATCH LIVE UPDATES

COMING UP on July 22
11:30 a.m. ET: Ont. NDP Leader Horwath speaks
2:00 p.m. ET: Toronto health officials give COVID-19 update
3:30 p.m. ET: B.C. announces new child care spaces

CTV News' 24-hour news channels, CTV News Channel and CP24, are now available for a limited time through participating TV service providers.
CTV News is also making our live local newscasts widely available online for a limited time.

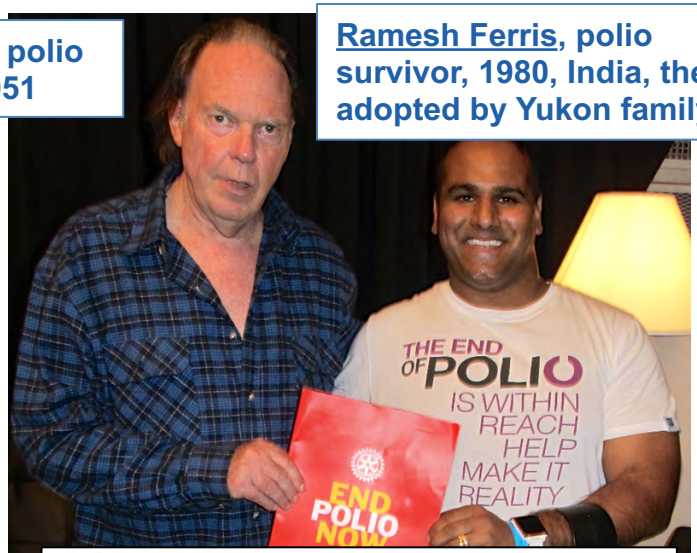
- There are also close echoes between the polio vaccine development story and the urgent efforts to develop COVID-19 vaccines

Polio Eradication: *Canadian Leadership*

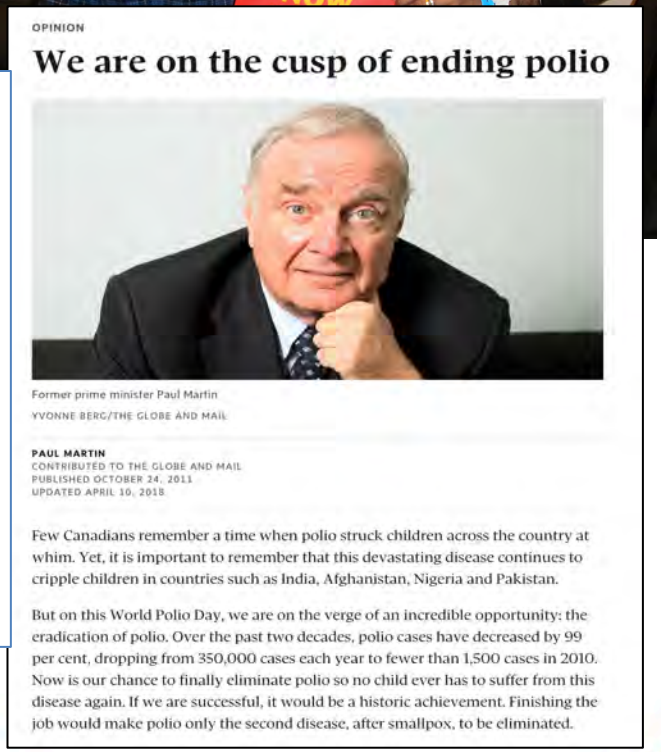
- The Canadian government – and Canadian Rotarians – have remained strong supporters of the polio eradication program from the beginning; further supported by notable Canadians with direct polio experience, ie: Neil Young, Paul Martin, Jr. and Ramesh Ferris
- 1985-2002 – Canada contributed $27.19 million
- 2003-2005 - $102.53 million
- 2006-2016 - $452 million
- June 2017 - $100 million over 3 years

Neil Young, polio survivor, 1951

Ramesh Ferris, polio survivor, 1980, India, then adopted by Yukon family



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 disease again. If we are successful, it would be a historic achievement. Finishing the job would make polio only the second disease, after smallpox, to be eliminated.

Polio Eradication: *Canadian Leadership*

- **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**

- **As this presentation will highlight, Canada's polio legacy actually runs much deeper in time and in its national and global impact…**

Twitter, Nov. 19, 2019

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/

Polio Eradication:
Canadian Leadership

- **Canada's historic polio legacy was highlighted at the Rotary International Convention in Toronto in June 2018**

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")
- **Polio's clinical variability a common feature with COVID-19**
- 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

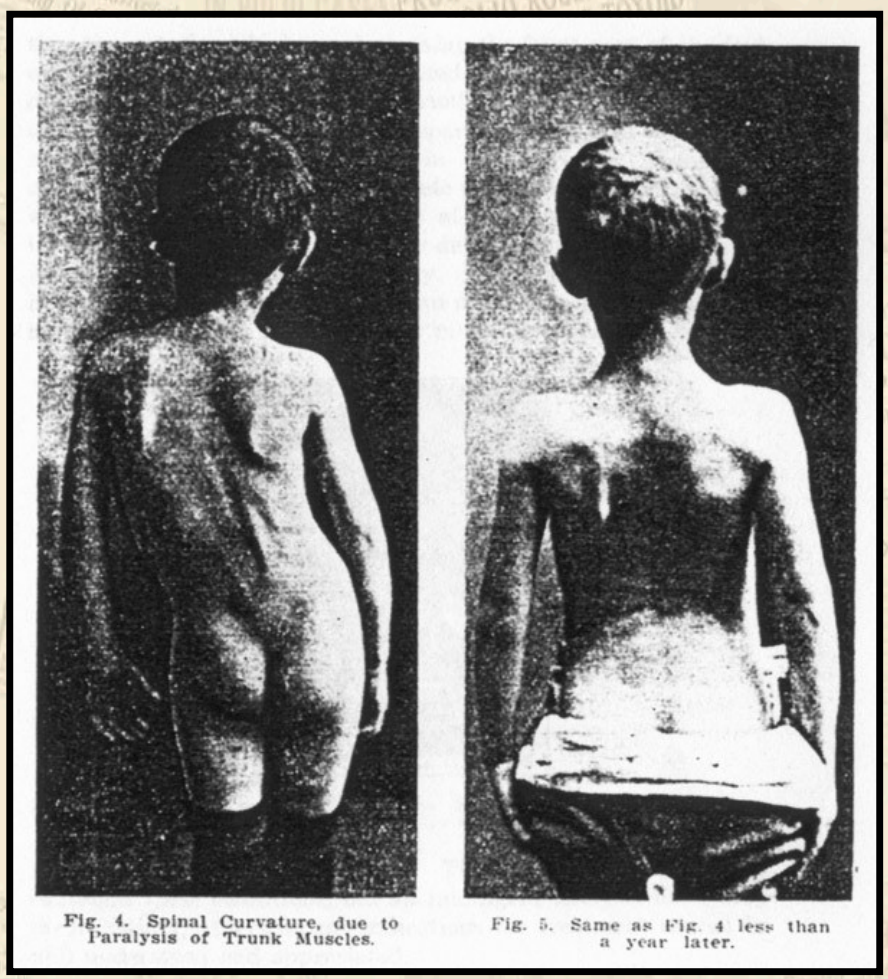


Fig. 4. Spinal Curvature, due to Paralysis of Trunk Muscles.

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

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

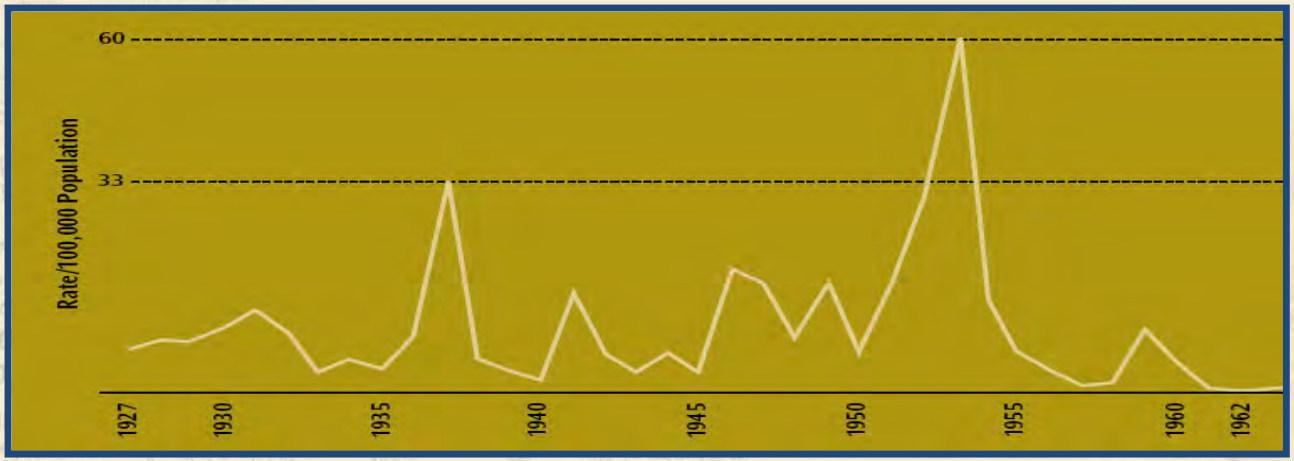
- The global experience with the COVID-19 pandemic over the past 8 months echoes a variety of the public health and clinical challenges of polio that unfolded, particularly in Canada, over some 50 years of worsening epidemics

Polio: “The Middle-Class Plague”

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

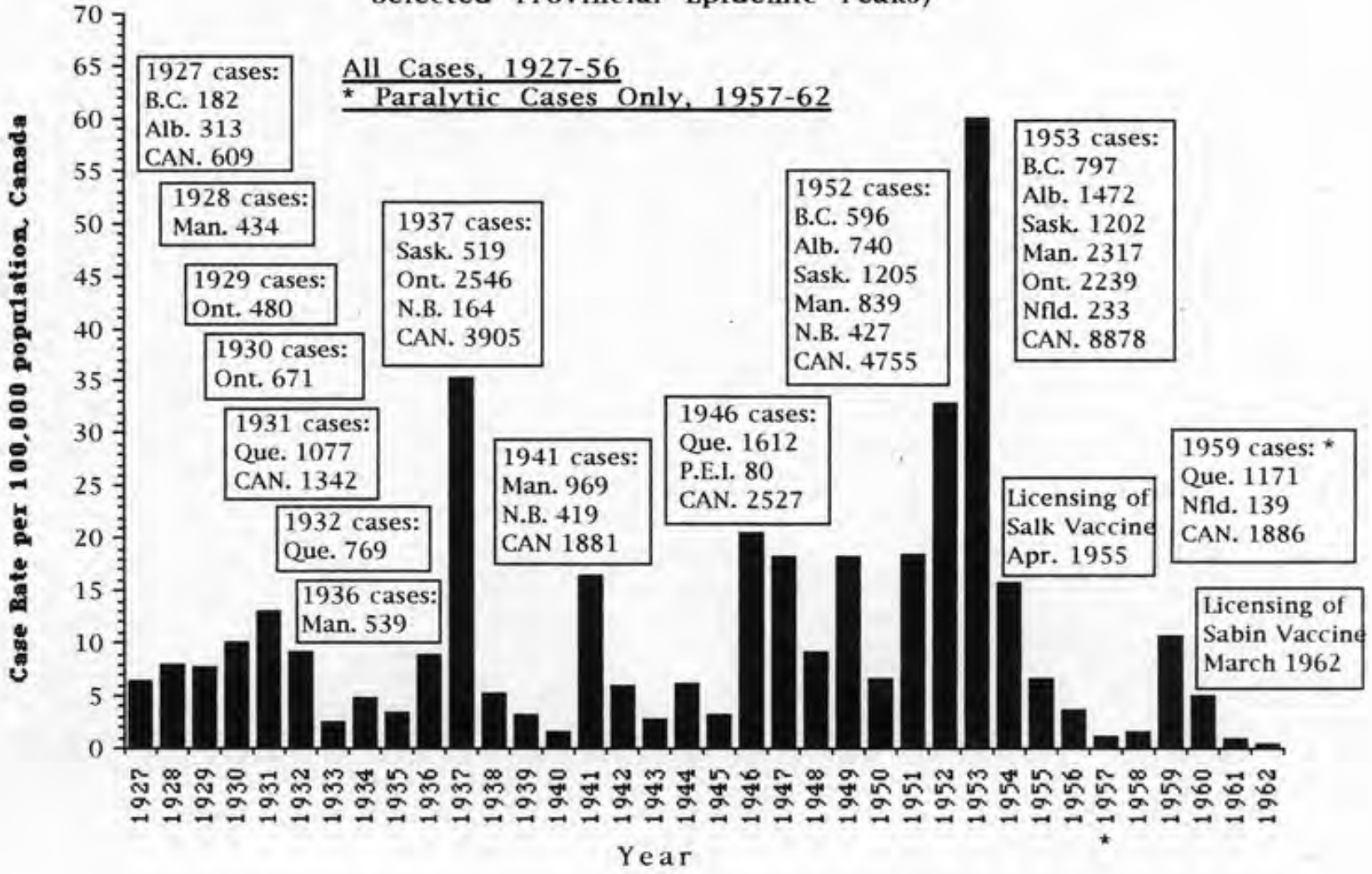
- Some 50,000 Canadians, mostly children, were affected by paralytic polio between 1927 and 1962

- 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"

- 1860s-80s – First reports of "infantile paralysis" outbreaks in Europe; not clear if disease contagious
- 1874 – "Poliomyelitis" scientific name given (inflammation of grey matter in spinal cord)
- 1880s-90s – First polio outbreaks in North America
- 1908 – Isolation of poliovirus in laboratory monkeys

***Journal of Experimental Medicine*, March 1910**

EXPERIMENTAL EPIDEMIC POLIOMYELITIS IN MONKEYS.[1]

By SIMON FLEXNER and PAUL A. LEWIS.

(*From the Laboratories of the Rockefeller Institute for Medical Research, New York.*)

PLATES XVIII AND XIX.

INTRODUCTION.

Epidemic poliomyelitis has become, in the past decade, a world-wide disease. The present state of our knowledge of the epidemic spread of poliomyelitis, up to the outbreaks in Europe and America since 1907, is well given in Wickman's[2] monograph. That epidemic poliomyelitis is an infectious disease is clearly pointed out by Medin,[3] although, at an earlier date, Cordier[4] gave it as his belief that it is a contagious disease. The most convincing evidence of the contagiousness of epidemic poliomyelitis is supplied by Wickman's[5] studies of several Swedish epidemics.

Up to the present time there has existed no convincing knowledge of the nature of the agent causing epidemic poliomyelitis. Various bacteria and especially certain cocci[6] have from time to time been isolated in cultures from fluids obtained by lumbar puncture from patients suffering from epidemic poliomyelitis, or from specimens of the central nervous system removed at autopsy. These bacteria did not conform to one species or group of microörganisms and did not suffice to set up poliomyelitis in animals. They can be accounted for more satisfactorily as contaminations or secondarily invading bacteria than as the cause of the disease.

[1] Received for publication January 3, 1910.

[2] Wickman, Beiträge zur Kenntniss der Heine-Medinschen Krankheit, Berlin, 1907.

[3] Medin, Verhand. des x Internat. Med. Congresses, Berlin, 1890, ii, 37.

[4] Cordier, cited by Medin, *Lyon médical*, 1888, lvii, 5, 48.

[5] Wickman, *op. cit.*

[6] Geirsvold, *Norsk Magazin f. Laegevid*, 1905, iii, 1280 (cited by Harbitz and Scheel).

Polio: "The Middle-Class Plague"

- 1890s - First outbreaks in North America
- 1910 – Polio incidence increased, striking localized parts of Canada

- While most cases were children under 4, there were several adult victims, and it was not a "new disease" at all
- Large outbreaks and epidemics of "infantile paralysis" were new, including in the U.S. and in Europe

Toronto Star, Aug 17, 1910

CHILDREN ARE ATTACKED BY STRANGE EPIDEMIC

Twenty Cases of Fever and Infantile Paralysis—Once Swept Over the States.

Special to The Star.

Hamilton, Ont., Aug. 17.—An epidemic of poliomyelitis, or infantile paralysis, a comparatively new disease, which is attracting much interest among medical men the world over, has broken out here.

A score of cases have been reported to the Health Department, and the disease seems to be spreading. It was first noticed three or four weeks ago when a little girl, supposed to be suffering from hydrophobia, was taken to the hospital, where she died. It was later discovered she was a victim of infantile paralysis.

The disease generally begins with a high fever and then the patient is suddenly stricken with paralysis.

While most of the cases here are children under four years of age, two or three adults are victims.

Some years ago the disease swept over a portion of the States, claiming victims by the hundreds.

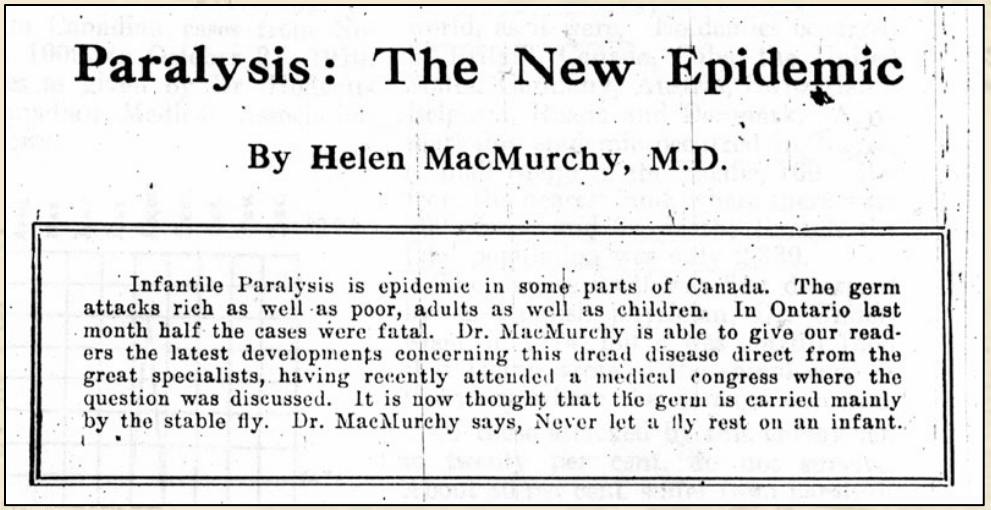
Polio: "The Middle-Class Plague"

- 1890s - First outbreaks in North America

- 1910 – Polio incidence increased, striking localized parts of Canada

Dominion of Canada:	
Ontario	354
Quebec	187
British Columbia	48
Alberta	27
Manitoba	17
New Brunswick	12
Saskatchewan	6
Nova Scotia	6
Prince Edward Island	1
	658

- "1910 was in a terrible sense a 'wonder year' for epidemic poliomyelitis. In that year it appeared all over the world," as stressed in a 1912 *Maclean's* article
- It was also clear that most polio victims were "not among the poor, or delicate," and yet its cause was very much unclear



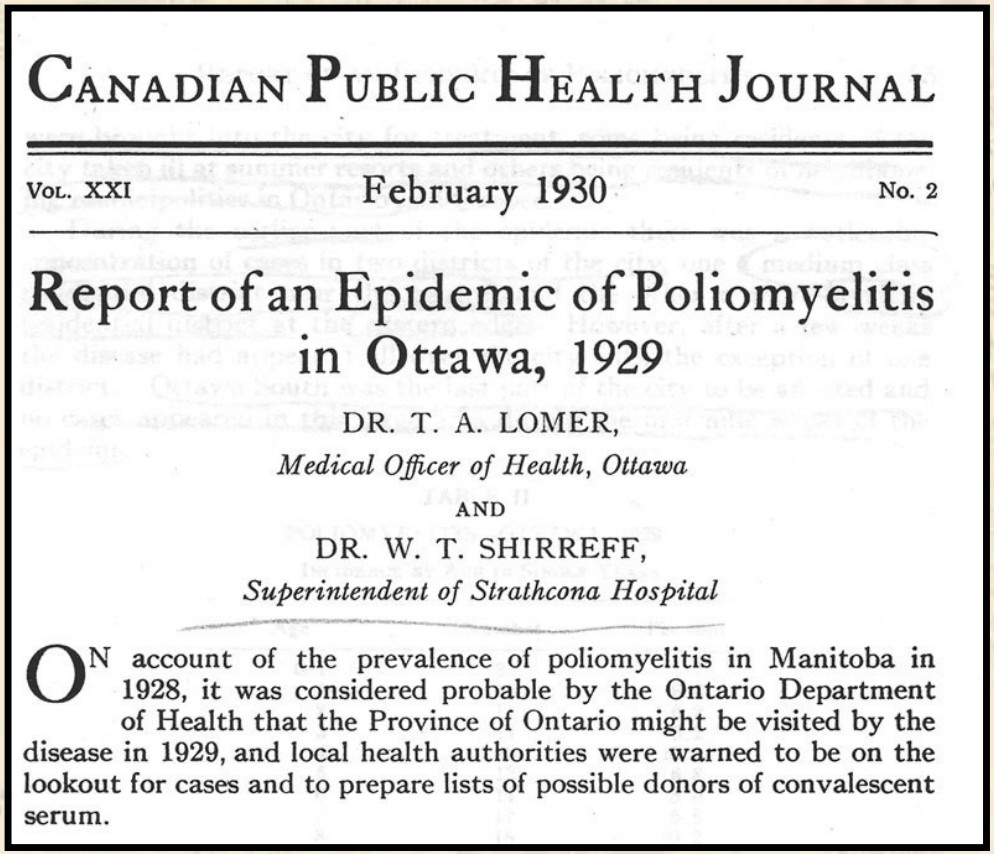
Paralysis: The New Epidemic

By Helen MacMurchy, M.D.

Infantile Paralysis is epidemic in some parts of Canada. The germ attacks rich as well as poor, adults as well as children. In Ontario last month half the cases were fatal. Dr. MacMurchy is able to give our readers the latest developments concerning this dread disease direct from the great specialists, having recently attended a medical congress where the question was discussed. It is now thought that the germ is carried mainly by the stable fly. Dr. MacMurchy says, Never let a fly rest on an infant.

Polio: "The Middle-Class Plague"

- 1890s - First outbreaks in North America
- 1910 – Polio incidence increased, striking localized parts of Canada
- 1927 - BC and Alberta hit with first widespread epidemic
- The disease marched eastwards
  - 1928 Manitoba
  - 1929 & 1930 Ontario
  - 1931 & 1932 Quebec



CANADIAN PUBLIC HEALTH JOURNAL

VOL. XXI February 1930 No. 2

Report of an Epidemic of Poliomyelitis in Ottawa, 1929

DR. T. A. LOMER,
Medical Officer of Health, Ottawa
AND
DR. W. T. SHIRREFF,
Superintendent of Strathcona Hospital

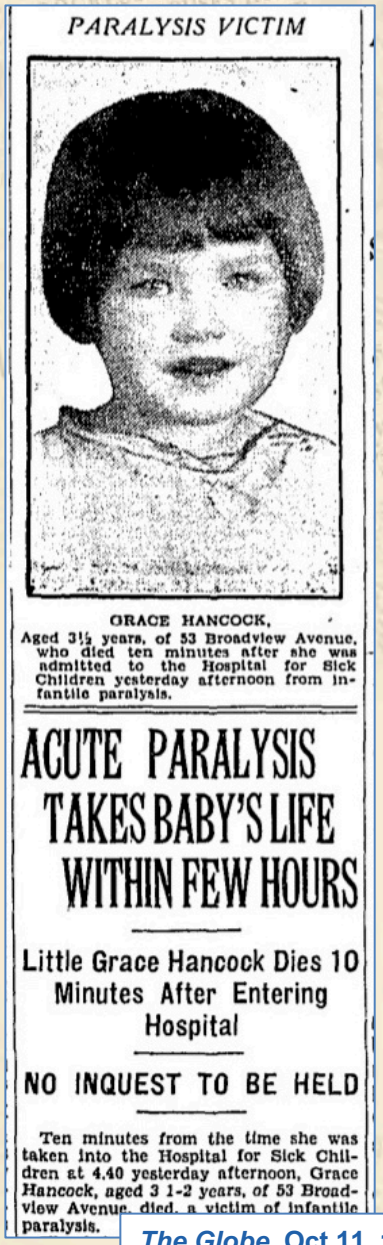
ON account of the prevalence of poliomyelitis in Manitoba in 1928, it was considered probable by the Ontario Department of Health that the Province of Ontario might be visited by the disease in 1929, and local health authorities were warned to be on the lookout for cases and to prepare lists of possible donors of convalescent serum.

Polio: "The Middle-Class Plague"

- Alarming were tragic stories of deaths due to polio, such as a 3-year-old Toronto girl dying of polio 10 minutes after arriving at the Hospital for Sick Children, most likely of paralysis of the chest muscles, fatally impairing breathing

- The hospital would get an iron lung in 1930 (the first in the country), but there was no time for this young girl to get to it

- Impairment of breathing causing death is a common feature between polio and COVID-19, although the age of the principle victim of each disease was at opposite ends of the age spectrum; over time polio victims shifted to older ages, while COVID-19 victims have shifted to younger ages



PARALYSIS VICTIM

GRACE HANCOCK,
Aged 3½ years, of 53 Broadview Avenue, who died ten minutes after she was admitted to the Hospital for Sick Children yesterday afternoon from infantile paralysis.

ACUTE PARALYSIS TAKES BABY'S LIFE WITHIN FEW HOURS

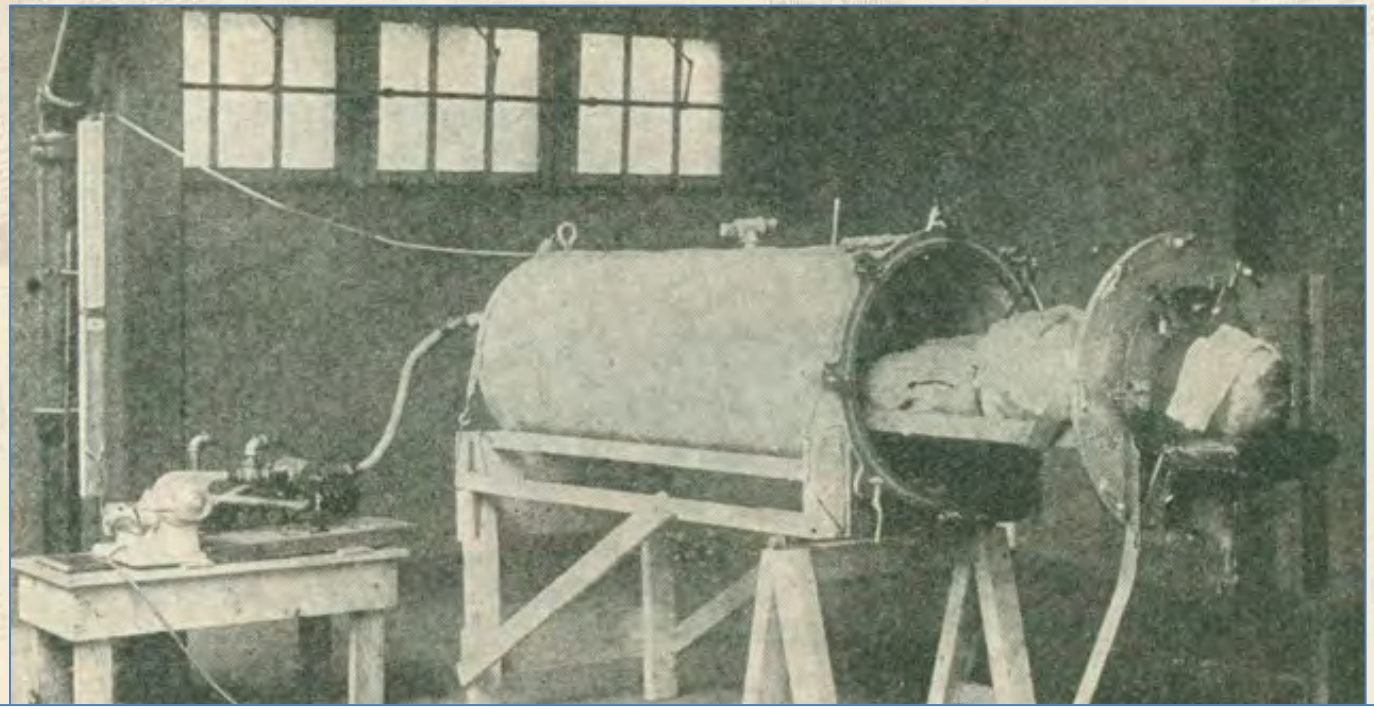
Little Grace Hancock Dies 10 Minutes After Entering Hospital

NO INQUEST TO BE HELD

Ten minutes from the time she was taken into the Hospital for Sick Children at 4.40 yesterday afternoon, Grace Hancock, aged 3 1-2 years, of 53 Broadview Avenue, died, a victim of infantile paralysis.

The Globe, Oct 11, 1930, p. 13

Polio: "The Middle-Class Plague"



- **1928 - The first "iron lung" for polio treatment developed at Harvard University**
- **Essentially a metal tank into which all but the head of the patient was sealed. A motor, or hand crank, operated a set of bellows and the negative and positive pressure inside the iron lung forced the patient's lungs to expand and contract to enable breathing**

- **In contrast, in severe COVID-19 cases in which the virus attacks the lungs to impair breathing, the ventilator provides oxygen directly into the lungs**

Polio Epidemic: Ontario, 1937

- 4,000 cases reported nationally
- Second worst polio epidemic in Canadian history
- In Ontario:
  - 2,546 cases (750 in Toronto)
  - 119 deaths (31 in Toronto)
  - Ontario Department of Health in crisis mode
  - Convalescent serum & standardized splints provided to all cases
  - Definitive trial of a hopeful preventive nasal spray in Toronto; no effect

Hospital for Sick Children Archives

ONTARIO

A Statement by the Ontario Department of Health on

POLIOMYELITIS

("INFANTILE PARALYSIS")

In view of the prevalence of "infantile paralysis" in Ontario at the present time, and in recognition of the deep concern felt by parents over the protection of their children, the Provincial Department of Health is issuing the following statement concerning the nature of the disease and the question of what can be done to reduce the danger of infection.

Nature of the Disease

Like measles and scarlet fever, "infantile paralysis" is a communicable or "catching" disease. Like them also, it is mainly a disease of childhood. Yet the term "infantile" is apt to be misleading. While it is true that the majority of cases occur among children under ten years of age, the disease does occur, especially in rural districts, among older children and young adults.

The term "paralysis" is likewise misleading since it conveys the impression that some loss of muscular function is characteristic of every case of the disease. This is not true. It is now known that only a small proportion of those who contract the disease actually develop paralysis.

Since the disease is not limited to infants and since paralysis does not occur in all cases, the name "infantile paralysis" is now regarded as a misnomer. The correct name for the disease is "polio-myel-itis", which simply means acute inflammation ("itis") of the grey matter ("polio") of special portions of the spinal cord which control movement of the muscles. This inflammation is believed to be due to a special sort of infection which probably gains entrance to the nervous system through the upper part of the nose and throat.

Cause of the Disease

Poliomyelitis has been definitely recognized as a communicable disease since 1909 when investigators succeeded in securing from humans, ill with the disease, a minute living substance called a "virus" which was found to be capable of producing poliomyelitis in monkeys.

Much remains to be discovered about the nature of this virus but a good deal has already been learned. In size, it has been found to be less than one millionth of an inch in diameter. The virus is present in the nervous tissue of humans who have died from the disease. It is also found in the nose and throat, not only of persons ill with the disease, but also of persons who have been in contact with the disease.

How the Disease Spreads

The exact manner in which the disease is transmitted from one person to another is not known. However, the disease does not arise spontaneously. The source of infection is a human being who is carrying the virus. Such a person need not necessarily be suffering from the disease. Yet the mere presence of the virus in the nose and throat affords ample opportunity for spread of infection. In such cases minute particles are given off by coughing, sneezing and talking. Fingers are constantly being carried to and from the mouth and nose and in this way articles, such as improperly washed eating and drinking utensils, common towels, children's toys, etc., may become contaminated.

Any set of circumstances which permits the frequent and rapid transfer of nose and throat secretions from one person to another increases the possibility of infection.

There is no evidence that flies or other insects play an important part in the spread of poliomyelitis.

Chlorination of municipal water supplies as now practised, and the proper pasteurization of milk have eliminated water and milk as possible sources of infection.

Signs and Symptoms of the Disease

The early symptoms of poliomyelitis are neither constant nor regular in their appearance, but certain of them are sufficiently suggestive to warrant the summoning of the family physician.

The onset is usually sudden, with rapidly rising TEMPERATURE, fluctuating between 101-103 degrees. HEADACHE is another common symptom. The young child is apt to appear irritable and cries easily when disturbed. The patient is usually willing to stay in bed, appears drowsy and takes little interest in his surroundings.

VOMITING is fairly characteristic. Constipation is often present, whereas diarrhoea is unusual. Food is refused.

Often the characteristic symptoms of COLD or SORE THROAT are present.

SORENESS IN THE MUSCLES of the back and STIFFNESS and pain in the joints of the arms and legs may occur.

In many cases of poliomyelitis the condition does not go beyond this stage, and terminates after four to ten days' illness.

However, in other cases, the disease proceeds into a second stage, in which the elevation of temperature and rapid pulse are accompanied by marked irritability and drowsiness. The patient becomes mentally disturbed and takes on an anxious, freightened expression. Sleep may be disturbed by twitching and the hands may shake and tremble.

The following specific signs are of particular importance: STIFFNESS OF THE SPINE. The head may be bent on the neck but efforts to bend the neck on the shoulders cause pain and are resisted. The child is unable, while sitting up in bed, to bend his head down to touch the knees. If he bends at all, it is at the hips with the back held rigid.

PECULIAR SITTING POSTURE. When he sits up he props himself behind with extended arms supporting a tender or painful spine.

Preventive Measures

The precautionary measure of first importance is to protect the child from contact with infection. Since other human beings are the primary source of infection, then children, who are evidently much more susceptible than adults, should be protected as far as is reasonably possible from contact with people.

"Keep your child in your own yard" is a wise precaution. In crowded stores, street cars, motion picture theatres, bathing pools, picnics,—in fact, in any setting where there is a large number of people, the chances of exposure to possible infection are tremendously increased.

Of equal importance for the protection of children is the prompt calling of a physician if the child shows the indications of illness described above.

Convalescent Serum

Medical opinion is divided concerning the effectiveness of the so-called "Convalescent Serum" in poliomyelitis. In the absence of conclusive evidence, the Department is continuing to supply this serum to physicians on request. Owing to the limited supply available, its use must of necessity be limited to cases suffering an attack of the disease.

Nasal Spray

Based on the assumption that the virus enters the body through the upper part of the nose, attempts are being made to prevent its entrance by spraying the nasal passages with certain chemicals. Since this method is still entirely in the experimental stage, it is not one which can be recommended for general use.

Precautions in the Care of Those Ill

When a diagnosis of poliomyelitis has been made, the patient must be isolated for a period of at least three weeks. Since other members of the family are likely to be carriers of the virus, the protection of the community requires that they be quarantined until the danger of further spread has been eliminated. Care should be taken to see that articles which may have become contaminated by the patient are disinfected or burned. Special precautions should be taken in regard to the disposal of nasal and alimentary discharges. Those who are handling the patient should exercise special care regarding their hands and person before coming in contact with other people.

MINISTER OF HEALTH

Polio Epidemic: Ontario, 1937

"IRON LUNG" KEEPS PARALYSIS VICTIM ALIVE

Victim of an attack of infantile paralysis, the extent of which nobody yet knows, the life of 11-year-old Joyce McKercher of Weston ltd. is entirely dependent on the "iron lung" at the Hospital for Sick Children (2) for life. Saturday she was taken ill and rushed to the hospital in the nick of time after the paralysis was found to have settled in her lungs. The machine must operate without cessation and indefinitely if the auburn-haired schoolgirl is to live. Turning his camera upside down, a Star photographer got a close-up view (1) of the little girl who must be attended (3) night and day. Joyce will be 12 next Monday.

GIRL, 11, IN AN "IRON LUNG" IS FIGHTING FOR HER LIFE

Joyce McKercher Tells Star She Feels "A Little Better"

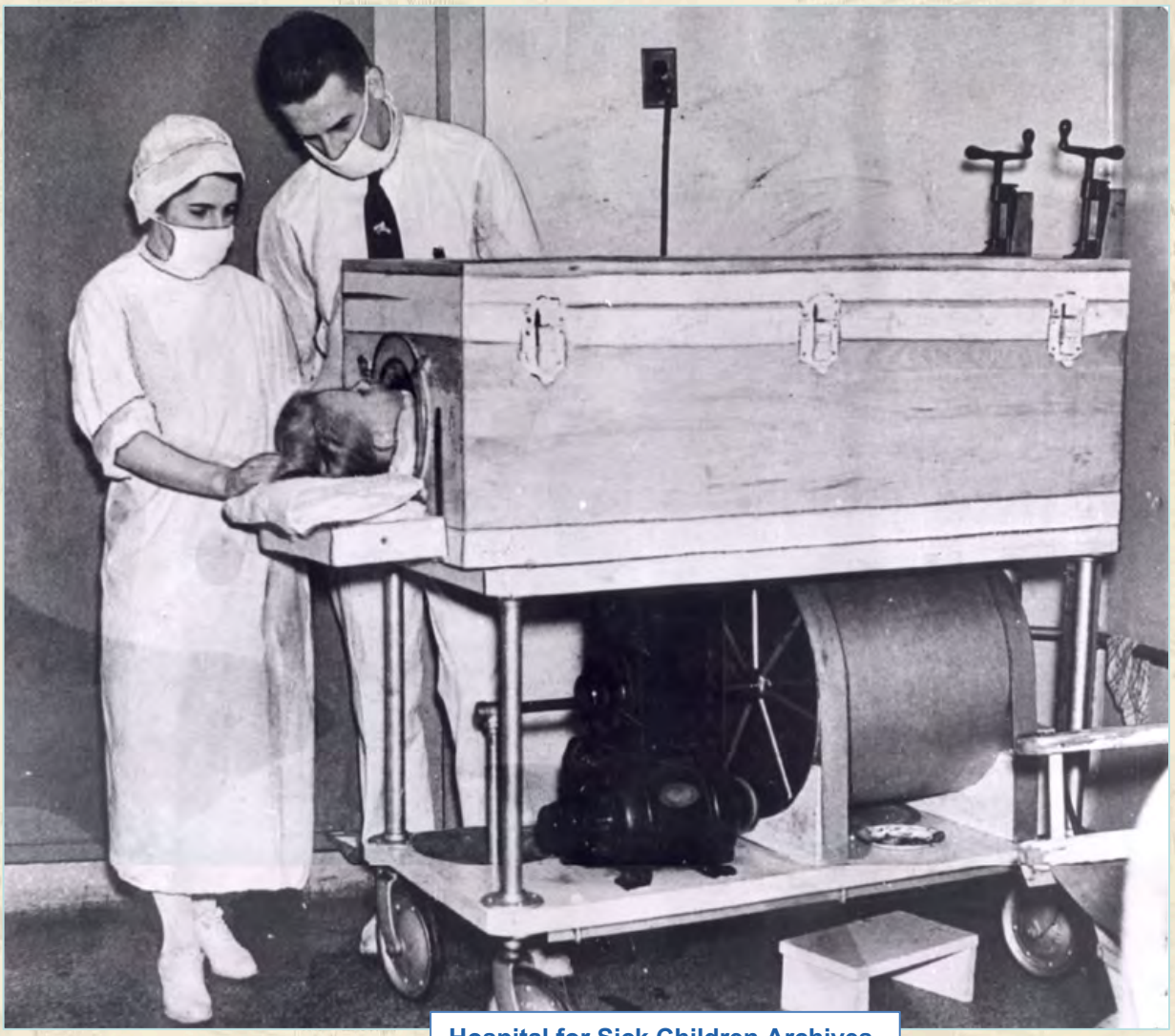
PRAY ON VERANDA

Fighting for her life in the only "iron lung" in Toronto, 11-year-old Joyce McKercher lay in the infectious disease ward of the Hospital for Sick Children to-day, and as the pulsating, rumbling metal cylinder forced air into her lungs

- **Most alarming was the sharply higher numbers of severe and life-threatening cases with weakness or paralysis of muscles that control breathing and swallowing**
- **When the epidemic started, the Hospital for Sick Children had the only iron lung in the country, which was soon in use when an 11-year-old girl needed it**

Polio Epidemic: Ontario, 1937

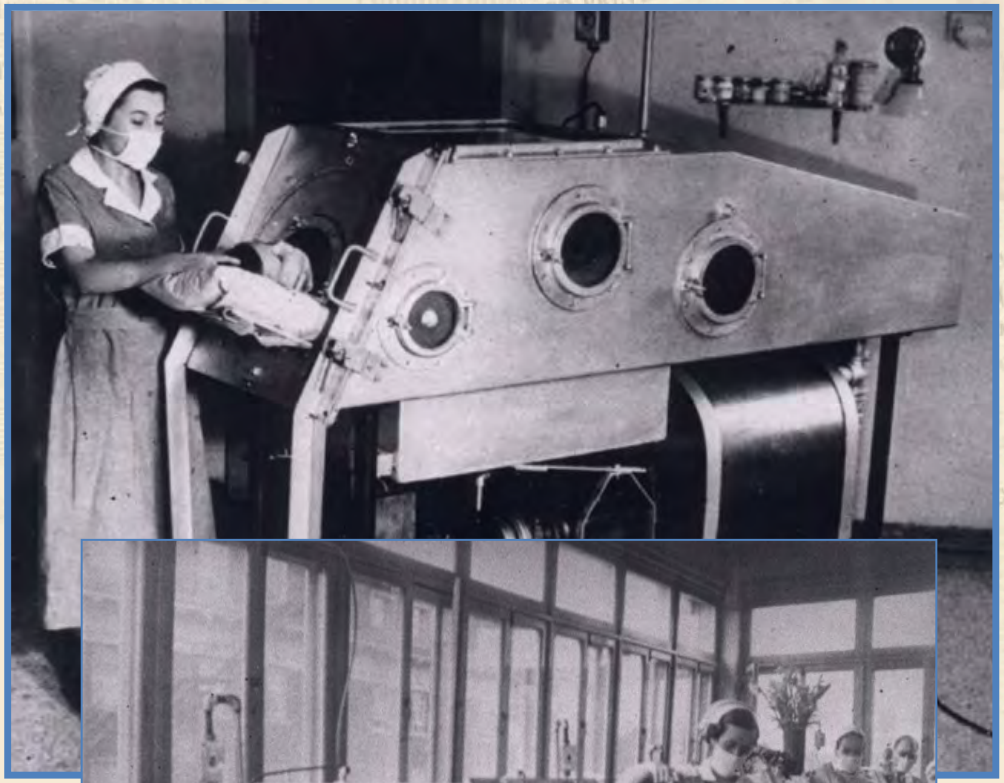
- When a young boy arrived at HSC with respiratory weakness and the iron lung was still occupied, hospital staff scrambled and were able to assemble a “wooden lung” that saved his life



Hospital for Sick Children Archives

Polio Epidemic: Ontario, 1937

- Fearful of many more such cases, this effort was followed by the construction of 27 iron lungs in the basement of HSC, paid for by the Ontario Department of Health; some iron lungs distributed elsewhere in the province, and beyond.



Hospital for Sick Children Archives

Rotary Club - 29/4/38

PRESIDENT JIM - CHAIRMAN VINCE - HONOURED GUESTS AND FELLOW ROTARIANS

THANKS TO ROTARY CLUB

While the title of this talk is announced in the Rotary Voice as the "Iron Lung and It's Uses", I do not want this opportunity, with which I have been honoured, to pass without saying how much the Board of Trustees, Officer and Professional Staff of the Hospital appreciates the magnificient interest and financial support which the Rotary Club of Toronto and the Crippled Childrens Committee in particular have taken in the work of crippled children.

As the work of the Hospital has grown from year to year, the Crippled Childrens Committee of the Club has kept abreast of the demands made upon it, and without their help the Hospital would find it difficult to finance the supplying of the many braces, appliances and shoes for crippled children that are treated and examined by our doctors each year.

ONLY ONE MACHINE AVAILABLE

As to the Iron Lungs, which were designed and built by the Hospital during a very short period late last summer, I will tell you in a few words the nature of the circumstances which led to the necessity of this work. (Dr Drinker)

Back in 1930 the Hospital for Sick Children purchased, through the University, the first Iron Lung that came into Canada, and as far as I know it was the only device of the kind available in the Province until last summer. Early in August of last

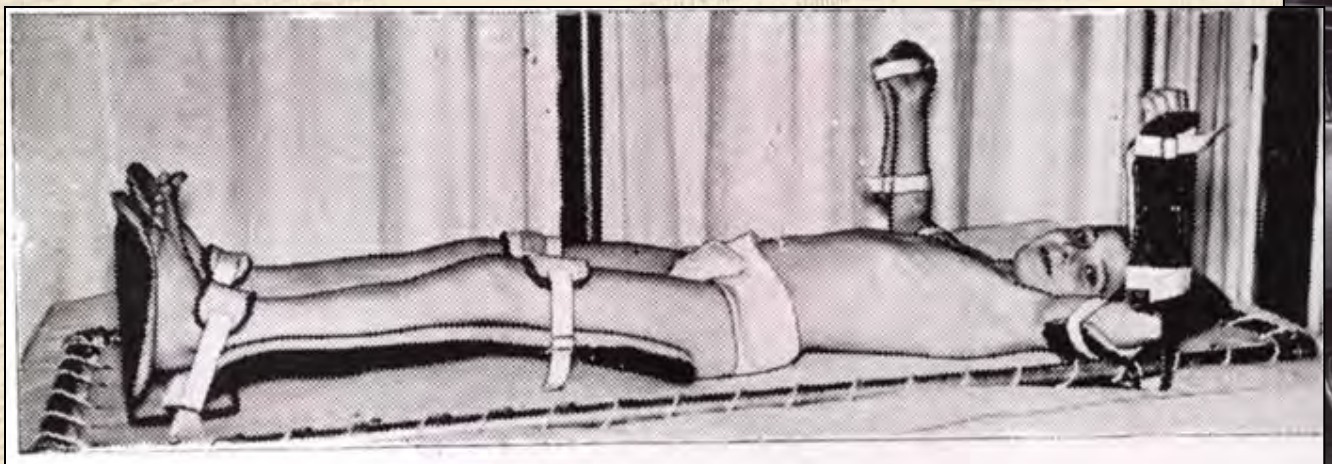
This was one of the original Drinker machines

- **April 29, 1938: Opening of a presentation to the Toronto Rotary Club by Joseph Bower, Superintendent, Hospital for Sick Children**

An iron lung built at HSC in 1937 has been restored and is the centerpiece of an exhibit I guest-curated on the history of vaccines at the Museum of Health Care in Kingston. An online version of this exhibit can be seen at:

http://www.museumofhealthcare.ca/explore/exhibits/vaccinations/polio.html

Polio Treatment, 1930s



The Provincial Department of Health supplied all Poliomyelitis patients suffering from paralysis with splints and frames designed and built in our workshop.

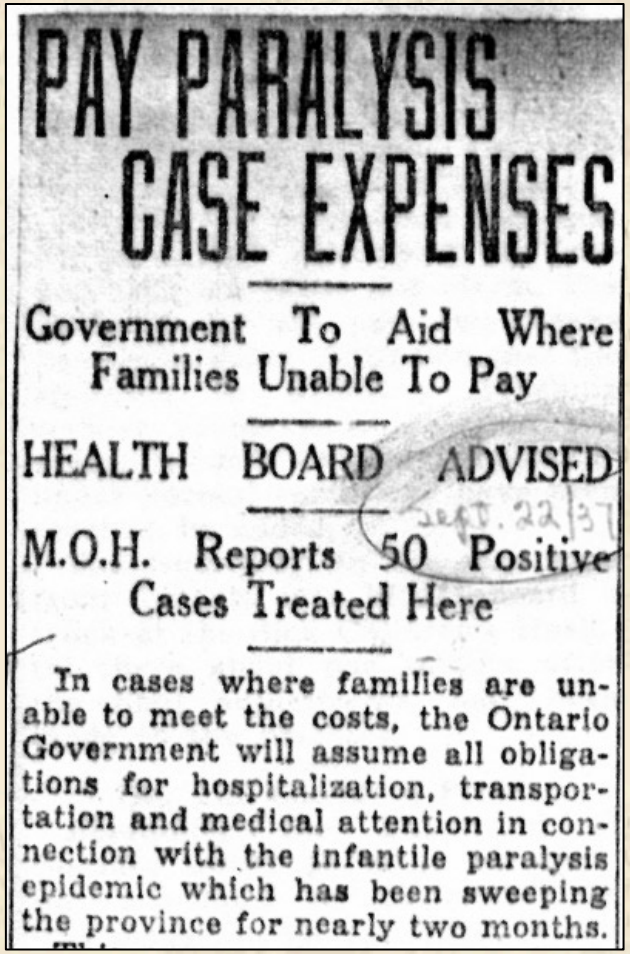
Hospital for Sick Children Archives

- Managing the crippling effects of polio was a major challenge
- Strict immobility was the standard of medicine until the early 1940s

Managing the Crippling Costs of Paralysis

- In Ontario, the severity of the 1937 epidemic prompted the provincial government to establish a distinctive program to cover the costs of treatment and hospitalization in selected hospitals, which continued into the early 1950s.

Hospital for Sick Children Archives



PAY PARALYSIS CASE EXPENSES

Government To Aid Where Families Unable To Pay

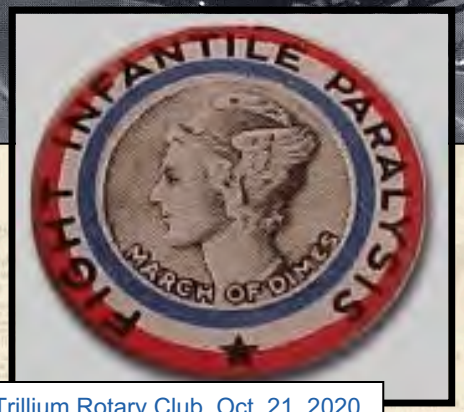
HEALTH BOARD ADVISED

M.O.H. Reports 50 Positive Cases Treated Here

In cases where families are unable to meet the costs, the Ontario Government will assume all obligations for hospitalization, transportation and medical attention in connection with the infantile paralysis epidemic which has been sweeping the province for nearly two months.

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.

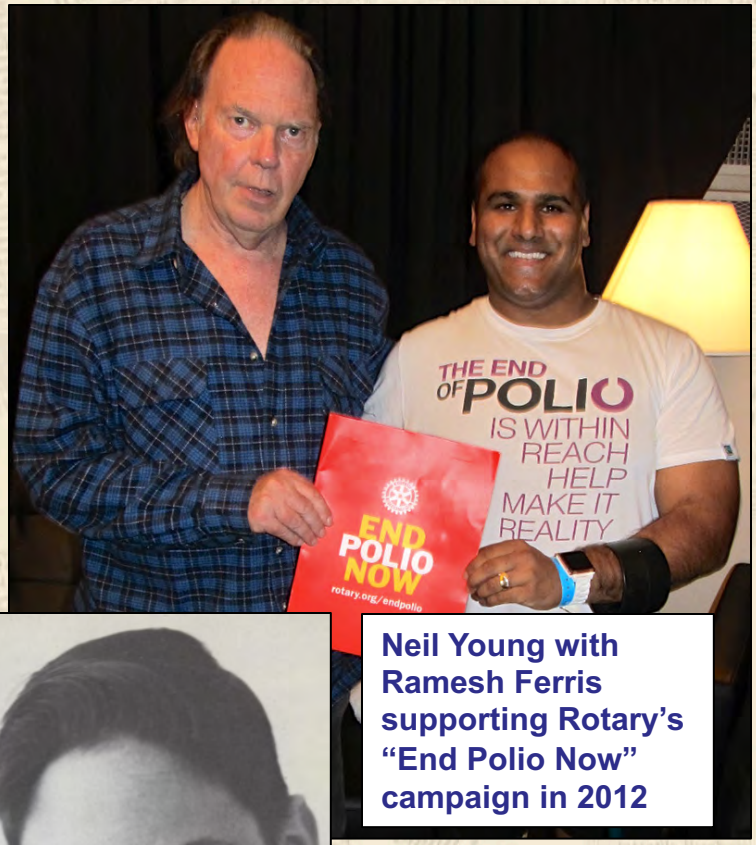
- Worsening polio epidemics, especially after WWII, put a huge strain on the Canadian public health and hospital infrastructure
- The ability of provincial governments to pay for specialized polio care services became acute
- In 1948 federal health minister, Paul Martin, introduced annual Federal Health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

Polio in Ontario, 1951: The Neil Young Case



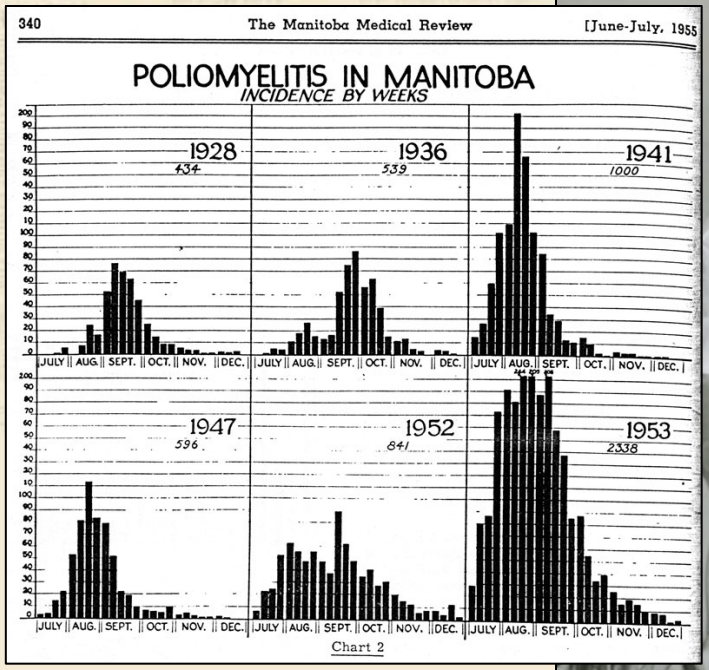
Neil Young with Ramesh Ferris supporting Rotary's "End Polio Now" campaign in 2012

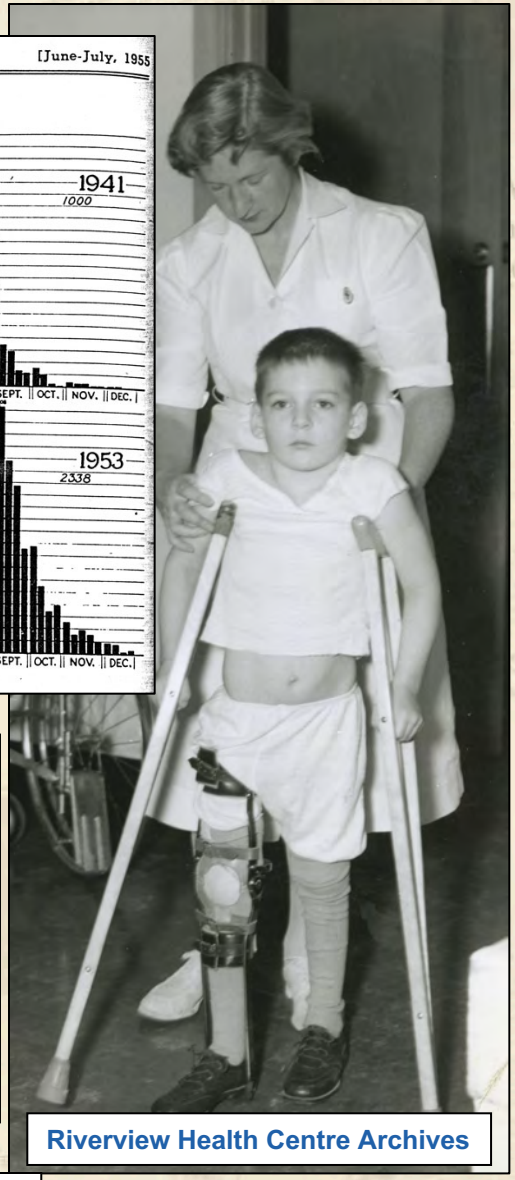
- "Polio is the worst cold there is," was how 5-year-old Neil Young summed up his polio experience in Omemee, Ontario during the province's major outbreak in 1951
- Neil's polio experience was recorded by his father, writer Scott Young, which I used as the focus of an undergraduate research paper in 1988 at the University of Western Ontario.

- In 1952, Joni Mitchell, was was stricken by polio when she was 9 years old and lived in Saskatoon

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."

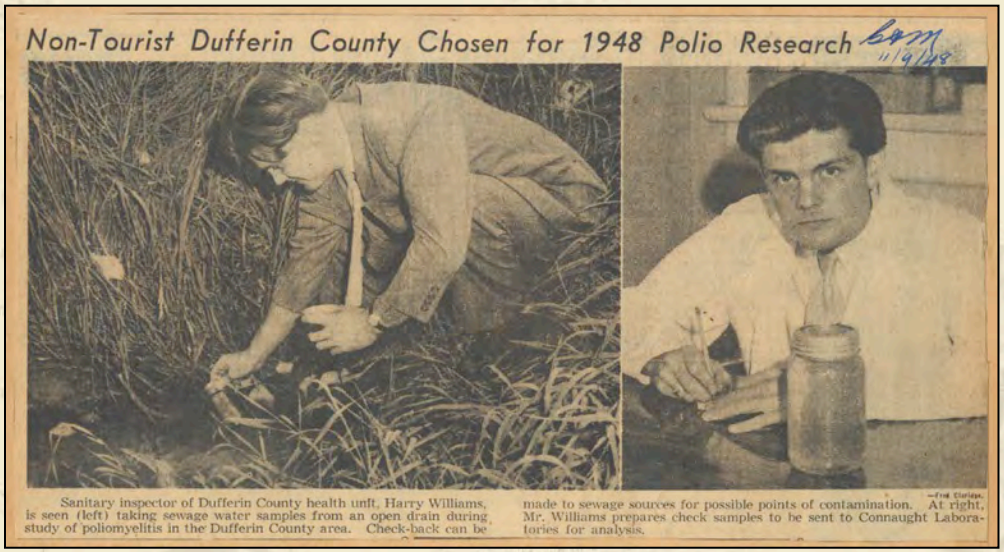
The preparation and distribution of biological and related products will be continued.

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 & 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**



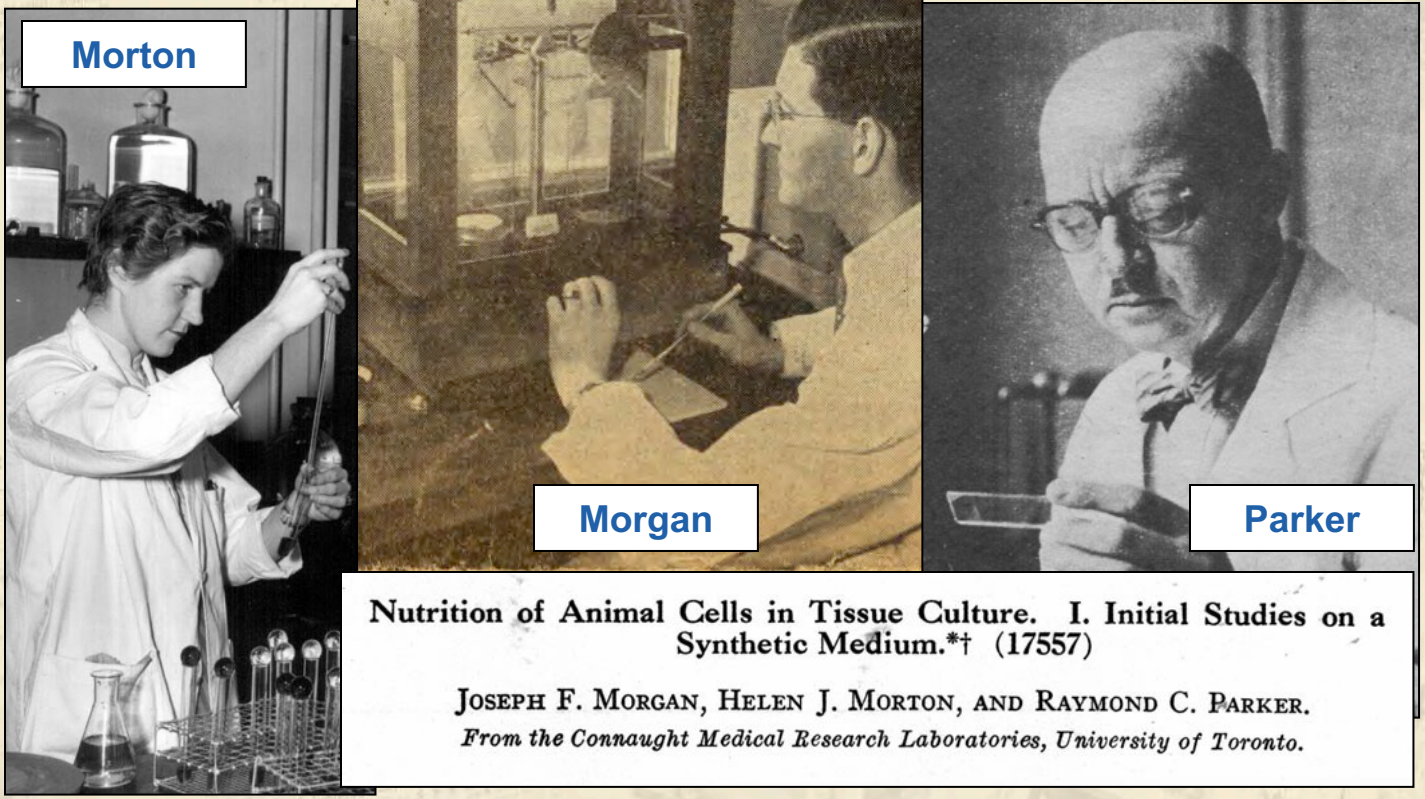
Non-Tourist Dufferin County Chosen for 1948 Polio Research

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.

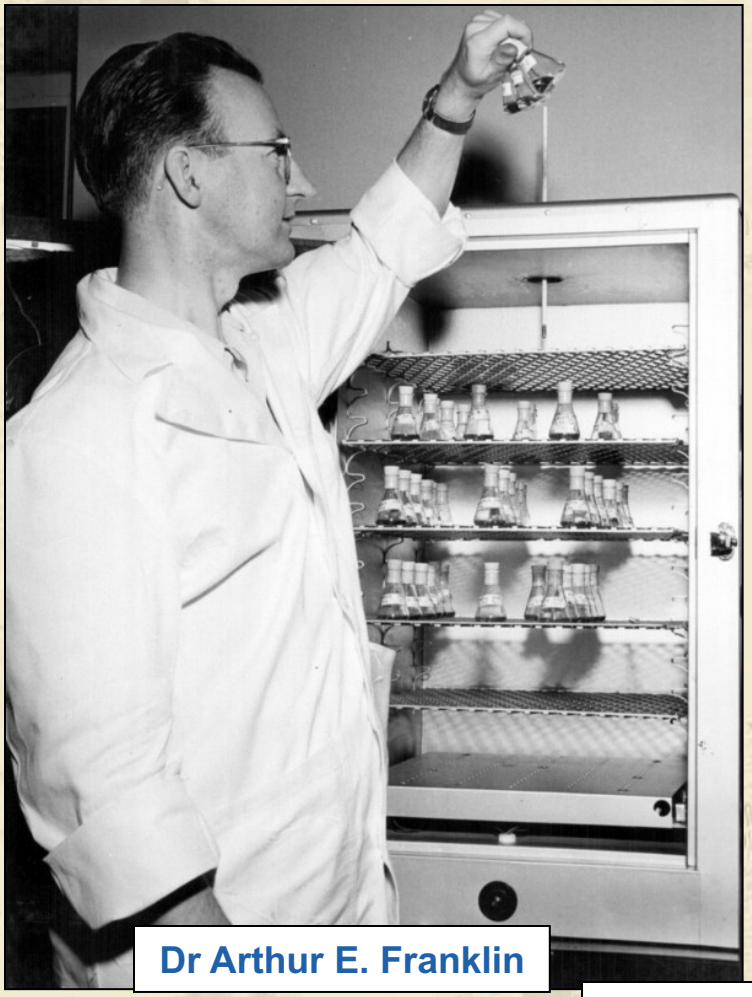
Research Grant
Ottawa Aids Doctor Study Polio Cause

"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



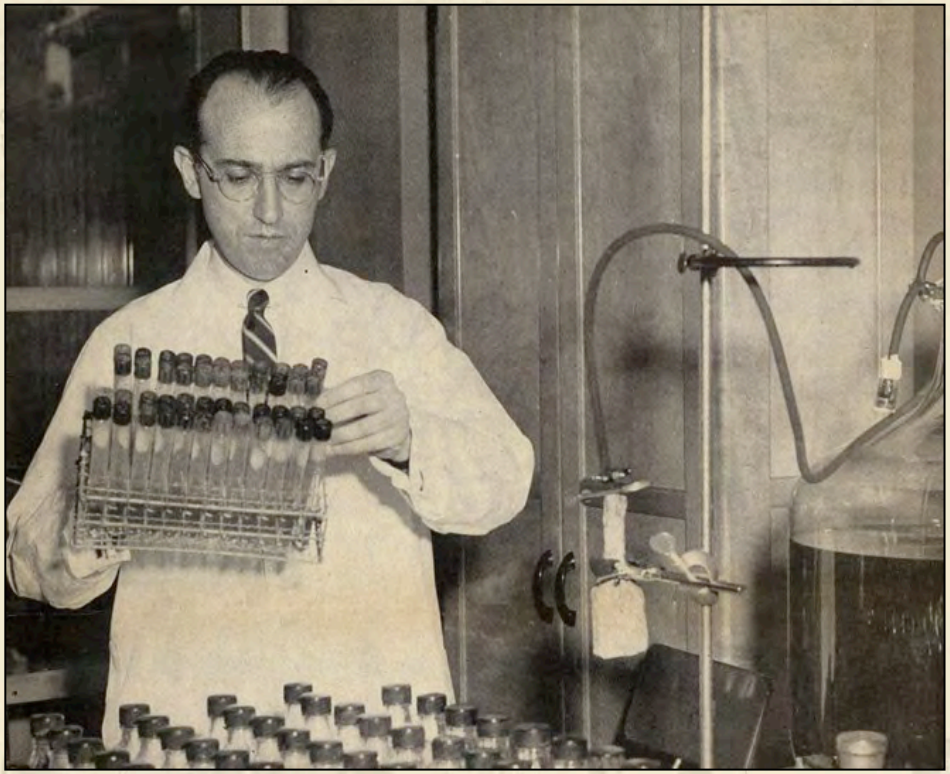
Dr Arthur E. Franklin

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**



"The Toronto Method"
Facilitating Large Scale Poliovirus Production

- **1952 - Recognizing Connaught's experience in developing large scale vaccine production technologies, the NFIP financed a major pilot project to cultivate poliovirus in large quantities**
- **1953 - Building on her experience with 'deep culture' pertussis and other vaccines, Dr. Leone N. Farrell developed a method to produce poliovirus fluids on a large scale using Medium 199 in large bottles incubated on special rocking machines**

Sanofi Pasteur Canada Archives

Dr L.N. Farrell and prototype "Toronto Method" bottle rocking machine, 1953

Salk Polio Vaccine Field Trial: *Connaught Supplies Poliovirus Fluids*

- **July 1953 - Encouraged by Salk's progress and Connaught's "Toronto Method," 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.**
- **1953-54 - Connaught produced over 3,000 litres of poliovirus fluids for the U.S. trial that were shipped to two U.S. pharmaceutical firms by station wagon for inactivation and processing into the finished vaccine**
- **1954-55 - Connaught then focused on full preparation of vaccine for eventual Canadian use**

Sanofi Pasteur Canada Archives

- **At the current point in the COVID-19 pandemic, the development of potential COVID-19 vaccines has yet to reach an equivalent stage**

COVID-19 Vaccine Development

- **However, globally, there are an unprecedented number of COVID-19 vaccine candidates in varying stages of development**

How close are we to a vaccine for COVID-19?

A look at the different vaccines under development, and where they are in the pipeline

Emily Chung
CBC News • Posted: July 17, 2020 • Last updated: July 21, 2020

An effective vaccine against the coronavirus that causes COVID-19 is everyone's hope for a real return to normal life. More than 100 teams of scientists around the world are working to develop and test a vaccine against the virus SARS-CoV-2 as quickly as possible. They're employing a huge variety of strategies and technologies, including some that have never been used in an approved vaccine before.

"It's a very fascinating and kind of impressive effort," said Dr. Lynora Saxinger, an infectious disease specialist at the at the University of Alberta in Edmonton.

"It's absolutely crucial."

Even in countries that have had a devastating number of deaths from COVID-19, there is nowhere close to a level of "herd immunity" within the population preventing the disease from spreading exponentially if we go back to normal levels of social interaction, she said.

Total number of vaccine candidates

Pre-clinical evaluation	Phase 1	Phase 2	Phase 3	Approved
142	24	15	4	0

COVID-19 Vaccine Development

- **Of these, there are at least 7 COVID-19 vaccine candidates in development with significant Canadian involvement**

Lots of Canadian candidates

As mentioned earlier, Canada currently has at least seven vaccine candidates under development, with Canadian involvement in the development of some others. Saxinger said that maximizes the impact of the expertise we have, from work on diseases such as Ebola, SARS and MERS.

Developing and producing vaccines here at home could also give Canada more control over when Canadians can get the vaccine, and who can be prioritized, given that there will likely be huge demand for the vaccine from countries around the world.

"I don't think we want to rely on others, hoping they will remember us," said Volker Gerdts, director and CEO of VIDO-Intervac at the University of Saskatchewan in Saskatoon, one of the Canadian teams developing a SARS-CoV-2 vaccine. The current race for a vaccine underscores why it's important for countries like Canada to be self-sufficient, he added.

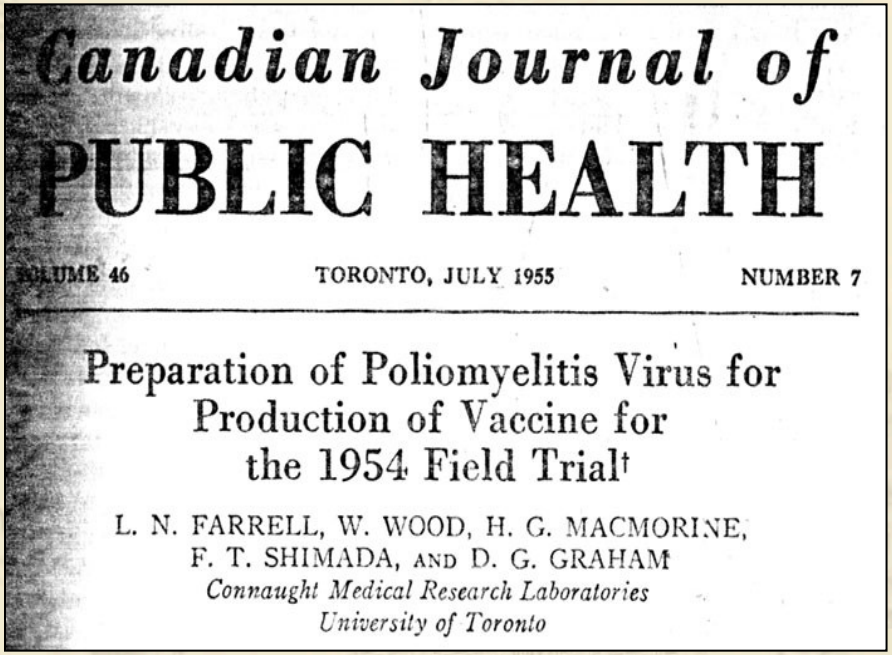
Canadian vaccine candidates

Developer	Pre-clinical evaluation	Phase 1	Phase 2	Phase 3	Approved
Medicago/GSK	Virus-like particles				
Mediphage Bioceuticals/University of Waterloo	DNA				
University of Manitoba	Non-replicating viral vector				
VIDO-InterVac, University of Saskatchewan	Protein subunit				
University of Alberta	Protein subunit				
Western University	Replicating viral vector				
Entos Pharmaceuticals	DNA				
IMV Inc.	Protein subunit				

- **In 1953-54, there was one polio vaccine candidate, the development, testing and production of which had quite considerable Canadian involvement…**

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

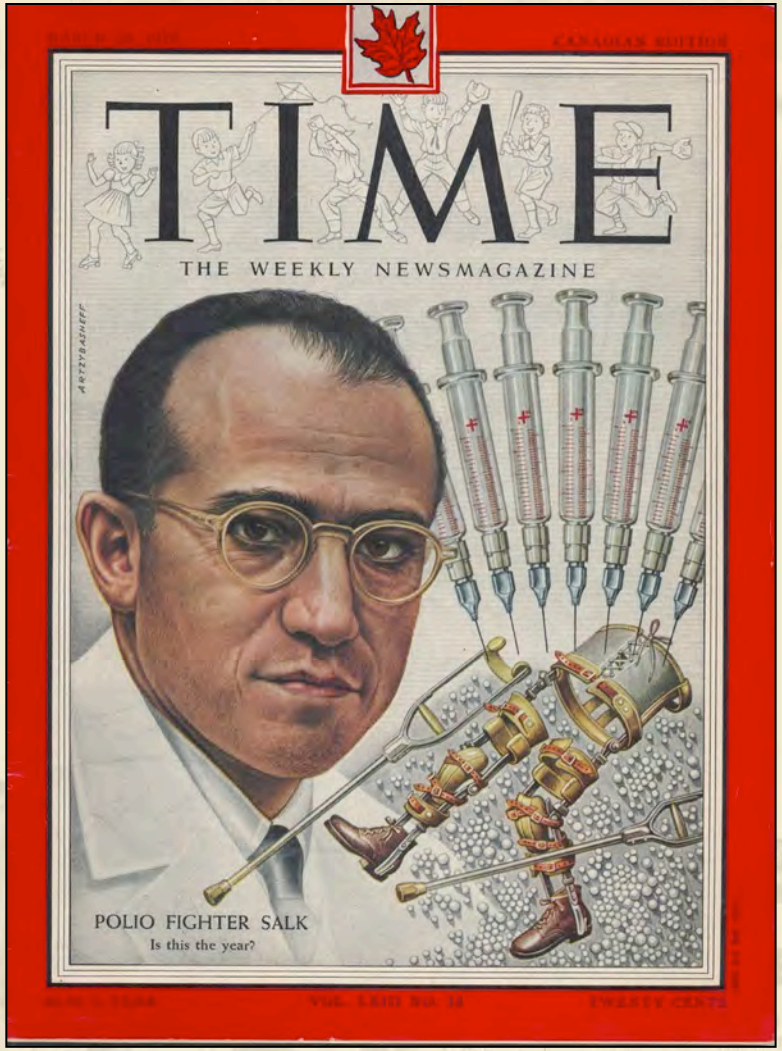


Canadian Journal of
PUBLIC HEALTH

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



Canada prepares for a National Salk Vaccine Trial

- **Meanwhile, the federal and provincial governments planned an all-Canadian observed-controlled trial of Connaught's Salk vaccine, set to start in April 1955, regardless of U.S. results.**

Sanofi Pasteur Canada Archives

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

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

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

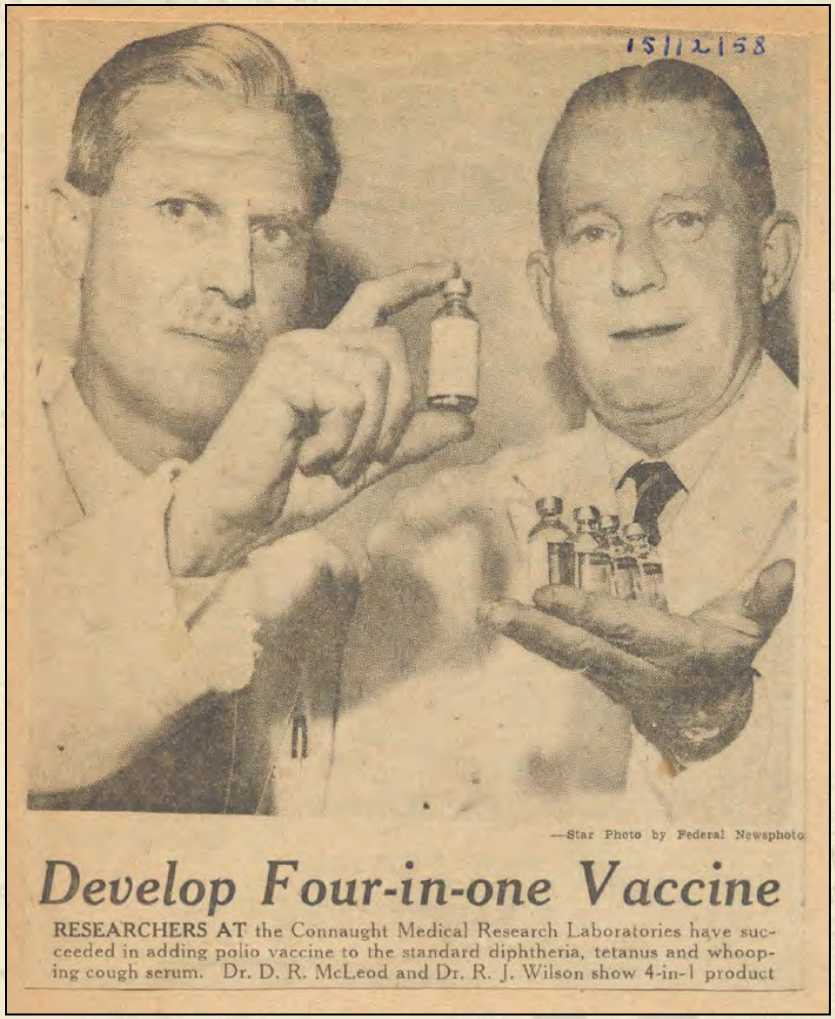
A second contribution, he said, was the discovery by J. F. Morgan, H. J. Morton and R. C. [illegible] of a satisfactory method

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

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**

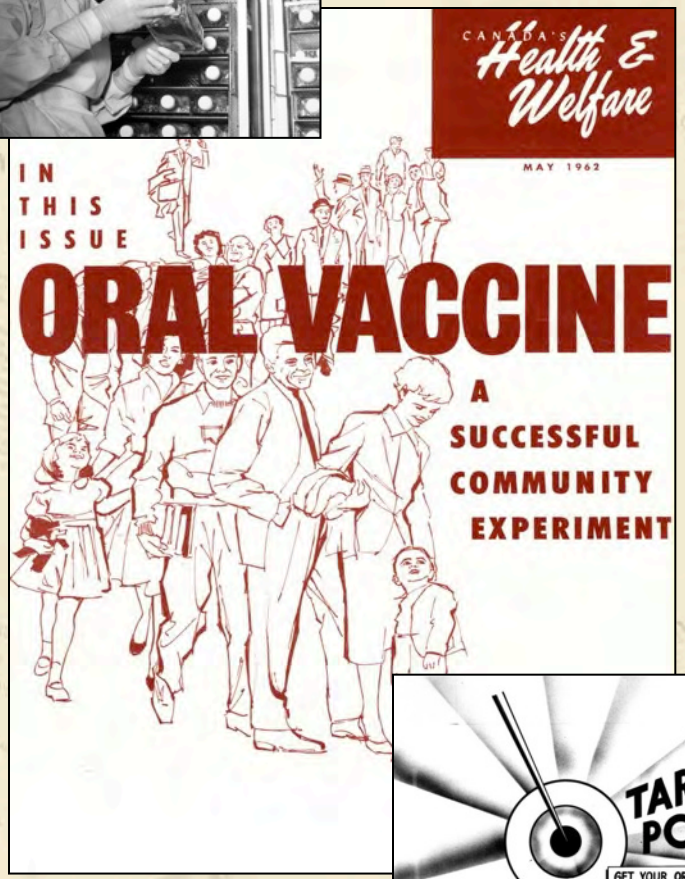
- **1955-62 - Canadian polio incidence falls dramatically, although not without some significant polio outbreaks where immunization rates among adults and young children were low**

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 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

Connaught & Polio Vaccines:
Leadership in Oral Polio Vaccine Development

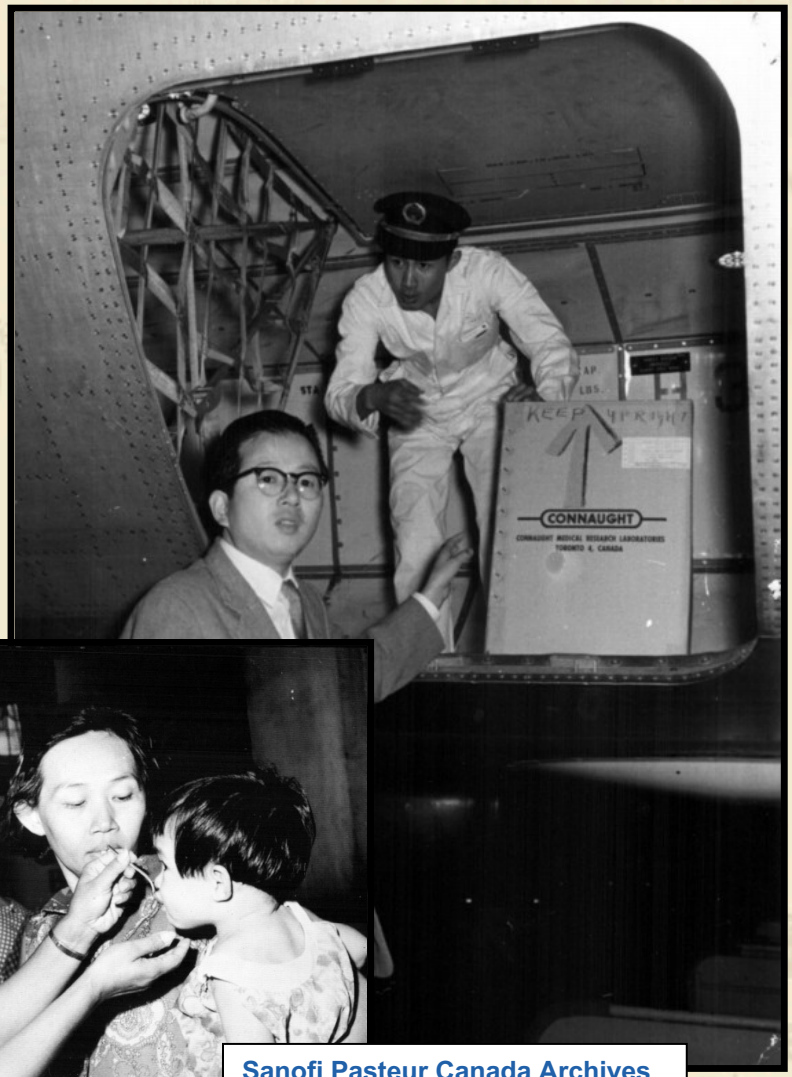


- 1959 - Seed pools were provided by Dr Albert B. Sabin of the University of Cincinnati
- 1960-61 - OPV "Field Demonstrations" were conducted in Nova Scotia, Quebec and Saskatchewan
- March 1962 – Connaught's trivalent Sabin Oral Polio Vaccine licensed in Canada

Sanofi Pasteur Canada Archives

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

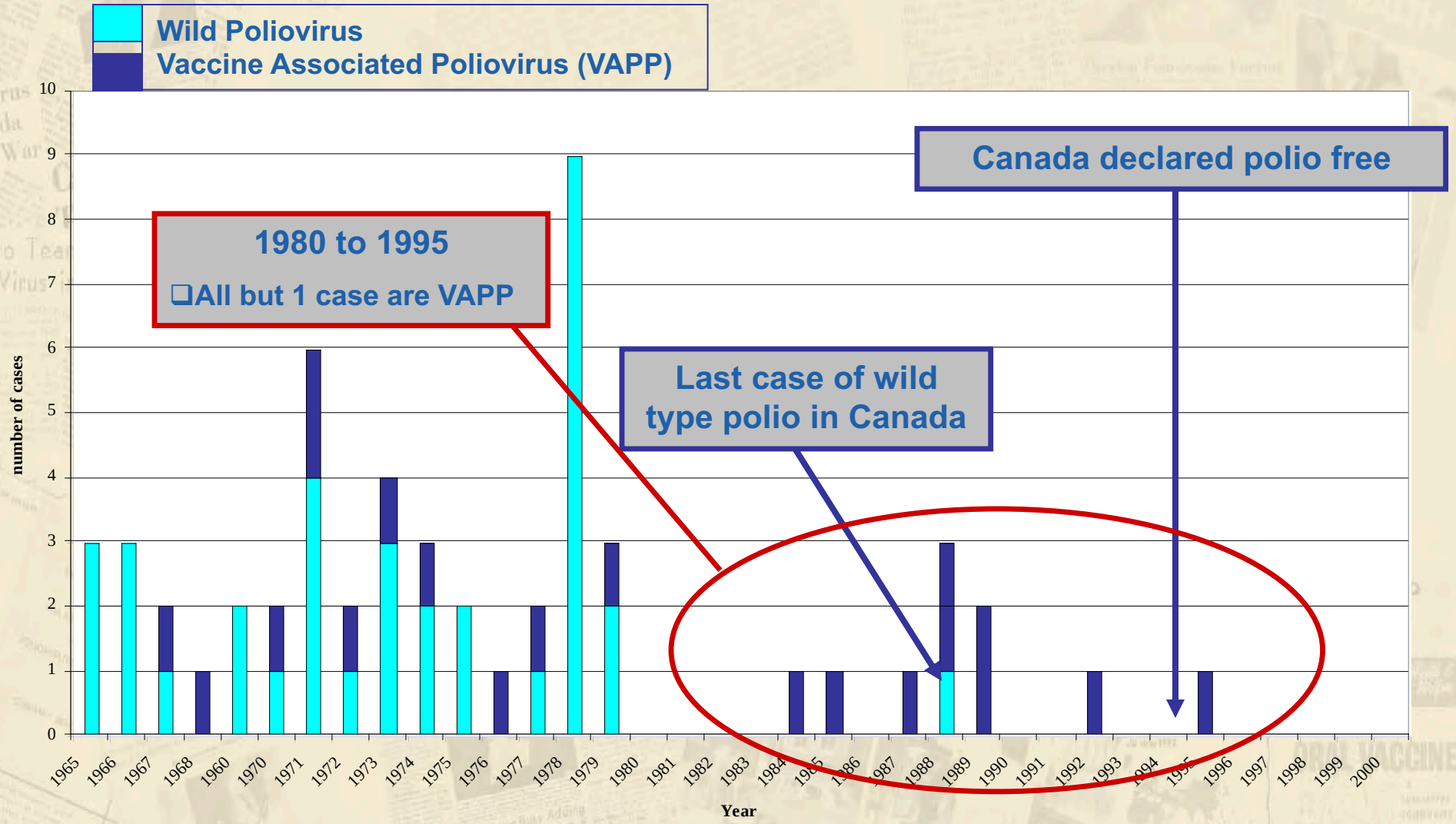
The story of how Canada helped to check a serious outbreak of polio in Japan during the late summer of 1961 was

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

The results were so spectacular that the Japanese Gov-

Polio Epidemiology in Canada – 1965 to 2000

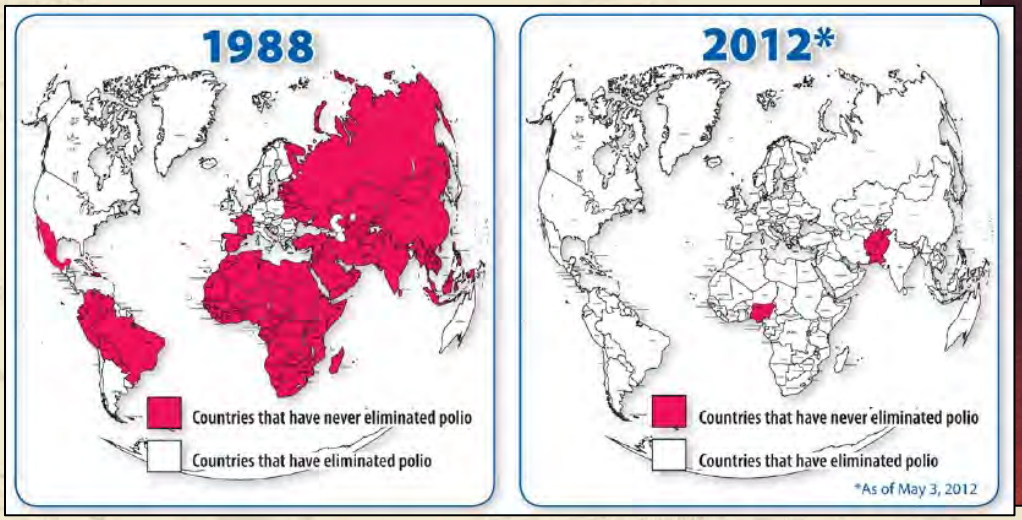
Wild Poliovirus, Imported outbreaks and VAPP Polio Cases



Polio's Persistence

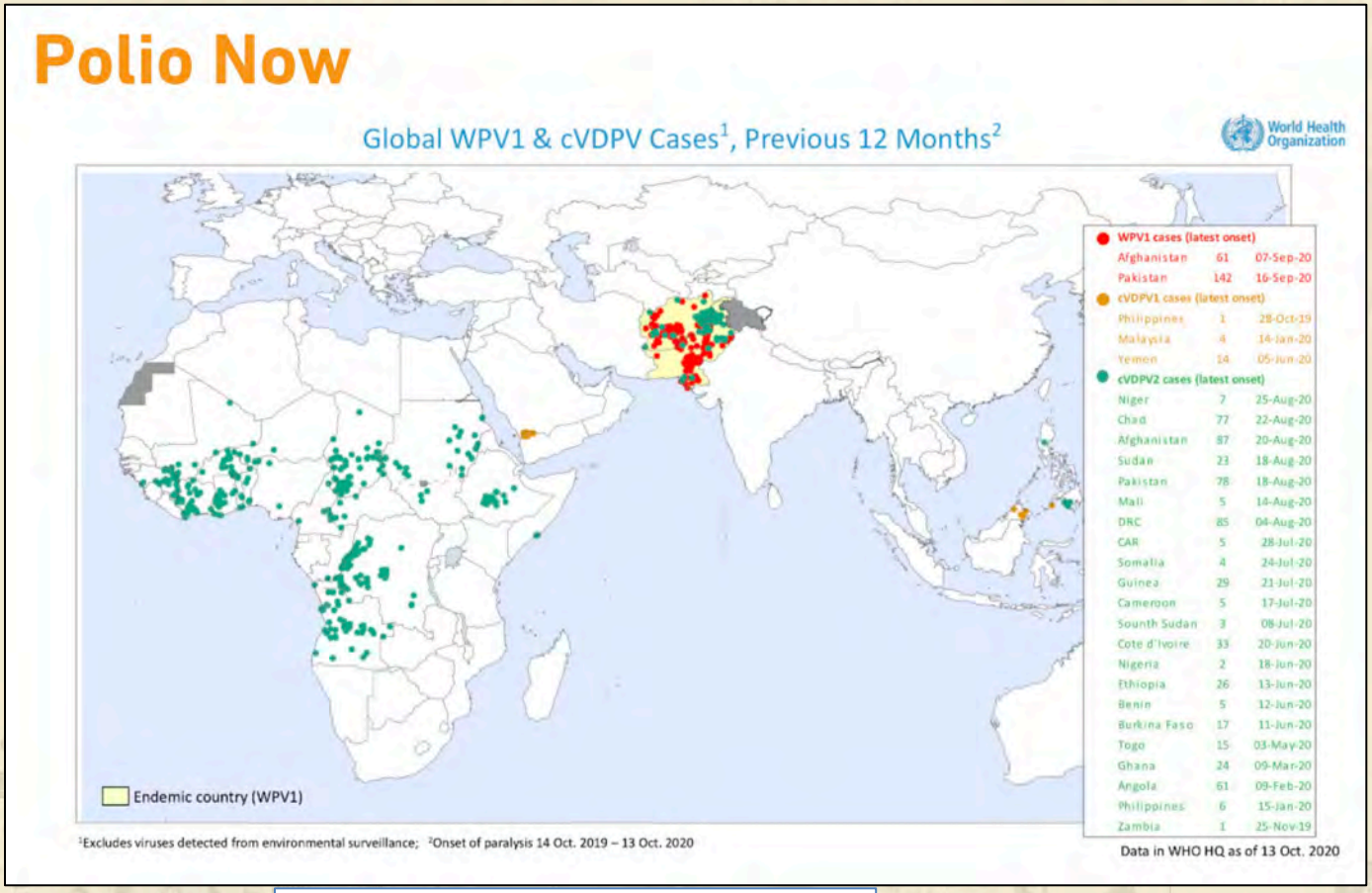
- 1988 – Despite wide international use of both types of polio vaccine, the disease remained endemic in most of the world, with some 300,000 cases per year.

- 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.



Current Global Polio Incidence (latest statistics)

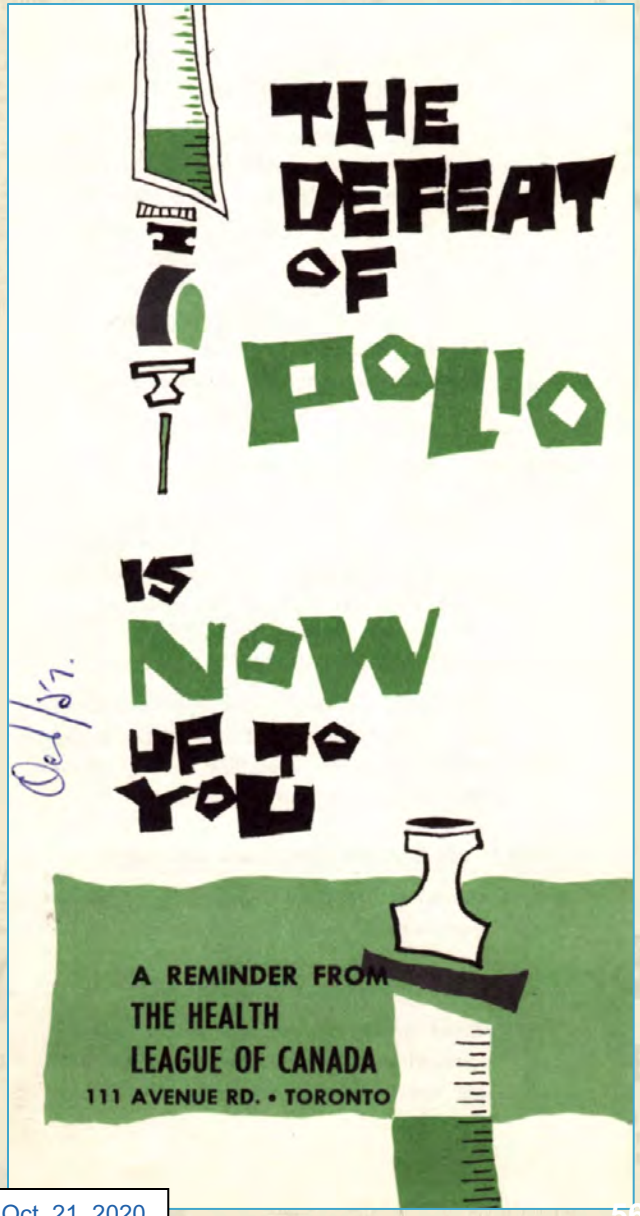
- As wild poliovirus is eliminated, new challenges persist, such as circulating live vaccine virus and the risks of its reversion to virulence
- Today, more polio cases due to cVDPV than wild poliovirus



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

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."



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)**